

**Menstrual attitudes and distress: A multidimensional approach to
cross-cultural research**

**Thesis submitted in accordance with the requirements of the University
of Liverpool for the degree of Doctor of Philosophy by Angela Dawn
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Declaration

This thesis is the result of my own work. The material contained in the thesis has not been presented, nor is currently being presented, either wholly or in part for any other degree or other qualification.

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Table of Contents

Declaration	iii
Acknowledgements	iv
Table of contents	v
List of tables	viii
List of figures	xi
Abstract	xii
List of abbreviations	xiii
Study One	1
1.1 Preface	1
1.2 Introduction	1
1.2.1 Description of the thesis layout and background	1
1.2.2 Menstrual cycle terminology	4
1.3 Study One literature review	5
1.3.1 Menstrual cycle symptoms and characteristics: A number of varieties and explanations	5
1.3.2 History and definition of menstrual-related conditions and problems with diagnosis	9
1.3.3 Issues of measurement: Problems with methodology in menstrual cycle research	11
1.3.4 Anxiety and depression in the menstrual cycle	17
1.3.5 Metatheoretical approaches to the menstrual cycle	19
1.3.6 How menstrual attitudes and menstrual symptoms work together	32
1.3.7 Definitions of culture and cross-cultural psychology	33
1.3.8 Exploring themes in cross-cultural psychology: : <i>Emic/Etic</i> and collectivist/individuals dimensions and psychological distress research	36
1.3.9 Culture, psychology and religion	38
1.3.10 Cultural versus cross-cultural psychology literature	39
1.3.11 Cross-cultural differences between nationalities: Attitudes and symptom reporting	40
1.3.12 Cross-cultural differences between religions: Attitudes and symptom reporting	44
1.3.13 Cross-cultural differences between ethnicities	46
1.3.14 Menstruation and psychological distress in a cross-cultural context	47
1.3.15 Conclusions	48
1.4 Study One aims, objectives and hypotheses	51
1.5 Study One methods	52
1.5.1 Rationale for culture choice	52
1.5.2 Measures	53
1.5.3 Pilot study	58
1.5.4 Participants	60
1.5.5 Procedure	61
1.5.6 Data analysis	63
1.5.7 Ethics approval	63
1.6 Study One results	65
1.6.1 Description of the respondents: Socio-demographic profile of the sample	65
1.6.2 Reproductive status	67
1.6.3 Anxiety and depression levels	70
1.6.4 General health	71
1.6.5 Religious converts	71
1.6.6 Description of the respondents to the religiosity questionnaire	72
1.6.7 ANOVA results for exploratory analysis: Religion versus religiosity	78

1.6.8	ANOVA results for hypothesis 1: Cultures will vary significantly in menstrual attitudes and distress	82
1.6.9	ANOVA results for exploratory analysis: Anxiety/Depression as a 3 rd variable	86
1.6.10	ANOVA results for exploratory analysis: Child status as a 3 rd variable	104
1.6.11	Multivariate linear regression analyses: MAQ and MDQ factors as outcome variables	113
1.6.12	Pearson product-moment correlation results for hypothesis 2: Menstrual attitudes and symptoms will be correlated	121
1.7	Study One discussion	123
1.7.1	Summary of key results	123
1.7.2	Demographic and sampling background	123
1.7.3	Inclusion/Exclusion criteria	128
1.7.4	Sampling characteristics	128
1.7.5	The role of religiosity in describing the sample	129
1.7.6	Exploratory analysis: Religion versus religiosity – is there a difference?	132
1.7.7	Hypothesis 1: Cultures will vary significantly in menstrual attitudes and distress	134
1.7.8	Exploratory analyses: Anxiety as a third variable	140
1.7.9	Exploratory analyses: Child status as a third variable	141
1.7.10	Multivariate linear regression analyses: MAQ and MDQ factors as outcome variables	143
1.7.11	Hypothesis 2: Menstrual attitudes and symptoms will be correlated	144
1.7.12	Implications	145
1.7.13	Methodological issues, strengths, limitations, and alternative explanations	150
1.7.14	Implications for future research	156
1.7.15	Conclusions	157
Study 2		159
2.1	Study Two introduction	159
2.2	Study Two literature review	160
2.2.1	Alexithymia as a concept	160
2.2.2	Alexithymia cross-culturally	160
2.2.3	Alexithymia and anxiety/depression	161
2.2.4	Alexithymia, somatisation, mood and menstruation	162
2.2.5	Conclusions	162
2.3	Study Two aims, objectives and hypotheses	163
2.4	Study Two methods	165
2.4.1	Measures	165
2.4.2	Participants	166
2.4.3	Procedure	166
2.4.4	Sample size calculation	168
2.4.5	Data analysis	168
2.4.6	Ethics approval	168
2.5	Study Two results	170
2.5.1	Description of the respondents: Socio-demographic profile of the sample	170
2.5.2	Reproductive status	172
2.5.3	Anxiety and depression levels	174
2.5.4	General health	175
2.5.5	Religious converts	175
2.5.6	ANOVA results for hypothesis 2: Replication of Study One	176
2.5.7	<i>Post hoc</i> sample size calculation: Replication of Study One	183
2.5.8	Student's t-test results for hypothesis 3: Protestants will have higher alexithymia scores than Catholics	183
2.5.9	<i>Post hoc</i> sample size calculation: Significant differences in alexithymia levels between religions	184
2.5.10	Student's t-test results for hypothesis 4: Alexithymic individual will report higher levels of menstrual cycle symptoms	184

2.5.11	<i>Post hoc</i> sample size calculations: Significant differences in MDQ reporting between alexithymic and non-alexithymic groups	184
2.5.12	Pearson product-moment correlation results for exploratory analysis: Correlation between anxiety and alexithymia, and correlation between depression and alexithymia	185
2.5.13	Hierarchical linear regression for exploratory analysis: Modelling MDQ factors with anxiety, alexithymia, and the interactive term anxiety*alexithymia as independent variables	185
2.6	Study Two discussion	191
2.6.1	Summary of key results	191
2.6.2	Demographic and sampling background	191
2.6.3	Demographic differences and sampling characteristics between the Study One and Study Two samples	193
2.6.4	Hypothesis 2: Replication of Study One	197
2.6.5	Hypothesis 3: Mean differences in alexithymia levels	202
2.6.6	Hypothesis 4: Alexithymia is related to menstrual cycle symptom reporting	206
2.6.7	Exploratory analysis: Correlation between anxiety and alexithymia and correlation between depression and alexithymia	207
2.6.8	Hierarchical linear regression: Anxiety and alexithymia as independent predictors of menstrual cycle symptom reporting	208
2.6.9	Methodological issues, strengths and limitations	210
2.6.10	Conclusions	211
	Overall Conclusions	213
3.1	Summary of overall key results	213
3.2	Overall implications	213
3.2.1	Implications for future research	217
3.2.2	Implications for practice	220
3.3	Final summary	222
	References	224
Appendices		
	Appendix 1	255
	Appendix 2	274
	Appendix 3	276
	Appendix 4	291

List of Tables

Study One

Table 1: Factors showing trends between cultural groups for the MAQ and MDQ and their effect sizes _____	61
Table 2: Number of women having full-time, part-time and no work for the national/religious groups _____	67
Table 3: Number of women converting between religions _____	72
Table 4: Answers to the religiosity questionnaire across religious and national groups by percentage: Church attendance _____	74
Table 5: Answers to the religiosity questionnaire across religious and national groups by percentage: Religious activities in home and importance of religion _____	75
Table 6: Answers to the religiosity questionnaire across religious and national groups by percentage: Current religious beliefs and religious influences _____	76
Table 7: Means, standard deviations and ANOVA test results for the MAQ with religion and religiosity as independent variables _____	80
Table 8: Means, standard deviations and ANOVA test results for the MDQ with religion and religiosity as independent variables _____	81
Table 9: Means, standard deviations and ANOVA test results for the MAQ with nationality and religion as independent variables _____	84
Table 10: Means, standard deviations and ANOVA test results for the MDQ with nationality and religion as independent variables _____	85
Table 11: Anxiety caseness means, standard deviations and ANOVA main effect results for the MAQ factors _____	88
Table 12: Anxiety caseness means, standard deviations and ANOVA main effect results for the MDQ factors _____	89
Table 13: Means, standard deviations and ANOVA 2-way interaction results for the MAQ factors with nationality, religion and anxiety caseness as independent variables _____	90
Table 14: Means, standard deviations and ANOVA 2-way interaction results for the MDQ factors with nationality, religion and anxiety caseness as independent variables _____	91
Table 15: Bonferroni "t" follow up test significance for the interaction between nationality and anxiety caseness for the MDQ factor Pain _____	93
Table 16: Bonferroni "t" follow up test significance for the interaction between nationality and anxiety caseness for the MDQ factor Autonomic Reactions _____	94
Table 17: Bonferroni "t" follow up test significance for the interaction between nationality and anxiety caseness for the MDQ factor Negative Affect _____	95
Table 18: Bonferroni "t" follow up test significance for the interaction between nationality and anxiety caseness for the MDQ factor Arousal _____	96
Table 19: Bonferroni "t" follow up test significance for the interaction between religion and anxiety caseness for the MAQ factor Menstruation as a Natural Event _____	97

Table 20: Bonferroni "t" follow up test significance for the interaction between religion and anxiety caseness for the MDQ factor Pain _____	99
Table 21: Bonferroni "t" follow up test significance for the interaction between religion and anxiety caseness for the MDQ factor Autonomic Reactions _____	100
Table 22: Bonferroni "t" follow up test significance for the interaction between religion and anxiety caseness for the MDQ factor Impaired Concentration _____	101
Table 23: Bonferroni "t" follow up test significance for the interaction between religion and anxiety caseness for the MDQ factor Behaviour Change _____	102
Table 24: Bonferroni "t" follow up test significance for the interaction between religion and anxiety caseness for the MDQ factor Control _____	103
Table 25: Child status means, standard deviations and ANOVA main effect results for the MAQ factors _____	105
Table 26: Child status means, standard deviations and ANOVA main effect results for the MDQ factors _____	106
Table 27: Bonferroni "t" follow up test significance for the interaction between nationality and child status for the MAQ factor Menstruation as a Debilitating Event _____	108
Table 28: Bonferroni "t" follow up test significance for the interaction between nationality and child status for the MAQ factor Menstruation as a Bothersome Event _____	109
Table 29: Means, standard deviations and ANOVA 2-way interaction results for the MAQ factors with nationality, religion and child status as independent variables _____	111
Table 30: Means, standard deviations and ANOVA 2-way interaction results for the MDQ factors with nationality, religion and child status as independent variables _____	112
Table 31: Multiple linear regression analysis for the MAQ factor Menstruation as a Debilitating Event _____	114
Table 32: Multiple linear regression analysis for the MAQ factor Menstruation as a Bothersome Event _____	114
Table 33: Multiple linear regression analysis for the MAQ factor Menstruation as a Natural Event _____	115
Table 34: Multiple linear regression analysis for the MAQ factor Anticipation and the Prediction of the Onset of Menstruation _____	115
Table 35: Multiple linear regression analysis for the MAQ factor The Denial of Any Effect of Menstruation _____	116
Table 36: Multiple linear regression analysis for the MDQ factor Pain _____	116
Table 37: Multiple linear regression analysis for the MDQ factor Water Retention _____	117
Table 38: Multiple linear regression analysis for the MDQ factor Autonomic Reactions _____	117
Table 39: Multiple linear regression analysis for the MDQ factor Negative Affect _____	118
Table 40: Multiple linear regression analysis for the MDQ factor Impaired Concentration _____	118

Table 41: Multiple linear regression analysis for the MDQ factor Behaviour Change _____	119
Table 42: Multiple linear regression analysis for the MDQ factor Arousal _____	119
Table 43: Multiple linear regression analysis for the MDQ factor Control _____	120
Table 44: MAQ and MDQ factors correlation coefficients _____	122
Table 45: Means and standard deviations for MAQ scores for this and other comparable research _____	138
Table 46: Means and standard deviations for MDQ scores for this and other comparable research _____	139

Study Two

Table 47: Means, standard deviations and ANOVA test results for main effects for the MDQ factors with religion and anxiety caseness as independent variables _____	181
Table 48: Means, standard deviations and ANOVA 2-way interaction results for the MDQ factors with religion and anxiety caseness as independent variables _____	182
Table 49: Simple linear regression analysis results for the MDQ factors with the interaction between anxiety and alexithymia as an independent variable _____	187
Table 50: Steps included in the hierarchical regression analysis with the MDQ factors as outcome variables _____	187
Table 51: Multivariate analysis results for the MDQ factor Pain _____	188
Table 52: Multivariate analysis results for the MDQ factor Water Retention _____	188
Table 53: Multivariate analysis results for the MDQ factor Autonomic Reactions _____	189
Table 54: Multivariate analysis results for the MDQ factor Negative Affect _____	189
Table 55: Multivariate analysis results for the MDQ factor Impaired Concentration _____	189
Table 56: Multivariate analysis results for the MDQ factor Behaviour Change _____	190
Table 57: Multivariate analysis results for the MDQ factor Arousal _____	190
Table 58: Multivariate analysis results for the MDQ factor Control _____	190

List of figures

Study One

Figure 1: Interaction between nationality and anxiety caseness for the MDQ factor Pain _____	93
Figure 2: Interaction between nationality and anxiety caseness for the MDQ factor Autonomic Reactions _____	94
Figure 3: Interaction between nationality and anxiety caseness for the MDQ factor Negative Affect _____	95
Figure 4: Interaction between nationality and anxiety caseness for the MDQ factor Arousal _____	96
Figure 5: Interaction between religion and anxiety caseness for the MAQ factor Menstruation as a Natural Event _____	97
Figure 6: Interaction between religion and anxiety caseness for the MDQ factor Pain _____	99
Figure 7: Interaction between religion and anxiety caseness for the MDQ factor Autonomic Reactions _____	100
Figure 8: Interaction between religion and anxiety caseness for the MDQ factor Impaired Concentration _____	101
Figure 9: Interaction between religion and anxiety caseness for the MDQ factor Behaviour Change _____	102
Figure 10: Interaction between religion and anxiety caseness for the MDQ factor Control _____	103
Figure 11: Interaction between nationality and child status for the MAQ factor Menstruation as a Debilitating Event _____	108
Figure 12: Interaction between nationality and child status for the MAQ factor Menstruation as a Bothersome Event _____	109
Figure 13: Interaction between religion and child status for the MDQ factor Arousal _____	110

Study Two

Figure 14: Interaction between religion and anxiety caseness for the MDQ factor Pain _____	178
Figure 15: Interaction between religion and anxiety caseness for the MDQ factor Autonomic Reactions _____	178
Figure 16: Interaction between religion and anxiety caseness for the MDQ factor Impaired Concentration _____	179
Figure 17: Interaction between religion and anxiety caseness for the MDQ factor Behaviour Change _____	179
Figure 18: Interaction between religion and anxiety caseness for the MDQ factor Control _____	180

Abstract

Introduction: Much of the cross-cultural literature in menstrual cycle attitude and symptom reporting has previously taken a unidimensional approach to designating individuals to cultural groups. This approach may not sufficiently describe the participants, and therefore conclusions drawn from this type of research may be flawed. Little of the previous literature has endeavoured to bring together menstruation, mood, and culture in order to examine menstruation using a biopsychosocial model. Additionally, the concept of alexithymia has been attached to anxiety and mood, however there is a paucity of research that attempts to connect alexithymia to menstruation.

Method: Two questionnaire-based studies were carried out as part of this thesis. The first study was comprised of 322 participants from the US and UK who were Protestant or Catholic. These participants completed the MAQ, MDQ, HADS, a religion questionnaire, and demographic questionnaire.

The second study consisted of 191 participants, all of whom were British and were either Protestant or Catholic. These participants completed the MDQ, HADS, TAS, and a demographic questionnaire.

Results: The results from Study One showed that anxiety alone was able to predict menstrual cycle symptom reporting independently of the other explanatory variables. Religiosity was negatively significantly related to the menstrual attitude *Bothersome*. Very few differences in menstrual cycle attitude and symptom reporting could be found between national or religious groups; however, when anxiety caseness was added as a third variable, interactions between anxiety and national cultural group and anxiety and religious cultural group showed a graphed trend for menstrual cycle symptom reporting, although this was not significant in the multivariate regression models.

The results from Study Two showed that the interaction patterns between anxiety and religious cultural group were not able to be replicated in a sample of students. Additionally, the Study Two results showed that alexithymia predicts menstrual cycle symptom reporting, and that it is a significant predictor even after anxiety has been controlled for.

Conclusions: Menstrual cycle symptom reporting seems to be more affected by the experience of anxiety than cultural group membership, although the importance of investigating and discussing culture from a multidimensional perspective is still valid. Alexithymia was also shown to have an effect on menstrual cycle symptom reporting, and this effect was independent of the effect of anxiety. Support is given for the Psychosomatic Model and Social Psychological Model, along with the roles of stereotyping and the use of cultural idioms of distress.

List of abbreviations

ANOVA	Analysis of Variance
APA	American Psychiatric Association
BDI	Beck Depression Inventory
CBT	Cognitive Behavioural Therapy
DSM	Diagnostic and Statistical Manual of Mental Disorders
ES	Effect size
GOES	Great Ovulation Elation Syndrome
HADS	Hospital Anxiety and Depression Scale
HRT	Hormone replacement therapy
LH	Lutenizing Hormone
LLPDD	Late Luteal Phase Dysphoric Disorder
MAQ	Menstrual Attitudes Questionnaire
MDQ	Menstrual Distress Questionnaire
NS	Non-significant
ONS	National Statistics Online
PMDD	Premenstrual Dysphoric Disorder

PMS	Premenstrual Syndrome
PMT	Premenstrual Tension
ROC	Receiver Operating Characteristic curve
SD	Standard Deviation
SPSS	Statistical Package for the Social Sciences
SSRI	Selective Serotonin Reuptake Inhibitor
TAS	Toronto Alexithymia Scale
UK	United Kingdom
US	United States
USA	United States of America
WHO	World Health Organization

Study 1

1.1 Preface

I graduated with a B.A. double honours in Psychology and Scandinavian Studies in 2000 from Concordia College, Moorhead, MN, USA. From the beginning of my research career there, I was interested in women's psychology, cross-cultural psychology, and the psychology of religion. I went on to pursue an M.Sc. in Evolutionary Psychology at the University of Liverpool, focussing the thesis of that degree on pregnancy sickness from an evolutionary perspective, which combined the study of women's reproductive biology with women's reproductive psychology.

My professional and personal experiences have led me to study and work cross-culturally. I grew up in the Midwest of the United States, but have been an "expat" for nearly a decade. I have lived and undertaken research in Norway and in England, and have been fascinated by both the differences and the similarities between these countries and the one which I come from.

It is the combination of these elements of academic interest and previous life experience, along with the input of my PhD supervisor, which has formed the basis of this thesis.

1.2 Introduction

1.2.1 Description of the thesis layout and background

This thesis begins with a literature review, which sets up the first study of the thesis. It has been designed to guide the reader through the themes in the field of menstruation and cross-cultural psychology that are relevant to this research study. The literature review is followed by the method, results, and discussion for Study 1. Study 2 follows and has its own literature review, method, results and discussion. The two studies are followed by an overall conclusions chapter, which aims to tie together the implications and conclusions of the thesis as a whole.

Research in women's health is an area of study that has historically been neglected. Menstruation, as a culturally sensitive and taboo subject, has particularly been ignored (Delaney, Lupton, & Toth, 1988; Knaapen & Weisz, 2008). Historically, where the subject of menstruation has been acknowledged, it has been subject to the bias of the researcher's own cultural framework (Delaney et al., 1988; Rodin, 1992), which has tended to use a biomedical model. The inability of researchers to throw off their cultural constraints and view menstruation as an objective scientific phenomenon has led to many cultural and social assumptions being held as scientific fact, and without having been explored thoroughly (Walker, 1995). Sanders, Warner, Backstrom and Bancroft (1983) have described the menstrual health literature as now being "extensive but in many respects contradictory" (p. 487). As will be expanded upon in the literature review, more than 25 years after Sanders et al. (1983) wrote this remark about the field of menstrual health, the scenario is still one of little congruency.

More recently there has been a movement within the scientific community to consider the social, psychological and cultural influences of well-being and health, in addition to biological factors, and this has extended to menstrual cycle research as well (Knaapen & Weisz, 2008). In response to the recognition of the need to consider factors outside of the biomedical model, this research approaches the menstrual cycle from a conceptually multifactorial perspective.

This research will examine links between culture and menstruation, including both physical and psychological symptoms, and the attitudes that accompany them. The inclusion of cultural indices as independent variables in menstrual cycle research has begun to add to a more comprehensive multifactorial picture, showing important differences in how women belonging to various cultures express, experience, and understand menstruation.

This introduction to the relevant background literature in menstrual cycle psychology will explain the overall foundation for the research by first clarifying the menstrual cycle terminology to be used in this study. The

introduction next discusses menstrual cycle symptoms and characteristics. This is followed by sections exploring trends in diagnostic labelling of the experience of menstrual cycle symptoms, explaining the problems associated with finding appropriate criteria for diagnosis, and discussing the issues in menstrual cycle research methodology. A section presenting research in anxiety/depression and the menstrual cycle follows.

Previous researchers have approached menstrual cycle literature from several different perspectives with respect to the cause(s) of menstrual cycle symptom reporting. The two subsequent sections explain and discuss selected theoretical models that have been proposed for understanding the causes of menstrual cycle symptoms. This leads into a section which briefly explains how menstrual symptom reporting combines with menstrual attitude reporting to form a comprehensive picture of the experience and expression of menstruation for women.

The next focus of the literature review addresses cross-cultural psychology. This begins with previous literature addressing the meaning of culture and of cross-cultural psychology, and expanding into a couple more well-known themes in cross-cultural research; the next section discusses religion and religiosity as an important addition to cross-cultural research. The following section then explores the cross-cultural menstrual cycle research, looking at studies of cross-cultural attitudes and symptom reporting. Finally, literature incorporating menstrual cycle symptoms and attitude reporting with anxiety in a cross-cultural context is presented.

It is important to point out that this research is exploratory and employs a new way of looking at cross-cultural menstrual cycle research. Whilst the introduction and literature reviews for these studies endeavour to examine the relevant literature, the results of this exploratory research take the foci of these studies into unpremeditated territories. Necessarily, new literature topics are expanded upon in the discussion sections along with the application of some of those presented in the literature reviews. This is essential in order to incorporate and make sense of the results of these

exploratory analyses. Additionally, as this thesis integrates several different subjects in psychology, it is important to point out that the aim of this literature review is to present the literature necessary to understand the background, purpose, results and analysis of this thesis, and is not intended to act as an introduction to the entire field of menstrual psychology.

1.2.2 Menstrual cycle terminology

Before embarking upon an introduction to background literature on the menstrual cycle, the terminology to be used in this thesis must be clarified. Much of the previous work in the field of menstrual cycle research has used the term PMS (Premenstrual Syndrome) or PMT (Premenstrual Tension). This would logically suggest that any PMS or PMT research should have been based solely on symptoms which take place prior to the onset of menstruation. Paradoxically, this has not always been the case, and a critique of some previous research shows that the term PMS has been used as an umbrella expression to encapsulate all menstrual cycle symptoms.

For the purposes of this literature review, "menstrual cycle symptoms" will be used as an umbrella term for all menstrual cycle symptoms (much in the same way that the term 'perimenstrual symptoms' has been used in the literature), and this includes psychological and physical, premenstrual and menstrual. The term 'paramenstrual' is not used in this thesis unless used by other researchers to describe their research. This is because the term was originally coined by Karen Dalton (1964, 1984) to describe the four days preceding the menstrual period and the first four days of the actual menstrual period. This is more specific than the time frame that participants in this study were asked to report, and therefore may imply a greater deal of accuracy than is intended. Contrariwise, the terms PMS and PMT will be avoided because of their ambiguous natures, except when specifically used by other authors.

1.3 Study One literature review

1.3.1 Menstrual cycle symptoms and characteristics: A number of varieties and explanations

There is little consensus in the literature about which kinds of symptoms should be regarded as menstrual cycle symptoms, how many menstrual cycle symptoms actually exist, and how best to classify and categorise these symptoms. This section examines the number and types of symptoms associated with the menstrual cycle. This is followed by possible explanations for the number and variety of symptoms and the percentage of women thought to be reporting menstrual symptoms allied to the premenstrual syndrome, and finally a note on severe symptoms and menstrual cycle characteristics are addressed.

Researchers have identified over 150 physiological and psychological symptoms that have at some time been reported to be associated with the menstrual cycle (Magos, 1988; Moos, 1968; Robertson, 1991). The menstrual cycle has been connected to nearly every type of negative symptom in existence. The number and breadth of physiological and psychological problems associated with the menstrual cycle has become so vast that it is effectively implausible (Nicolson, 1995). Some of the more frequently reported symptoms are nervous tension, irritability, depression, headaches, water retention, weight gain, tiredness, food cravings, breast tenderness, cramps or stomach pains and fatigue (Brooks, Ruble, & Clark, 1977; Chrisler & Levy, 1990; Clare & Wiggins, 1979; Janiger, Riffenburgh, & Kersh, 1972; Kessel & Coppen, 1963; Mayo, 1999; Miota, Yahle, & Bartz, 1991; Richardson, 1990; Robertson, 1991; Rubinow & Roy-Burne, 1984; Ruble & Brooks-Gunn, 1982; Walker, 1997).

One of the theories posed to explain the large number of symptoms attributed to the menstrual cycle is that pre-existing psychological and physiological symptoms (i.e. symptoms that exist that are not directly related to the menstrual cycle), may be exacerbated by the onset of menstruation (Mitchell, Woods, & Lentz, 1991; Moos, 1968; Pearlstein, 1995). Some

researchers have extended the suggestion that individual symptoms are aggravated by menstruation to suggest that an entire disease entity can intensify during the onset of menstruation (Janiger et al., 1972; Magos, 1988).

Miota et al. (1991) highlighted the paucity of attention paid to the differences between premenstrual symptoms and symptoms present at other parts of the menstrual cycle that might be exacerbated premenstrually. Miota et al. (1991) go on to state that study designs have not distinguished menstrual symptoms as unique to menstruation or exacerbated by menstruation, and consequently researchers have attributed many physical symptoms and psychological symptoms as being allied to menstruation. This lack of differentiation also increases the likelihood that a woman will experience one of these symptoms at some time, and that this may coincidentally occur premenstrually and/or during the menses. This may greatly inflate the numbers of women reported to suffer from menstrual symptoms.

Additionally, the large number of reported symptoms are more understandable in western society (where small family size, early-onset menses and negative menstrual symptom reporting are prevalent), as many women will menstruate every month for nearly half of their lifespan (Miota et al., 1991; Taylor & Woods, 1991). This also serves to increase the chances that women will experience many of the symptoms in the range of human experience at some time during her menses.

The percentage of women reporting menstrual cycle symptoms that are regarded as being allied to the premenstrual or menstrual phase has been reported as between 15 and 95 per cent (Hargrove & Abraham, 1982; Kessel & Coppen, 1963; Logue & Moos, 1986; Paige, 1973; Reid & Yen, 1981). Tonks (1975) noted that if the prevalence of premenstrual syndrome is indeed that high, this state must be statistically normal. Consequently, this means that those women who do not undergo any premenstrual or menstrual symptoms would be statistically abnormal (Sampson, 1988). The large disparity between studies in percentage of women reported to experience

these types of menstrual cycle symptoms seems to be due in part to the discrepancy between studies in how menstrual cycle symptoms are measured and classified. This topic is discussed later in the introduction.

Other research has focussed on women who report severe clinical premenstrual and/or menstrual disturbances. As discussed in the section on diagnostic definitions below, this has been termed 'Premenstrual Dysphoric Disorder' in the *Diagnostic and Statistical Manual of Mental Disorders-IV (DSM-IV, APA)*. The research on severe symptoms is often carried out using women in clinical settings as participants. However, the intention of this thesis is to look at menstrual cycle symptom reporting in its full spectrum which varies from mild to severe within the general population. The intention is not to ignore severe clinical levels of menstrual cycle reporting, but to look at menstrual cycle reporting as a whole in the general population. Additionally, this study did not employ the necessary methodological tools in order to diagnose severe clinical levels of PMS, and also did not access participants from typical settings where women with severe symptoms can be found. This accounts for another reason why these types of labels are avoided throughout the thesis and instead the thesis refers to 'menstrual cycle symptoms'. (For further information on the topic of severe symptom reporting, please see Budieri, Li Wan Po, & Dornan, 1994; Caplan, McCurdy-Myers, & Gans, 1992; Corney & Stanton, 1991; Gallant, Popiel, Hoffman, Chakraborty, & Hamilton, 1992a, 1992b; Hamilton & Gallant, 1990; Mishell, 2005; O'Brien, 1993; Parlee, 1994; Severino & Gold, 1994; Yonkers, O'Brien, & Eriksson, 2008).

Although menstrual symptoms have been the most often discussed aspects of menstruation in the menstrual cycle literature, they are by definition tied in with other elements of the menstrual cycle, such as length and intensity of the menstrual flow of the menstrual cycle. Brooks-Gunn (1985) writes that these characteristics are the most outwardly noticeable. Both Brooks-Gunn (1985) and Paige (1973) have researched menstrual characteristics and have found reports between women to be variable. A few of the variables that their research has found menstrual characteristics to be associated with

are anxiety, hormonal contraception usage, religiosity, religion, and adherence to a traditional female role.

The time between periods varies not only between women, but also from cycle to cycle in the same woman, with anything between 10 to 60 days being reported (Vollman, 1977). Snowdon and Christian (1983) reported that there is more variation between women in bleeding-free days than in bleeding days. Their statistics stated that "among the 466 women who kept diary cards, 39 per cent menstruated for the same number of days in all bleeding episodes recorded and only 9 percent showed a variation in length of more than three days" (pp. 77-78). Hence, the typical biomedical model, which suggests that menstrual cycles are 28 days, with ovulation at day 14 may be overly simplistic, and may not fit with the true experience of many women.

These sections have introduced and assessed menstrual cycle symptom reporting in terms of the types of symptoms reported and the reasons such a large number can be found. Additionally these sections have reviewed the percentage of women reporting menstrual symptoms allied to the premenstrual syndrome. Given that almost all women in the Western world report that they experience some kinds of menstrual symptoms, it seems logical to explore the nature of these symptoms as normal variations in the lives of women, as opposed to exploring them as a disease process. Therefore a biomedical model that approaches menstrual symptoms from the standpoint of their abnormality is unlikely to be beneficial. A biopsychosocial approach that accepts menstrual symptoms as part of the normal range of human female experience should consider all of the factors influencing menstrual symptoms. Only this type of model, which takes into account that these symptoms may have biological, psychological and cultural bases will give a fuller and truer representation of menstrual symptomatology.

1.3.2 History and definition of menstrual-related conditions and problems with diagnosis

PMT is a term that was first used by Frank in 1931. He used it to describe female patients at his clinic who reported experiencing irritability and unrest in the days just before the onset of menstruation. He explained the occurrence of this phenomenon as the result of abnormal levels of female hormones. This explanation was based on his own assumptions, and not on supporting factual evidence. Greene and Dalton (1953) revisited this idea and coined the phrase PMS.

Further attempts to define and diagnose PMS have resulted in several different acronymic titles being given to menstrual and premenstrual symptoms, but these have brought their own problems. *Late Luteal Phase Dysphoric Disorder* (LLPDD) is a term that was agreed by the American Psychiatric Association (APA) in 1987 to describe clinically significant emotional and behavioural luteal phase symptoms that were of a recurring nature (Hurt et al., 1992). This was the first attempt to define and code PMS in the *DSM* and occurred in the third revised edition (*DSMIII-R*) (Connolly, 2001). In the 1994 *DSM-IV*, the title and diagnostic criteria of LLPDD were changed to become *Premenstrual Dysphoric Disorder* (PMDD). This was characterised in *DSM-IV* as a more severe form of PMS. This was agreed by Johnson (2004), who wrote that PMDD should be used to describe women at the high end of the spectrum of PMS. This has, however, been disputed by other researchers, such as Endicott (2000), who feel that PMDD should be seen as a distinct clinical entity.

Much of the PMS criteria used in a large amount of the menstrual cycle research closely matches that suggested by Connolly (2001). He stated that the diagnosis of PMS should include four aspects: the symptoms should occur in the luteal phase and be lacking in the follicular phase, they should recur on a monthly basis, and they should be of a severe enough character as to interfere with activities of daily living. The woman should be able to document these symptoms prospectively for two successive months.

Despite the previously mentioned labels, definitions, and attempts to categorise and classify menstrual symptoms and disorders, researchers have disagreed on the appropriate criteria for making a diagnosis of PMS. The two main disagreements have focused on worsening of symptomatology during the premenstrual phase, and duration of symptom-free time outside of the menstrual and premenstrual phases.

Various degrees of worsening of menstrual symptoms have been proposed by researchers. For example, Steiner and Wilkins (1996) proposed that a 50 per cent worsening of symptoms during the premenstrual phase should be required for a PMS diagnosis, while Rubinow, Roy-Burne, Hoban, Gold, and Post (1984) believe that reports should be taken for three months, with two of the three months qualifying as having a 30 per cent worsening of symptoms. However, both of these revised parameters have also been accused of being incomplete. Mitchell et al. (1991) point out that diagnosing PMS in this way still does not provide a baseline or ceiling for severity level against which to measure the percentage of change. This leads to inability to differentiate between mild symptoms and severe symptoms, as both qualify for a PMS diagnosis if they have enough worsening of symptoms.

Walker (1997) asserted that requiring a week symptom-free in order to obtain a PMS diagnosis is problematic. She referred to Bancroft's (1993) argument that certain symptoms associated with the premenstrual syndrome, such as irritability, are often present as part of the common experience. Due to the stresses inherent in life it is unlikely that people will remain irritability-free for seven days, thus potentially excluding many women from a PMS diagnosis. This is echoed by Nicolson (1995), who writes that everyone experiences the symptoms commonly associated with PMS from time to time. This highlights the difficulties arising from the fact that none of the symptoms reported to be associated with PMS are exclusive to PMS (Mayo, 1999). Gotts, Morse, and Dennerstein (1995) went a step further, stating that "the interactions between these different symptoms are so complex and intricate that PMS is effectively an idiosyncratic syndrome with different causes and different symptoms in different women" (p. 155). It is therefore self-evident that it is problematic to

try to design tools to measure a phenomenon for which the basic criteria cannot be agreed upon.

These sections have presented a brief history of the definition and labelling of menstrual cycle symptoms, and have additionally highlighted methodological problems with the attempts at labelling and categorising menstrual cycle symptoms. Previous menstrual cycle literature has been clouded by the inability to agree appropriate criteria and labels for menstrual cycle symptomatology, and many of those which have been suggested have put menstrual cycle fluctuations into the realm of a disease entity. This may not be the most appropriate way to conceptualise the menstrual cycle. For these reasons this research relies on the terminology 'menstrual cycle symptoms.'

1.3.3 Issues of Measurement: Problems with methodology in menstrual cycle research

There are also concerns about the methodology in menstrual cycle research regarding the ways in which menstrual cycle information is measured and obtained. These issues have tended to centre on retrospective versus prospective reporting, differential reporting based on whether the intent of the study is obscured, the focus of research surveys on negative symptom reporting, the timing and frequency of collecting the menstrual cycle data, and problems with participant subjectivity. These subjects will be explored in the following sections.

Many researchers have asserted that an undue negative rating is often obtained when participants fill out retrospective questionnaires instead of prospective questionnaires. Dan and Monagle (1994) write that retrospective reports tend to show higher symptom levels than prospective reports, and that this is a product of the "negative social context" that menstrual experiences are normally associated with (p. 204, see also Pazy, Yedlin, & Lomranz , 1989; Shaver & Woods, 1985).

Rubinow et al. (1984) reported that over half of the women who take part in prospective menstrual cycle symptom studies don't meet the criteria for PMS,

when calculated using prospective methods. Retrospective questionnaires are more likely to achieve a PMS diagnosis (Marvan & Cortes-Iniestra, 2001), and to this effect, several studies have found a tendency for over-reporting of symptoms when retrospective reports are used. Woods, Dery, and Most (1982) surveyed 73 women, using daily diaries for two months and then asked them to complete Moos Menstrual Distress Questionnaire (MDQ) (1968). They found that women tended to overestimate menstrual distress on the retrospective reports. Marvan and Cortes-Iniestra (2001) and Boyle and Grant (1992) have both found similar results. van den Akker, Eves, Service, and Lennon (1995) also found that retrospective reports yielded overestimates of menstrual distress in their survey of 121 women; however in this study the retrospective reports were taken before the prospective reports. Additionally, Haywood, Slade, and King (2002) found that women predicted menstrual pain to be higher when asked to predict it in the morning than their levels indicated at the end of the day. When these women were asked to recall the levels of pain a week later, the women rated the pain more highly. Logue and Moos (1986) write that for women with minimal symptoms (not severe symptom reporting), severity of symptoms may be overestimated. However, the differences average about 0.4 on a 6 point rating scale.

Parlee (1974) has suggested that this might be due to a stereotyping effect. These stereotypes are based on generalisations about women and their menstrual experience where "little or no supporting data are available" (p. 239). The idea of stereotyped responses to menstrual cycle symptom scales was born out of research she did showing that males and females report similarly when asked what women experience during the menstrual cycle. This suggested either a detailed knowledge of menstruation by males, or that both men and women were accessing similar stereotypes in their reports. Other research has shown results suggesting the role of stereotyping in menstrual cycle symptom reporting (van den Akker, Sharifian, Packer, & Eves, 1995; AuBuchon & Calhoun 1985; Brooks et al., 1977; Chrisler, Johnston, Champagne, & Preston, 1994; Englander-Golden, Schleitner, Whitmore, & Corbley, 1986; McFarland, Ross, & DeCourville, 1989; Olasov &

Jackson, 1987; Ruble, 1977; Walker, 1992), although some research has suggested differently (van den Akker & Steptoe, 1985).

However, despite the argument made against retrospective reports, several studies have found the opposite of those reported above (Bancroft, Williamson, Warner, Rennie, & Smith, 1993; Gallant et al., 1992b). Brodie and Niven (2000) found that prospective reports of menstrual distress were rated higher by women than the retrospectively recalled experience of the symptoms two weeks later. Jakic, Weinberg, Baird, Hornsby and Wilcox (2008) found that retrospective and prospective reports were similar; however, there was a slight tendency for women to underreport menstrual distress retrospectively. Richardson (1990) makes the case that both retrospective and prospective responses should be affected by culturally-induced expectations. He goes on to write "concurrent reports of experienced symptoms may correlate highly with retrospective judgments, even when the relevance of the menstrual cycle is disguised" (p. 390).

It seems that the biggest discrepancy in prospective versus retrospective reporting lies in the task that the participants are asked to complete. For a prospective diary, the woman is asked to fill in whether or not she has experienced a particular symptom on a particular day. For a retrospective questionnaire a woman is asked to report whether or not she has experienced a particular symptom at some point in the past. This is different because women may have experienced a symptom just once in their life, for example during menarche, but not normally during their cycle. This is echoed in the study by van Keep and Lehert (1981) which used French women participants. The women reported that they did experience premenstrual symptoms (77%), but only 38 per cent of the participants reported feeling them every cycle. Hence, retrospective studies may serve to get a more generalised idea of a woman's menstrual experience.

The many conflicting definitions of PMS and its criteria used in studies make it difficult to ascertain the differences between retrospective and prospective reporting, and whether or not a diagnosis of PMS can be reached more

accurately by one than the other. This research comes from the standpoint that because setting appropriate criteria for a PMS diagnosis is problematic in the first place; it may not be a helpful way to think about menstrual cycle symptoms in diagnosis/non-diagnosis terms.

It has also been suggested that obscuring the intent of the study is crucial in obtaining more accurate scores on menstrual symptom measurement tools. Walker (1997) warns that a desirability effect can happen in menstrual cycle research when the participants try to give the answers that they believe the researcher is looking for. These answers are often a socially stereotyped version of their actual experience.

This outcome can be worsened by the effect of priming. Priming happens when the researcher makes certain aspects of the research more salient than they have to be (Salancik & Pfeffer, 1977). Many of the current measurement tools used in menstrual cycle studies ask women to judge their menstrual or premenstrual phases with a *normal* non-menstrual, non-premenstrual baseline. This automatically encourages the woman to think of the premenstrual and menstrual times as *abnormal* and therefore worse than other times of the cycle. This type of methodology seems to assume that non-menstrual distress scores will be lower than menstrual distress scores (Pazy et al., 1989).

An example of a study which obscured the intent of the research, in Pazy et al.'s (1989) paper, 150 Israeli women completed MDQ without knowing that the questionnaire was being used to measure menstrual versus non-menstrual symptoms. They rated their non-menstrual time as being more distressing than their menstrual time. The same trend was shown by Chernovetz, Jones, and Hansson (1979), who carried out a similar study, but with male participants. Men who filled out menstrual cycle questionnaires and were not told that the symptoms were linked to menstruation reported higher levels of stress than when they were informed the symptoms were typical menstrual cycle symptoms. This demonstrates that awareness in a

study that a questionnaire is meant to be associated with the menstrual cycle can incite stereotypical response behaviour.

However there is also evidence that suggests that obscuring the intent of the study does not make a difference to the responses of women (van den Akker & Steptoe, 1985; Markum, 1976; Rogers & Harding, 1981). Gallant et al. (1992a) showed that awareness of the menstrual association of the experiment did not make a significant difference in the reports of women with severe PMS. It did, however, make a difference in the reporting of a few additional symptoms in women who were not suffering from PMS. A critical evaluation of the research in this area suggests that there may be some groups of women who are more affected than others by the association between a questionnaire and menstruation.

Another methodological problem in menstrual cycle research is that often it has only been negative symptoms related to the menstrual cycle that have been the focus of research. Stotland and Harwood (1994) state, "when groups of women are surveyed without strict inclusive and exclusive criteria, using only negative questions and retrospective reporting, most of the subjects often qualify for a diagnosis of 'premenstrual syndrome'" (p. 193). However, there have also been positive changes reported with the premenstrual phase, such as increased excitement, energy, well-being, work performance, and calm (Chandra & Chaturvedi, 1992; Logue & Moos, 1988; Stewart, 1989). Logue and Moos (1988) write that 5 per cent to 15 per cent of women report positive changes associated with the menstrual cycle. This apparent discrepancy between positive and negative symptoms relates to Sampson's (1988) question of whether PMS is a "clear-cut phenomenon or one end of a spectrum disorder which the majority of women experience" (p. 17). This may be a more helpful way of thinking about menstrual symptoms, as it is able to encompass women's experiences to a greater degree.

Some researchers have proposed that the negative menstrual symptoms reported by women are just the lack of feelings of elation, which have been reported post-ovulation. Ripper (1991) has suggested that instead of

referring to a negatively charged premenstrual phase in the cycle, a positively charged phase called Great Ovulation Elation Syndrome (GOES) should be acknowledged. Ripper argues that GOES occurs due to the observed increase in positive symptoms reported around ovulation and the lack of positive symptoms reported premenstrually. Instead of conceptualising the menstrual cycle as having a negatively charged phase, he believes that it is better thought of as having a lack of positive symptoms premenstrually. The idea of changing hormone states is inherent in this model, however the mechanism of action of GOES has not been largely further explored. When critically analysing the research on this subject, it appears that the differences here are a matter of perspective. Whether one sees a dip in mood premenstrually or a change in positive mood during ovulation depends on what is deemed to be the baseline menstrual experience. This has yet to be agreed. In any case, Ripper's work remains unconfirmed and has been mostly abandoned in the literature.

Not only does cycle length vary, but also the symptoms that women report tend to vary from cycle to cycle (Janiger et al., 1972; Rodin, 1992). This variance between women can cause difficulties in terms of both measuring and interpreting the meaning of the symptoms reported at different points in the menstrual cycle. For example, if a menstrual cycle questionnaire or diary asks a woman to report her symptoms during or from her most recent cycle, there is no guarantee that the symptoms experienced during that cycle will be representative of the woman's typical cycle. This may cause the data provided to be misleading in terms of women's true experiences.

Symptomatology results can be dependent on the number of times and when a woman's menstrual state is measured and how many cycles are assessed (Walker, 1997). This is compounded by individual variation among women, some of whom experience an increase in symptoms prior to menstruation, while others experience them after menstrual flow has begun (May, 1976). Moos (1968) reported that women experience psychological symptoms more often premenstrually, and physical symptoms more often during the menses.

Furthermore, it is difficult to precisely define when a woman considers that her first day of menstruation has begun, as some women spot for a couple of days before there is a steady flow of blood (Walker, 1997). It is problematical for a woman to be sure of what is 'universally' considered to be normal when it comes to what they experience menstrually.

The point raised above is in line with another methodological problem in menstrual cycle symptom reporting: participant subjectivity. Participant subjectivity is inherent in menstrual symptom reporting. Any experience that a woman has with her period can only be compared to what she has experienced before and what she has heard from other women. Therefore any response to items on a questionnaire will be subjective and relative to what the woman has found from past experience and that which she has been lead to believe by the accounts of other women (Snowdon & Christian, 1983). A critique of the issue of subjectivity identifies an increased need for a biopsychosocial approach, which could be employed to look at the issue from psychological and social standpoints in order to try to acknowledge subjectivity in this type of reporting.

This section has discussed many of the methodological problems within the menstrual cycle literature, some of which are common to all health research topics and others which are specific to the difficult issues surrounding menstrual cycle research. A critical analysis of much of the research discussed in the thesis shows that it also suffers from these methodological problems. As such, the research proposed in this thesis inherits several of the methodological problems from previous studies, although attempts to address and discuss these concerns have been considered in the discussion.

1.3.4 Anxiety and depression in the menstrual cycle

Anxiety and depression have been much researched in the field of menstruation. Lane and Francis (2003) have suggested that "mood is perhaps one of the most widely researched variables of interest with regard to the menstrual cycle, in particular depression and anxiety" (p. 127). Many studies have shown a relationship between menstrual cycle symptom

reporting and depression (Alonso & Coe, 2001; Gold et al., 2007; Golub, 1976a and 1976b; Hart & Russell, 1986; Kuczmierczyk, Labrum, & Johnson, 1995; Landen & Eriksson, 2003; Lane & Francis, 2003; Moos et al., 1969; Morse, Dennerstein, Varnavides, & Burrows, 1988; Roca, Schmidt, & Rubinow, 1999) and anxiety (Christensen & Oei, 1989; Hart & Russell, 1986; Haskett, Steiner, & Carroll, 1984; Landen & Eriksson, 2003; Lane & Francis, 2003; Mira, Vizzard, & Abraham, 1985; Moos et al., 1969; Negriff, Dorn, Hillman, & Huang, 2009; Roca et al., 1999; Watts, Dennerstein, & Horne, 1980). However, reports differ as to which of these is more strongly related to menstrual cycle symptom reporting. Additionally, research suggests that over half of women who have a record of anxiety or mood disorder also report PMS (Fava, 1992; Halbreich & Endicott, 1985). There is also a higher incidence of depression for women seeking treatment for PMS than in the general population (Barnhart, Freeman, & Sondheimer, 1995; Roca et al., 1999).

Negative affect has been proposed to be positively associated with menstrual cycle symptom reporting, as evidenced by its inclusion in both the Moos Menstrual Distress Questionnaire and the DSM criteria for PMDD (although other researchers have not found an association, see van den Akker, Sharifian et al., 1995; Ramcharan, Love, Fick, & Goldfien, 1992). It has been suggested that negative affect, (characterised by nervousness, tension, and irritability, Watson & Clark, 1984) may make individuals vulnerable to developing anxiety and depression (Clark, Watson, & Mineka, 1994; Watson & Clark, 1984; Watson, Clark, & Harkness, 1994). Additionally, negative affect, anxiety and depression have been reported to be highly associated with other personality constructs, such as neuroticism and extroversion (Brandes & Bienvenu, 2006; Gershuny & Sher, 1998). Neuroticism has also been reported to be related to menstrual cycle symptom reporting (Bancroft et al., 1993; Halbreich & Endicott, 1985; Kashwagi, McClure, & Wetzel, 1976; Levitt & Lubin, 1967; Mira et al., 1985; Taylor, 1979; Watts et al., 1980). Although Coppen and Kessel (1963) and Hirt, Kurtz, and Ross (1967) did not find neuroticism to be associated with dysmenorrhea. Studies of anxiety, depression and neuroticism have suggested that these factors are heritable

and temporally stable (van den Akker, Stein, Neale & Murray, 1987; Costa & McCrae, 1988; Eaves, Last, Young, & Martin, 1978; Floderus-Myrhed, Pederson, & Rasmuson, 1980; Jardine, Martin, & Henderson, 1984; Lykken, Tellegen, & DeRubeis, 1978; Tellegen et al., 1988; Watson & Clark, 1984), although other studies have also suggested that environment may be linked to menstrual cycle symptom reporting (van den Akker et al., 1987; van den Akker, Eves, Stein, & Murray, 1995). Additionally, studies of menstrual cycle symptom reporting have shown a heritability factor for dysmenorrhea (Kantero & Widholm, 1971) and menstrual cycle attitudes (Rose & Monroe, 1985).

1.3.5 Metatheoretical approaches to the menstrual cycle

There is a mass of disparate literature regarding the nature of menstrual cycle symptom reporting. Various models have been suggested to summarise research themes in the menstrual cycle literature. These themes acknowledge both the intent of the research and the viewpoints from which researchers have started. Various scientific perspectives about the menstrual cycle come from different original assumptions about the nature of the menstrual cycle.

As Engel (1977) has written, 'broadly defined, a model is nothing more than a belief system utilized to explain natural phenomena' (p. 130). As such, there are many potential ways to categorise the theoretical and practical themes found in the menstrual attitude and symptom literature. Examples include (but are not limited to) the biomedical models, the psychosocial models, the radical feminist models, the social psychological models, the learned helplessness model, and the state-related model. The formation of different models is helpful both in that they provide a framework which aids interpretation of the menstrual cycle literature, and also to compare different approaches towards researching the experience of menstruation. For the purposes of this review, five theoretical models will be discussed: the biomedical model, and four multifactorial models: the biopsychosocial model, the Psychosomatic model, the Social psychological model, and the Radical Feminist model. These models are different, yet inter-related. Due to their

inter-relation, some research can be found to fit within more than one type of model. The models presented here have been chosen as being the most relevant to the purposes and hypotheses of this study.

The Biomedical Model

A Biomedical Model started to be applied to menstruation in the 1930's when research on the menstrual cycle emerged with Frank's (1931) definition of PMT (emphasising the negative aspects of the experience) and its link to the female hormones (Walker, 1995). Much of the PMS literature today still reflects these beliefs. Brooks-Gunn and Ruble (1980) emphasise this point:

"the menstrual literature reflects the beliefs that 1) women experience fluctuations in physical and psychological symptoms associated with the menstrual cycle, 2) these fluctuations are hormonally, not socially based, and 3) these fluctuations are negative in nature, causing debilitation during the premenstrual and menstrual phases" (p .503).

Indeed, predominant biomedical thought assumes that disease (in this case PMS or menstrual symptoms that are seen as problematic) can be entirely explained by deviations from normal biological variables (Engel, 1977). However, as both Abplanalp, Haskett, and Rose (1980) and Walker (1997) point out, hormone levels are extremely variable during menstrual cycles, both between cycles in individual women and also between women.

The majority of the research carried out in the field of menstrually-related symptoms has been biomedical in nature. Indeed, most of the current research is still biomedical in nature, focussing on hormones, neurotransmitters, genetics, and pharmacological treatment. Due to the large number of cyclical variations that occur in the human body, there have been many possible variables proposed to be associated with menstrual symptoms and many of these have been used for correlational research. Taylor and Woods (1991) write that women experience fluctuations relating to ovarian hormones and their interaction with neurohormonal events for 30 to 40 years of their lives. This serves to create a large number of interactions, and the biomedical model has been occupied with studying them as the determinants of menstrual cycle symptom reporting.

The ovarian steroids have been the most often proposed variables to be the cause of negative menstrual symptoms. Frank (1931) believed that too much oestrogen was the reason for negative menstrual symptoms, and along the same line of thought, Greene and Dalton (1953) considered an imbalance of oestrogen and progesterone, resulting in too little progesterone to be responsible for menstrual symptoms. Phyllis (1991), proposed an alternative view that problematic menstrual symptoms are caused by high levels of progesterone, which when decreased result in a sort of "withdrawal effect" from the hormone (p. 55). Bancroft (1995) supported this argument by highlighting the high levels of progesterone that women are exposed to in comparison to the amount of oestradiol.

The previous examples show some of the many different theories about ways in which the ovarian hormones may trigger the symptoms that are associated with menstruation. Very few conclusive answers have been found along these lines (Backstrom et al., 1983; Halbreich, Endicott, Goldstein, & Nee, 1986; Rubinow et al., 1988). Schmidt, Nieman, Danaceau, Adams, and Rubinow (1998) have proposed that it is not elevated gonadal hormones themselves that are to blame for problematic menstrual cycle symptoms, but that some women are 'oversensitive' to the hormones. Other research has suggested that there may be a link between PMS and a higher frequency and lower amplitude of progesterone occurring at the same time as the secretion of lutenizing hormone (LH) (Facchinetti et al., 1993). These researchers have also found that those reporting PMS symptoms have a higher frequency and lower amplitude of LH secretion than control subjects. Interestingly, reduced amplitude of LH pulses was found to exist in stress and affective disorders, and this was also found in women reporting both amenorrhea and anxiety/depressive disorder (Chrousos, Torpy & Gold, 1998; Facchinetti et al., 1993).

Neurotransmitters have become one of the newer foci for followers of the biomedical model, and they have also been proposed to affect menstrual symptoms. Cardona, Tandon, Haskett, and Greden (1991) point out that the regulation of many central neurotransmitters by gonadal steroids might be

the link between menstrual changes and neurotransmitter activity. Pearlstein (1995) agrees that menstrual symptom difficulties are caused by gonadal steroids, neurotransmitters and neuroendocrine and circadian systems, and their influences on behaviour and emotions. Karsch (1984), however, has written, "the gonadotropins which control the ovary are themselves regulated by gonadotropin-releasing hormone from the hypothalamus" (p. 70). This serves as a reminder that the process is cyclical and a one-way causal pattern cannot be easily offered.

Biomedical model researchers have also investigated the role of serotonin in PMS reporting. Women who report problematic menstrual symptoms are more likely to have decreased serotonin level in mid- to late luteal phase than women who do not report these types of symptoms (Ashby, Carr, Cook, Steptoe, & Franks, 1988; Rapkin et al., 1987; Steege, Stout, Knight & Nemeroff, 1992; Taylor, Mathew, Ho & Weinman, 1984). Strine, Chapman, and Ahluwalia (2005) have also reported that psychological distress (often described in the luteal phase of the menstrual cycle, and more often in women with serotonin dysregulation (Dickerson, Mazyck & Hunter, 2003)), may be related to altered sensitivity to progesterone or its metabolites. Schechter, Bachman, Vaitukaitas, Phillips, and Saperstein (1989) have shown that this alters concentrations of neuroamines (e.g., serotonin, dopamine, and norepinephrine).

The previous examples of ways in which neurotransmitters might affect the menstrual cycle have not yielded particularly complete answers. It has often gone unrecognized that biological events, including neurotransmitter activity, can be affected by social and environmental experiences. Steiner (2009) has suggested that "the pattern of neuroendocrine events related to female reproduction is vulnerable to change and is sensitive to psychosocial, environmental and physiological factors" (p. 61). This leads into the next topic of discussion, which are the multifactorial models.

The Multifactorial Models

The Biopsychosocial Model

The biopsychosocial model suggests that biology, psychology and social environment interact with each other to form illness experience and expression (Suls & Rothman, 2004). Biopsychosocial models sit inter-related, and yet juxtaposed to the biomedical model. Because they necessarily include the biological element of illness, they are inter-related. Because they deviate from the standpoint that illness is simply based on underlying deviation from normal function, and acknowledge the role that one's psychology and social environment can play in the experience and expression of illness, they are juxtaposed. The biopsychosocial model is mainly credited to George L. Engel (1977), who set out the problems with the biomedical model, and also the need for a new type of scientific model. His proposal was a model that took into account that biology was not sufficient to describe why a person was ill, but that one had to look at both the person's psychology and the social environment to understand what meaning illness had within that context.

Over thirty years later the biopsychosocial model is still being used, although Suls and Rothman (2004) write that it has not been used to its full potential, and that further steps need to be taken to advance the biopsychosocial model through research, training, practice, and policy. There is evidence of biopsychosocial models being used in menstrual cycle psychology research. However, the ways in which the biological, psychological and social can be proposed to interact are many, and some researchers use different names for what is essentially a biopsychosocial model, containing all the necessary components to be classified as such. Two of these (the Psychosomatic and the Social Psychological models) are discussed below.

The Psychosomatic Model

The Psychosomatic Model is based on the premise that ovarian hormones are not dysfunctional. Instead, "there is something about the woman's temperament or psychology, which causes intensification of cyclical changes in mood and well-being through a psychosomatic mechanism" (p. 794,

Walker, 1995). In other words, instead of menstruation alone being responsible for the change in behaviour, a third variable is believed to be at work (Parlee, 1982).

Researchers have proposed many different possible psychological characteristics to be related to menstrual symptom reporting. Some examples are perceptions of the female role, perceived control over an adverse event, neuroticism, mental state, belief in social stereotypes, pain threshold and tolerance, low self-esteem, coping patterns, anger, guilt, negative affectivity learned from the mother, rumination, and vulnerability (van den Akker, Eves, Stein et al., 1995; Chernovetz et al., 1979; Coppen & Kessel, 1963; Gallant et al., 1992b; Levitt & Lubin, 1967; Paige, 1973; Plante & Denney, 1984; Richardson, 1995; Sigmon, Schartel, Hermann, Cassel, & Thorpe, 2009; Snowdon & Christian, 1983; Taylor, 1979; Taylor, Woods, Lentz, Mitchell, & Lee, 1991; Walker, 1997).

A critique of the psychosomatic model demonstrates that due to its cyclical nature, the model faces difficulties proving a causal relationship. For example, Snowdon and Christian (1983) report that many women dislike the traditional female role because of menstrual distress. However, the possibility also exists that women dislike menstrual distress because of a dislike of the female role. This shows that it is difficult to confirm which aversion (e.g. the female role or menstruation) comes first.

Another aspect of this model is that physical symptoms can also be viewed as the third variable which acts to change women's well-being and behaviour. This problem was demonstrated in two studies by Brooks-Gunn (1985) and Snowdon and Christian (1983) who reported that women who have a heavy flow tend to undergo more negative moods during their menses.

The Social Psychological Model

The Social Psychological Model proposes that hormonal changes that vary with the menstrual cycle become associated with changes in arousal, which then become identified with subjective emotional experiences. Walker (1995)

writes, "arousal is itself neutral, but becomes labelled as happiness or anger or irritability, etc. depending on the attributions made by the person experiencing it" (p. 795).

These ideas are supported by Lipowski (1989), who reports that it is the subjective nature of individual experience that is mainly responsible for what people think, feel and do. In addition, Dan and Monagle (1994) write that identification as a person with menstrual symptom difficulties comes from a situation where the woman takes normal cyclical changes and perceives them as distress. The woman's definition of herself as having an illness will often depend on the subjective meaning of the symptoms that the woman is experiencing and how they are represented for the woman in her image of a health-illness continuum (Taylor et al., 1991). The question that needs to be answered concerns what the mechanism is behind the associations of symptoms to negative feelings, and how the associations are used as a means by which sensations are interpreted (Ripper, 1991).

There are, however, conflicting reports about whether or not arousal does increase premenstrually. Levels of arousal have been shown to change cyclically during the menstrual cycle, and are thought to be highest premenstrually (Asso & Braier, 1982; Little & Zahn, 1974; Ussher & Wilding, 1991). However, van den Akker and Steptoe (1989) report that these changes may depend on the woman's experience of the menstrual cycle, and their study did not find a change in arousal premenstrually for PMS sufferers, but instead for non-PMS participants.

The Radical Feminist Model

In this model, PMS is not seen to be a real disease, but instead a label given to medicalise symptoms or behaviours that are not looked upon favourably by patriarchal society. Referring to these behaviours as part of an illness group causes women to blame themselves and seek out medical help instead of threatening status quo. Koeske and Koeske (1975) note that even when women have sufficient personal or situational factors to account for 'societally-negative' behaviour, those behaviours are likely to be blamed on

the woman's menstrual cycle. Koeske (1980) later wrote that in these cases the menstrual cycle is used as an explanation for negative behaviour that doesn't fit society's mould of the traditional role of woman. Some feminist researchers have proposed that the inclusion of PMDD in the DSM has only served to strengthen notions that the female reproductive body should be pathologised (Caplan et al., 1992; Nash & Chrisler, 1997; Ussher, 2000, 2002).

The dilemma facing followers of the radical feminist model is whether to accept or deny the existence of menstrual symptom problems and PMS as a disease entity. On the one hand, denying its existence would mean that women who feel that they are suffering might not receive treatment, and research on the subject might be compromised. On the other hand, acknowledging its existence would establish that there are biobehavioural differences between women and men (Johnson, 1987). Addressing this issue, (Ussher, 1989; 1992) suggested that whilst menstrual cycle symptomatology does certainly exist, it should not be seen as a psychopathic or pathologic disorder or syndrome.

Many of the feminist studies were designed as a response to the negative views of menstruation in the medical sphere and in popular media. Researchers in this paradigm have proposed studies that have drawn attention to many of the methodological problems in menstrual cycle research that were highlighted in Section 1.3.3 of this thesis. Some examples of this type of research are: research investigating how cultural stereotypes and various methods of reporting menstrual experiences influence the outcome of the studies (Brooks et al., 1977; Parlee, 1974; Ruble, 1977) studies investigating the claim that all women experience significant premenstrual changes (Ainscough, 1990; Jarvis & McCabe, 1991; Slade, 1984), studies investigating the variability in menstrual cycles between women and between cycles (Walker, 1994), studies researching positive experiences in menstruation (Logue & Moos, 1988; Ripper, 1991; Stewart, 1989), and also research looking at the wider context of women's lives as influential in symptom reporting – mostly using stress research and the

conceptualisation of menstruation as a stressor as indication of these types of factors (van den Akker & Steptoe, 1989; Choi & Salmon, 1995; Collins, Eneroth, & Landgren, 1985; Gannon, Luchetta, Pardie, & Rhodes, 1989; Plante & Denney, 1984). Other feminist studies have deconstructed cultural notions of femininity and menstruation (Johnson, 1987; Laws, 1990; Martin, 1989; Nicolson, 1992; Rittenhouse, 1991; Rodin, 1992; Ussher, 1989, 2003).

These models have presented a useful tool for categorising previous menstrual cycle research. They are also useful in providing a means to conceptualise the theories behind why menstrual cycle symptoms occur. The research in this thesis acknowledges the need for using biopsychosocial models to better understand menstrual attitudes and symptoms, and agrees with the need to consider multifactorial models in menstrual cycle research. Following the results of this study, this is a topic that will be returned to in the discussion.

Discussion of the models: strengths and limitations

The categorisation of menstrual cycle research into these previously presented models is helpful as a means of processing much of the information available about the menstrual cycle. However, Walker (1995) has acknowledged that there are problems with these models and the theories that they represent, and gives several criticisms of the models: menstrual symptom reporting may not be caused by abnormal hormones, premenstrual syndrome has not been fully described before being explained, there is considerable overlap between the models, researcher subjectivity has often not been accounted for, and a one-way causal relationship between variables has been assumed. In order to better understand the theoretical bases for the sources of menstrual cycle attitude and symptom reporting, Walker's criticisms and Kinderman's (2005) criticism of the biopsychosocial model will be discussed below.

Frank, in 1931, assumed that abnormal or excessive hormones must be the connection between women's reported mood disturbances and the premenstrual phase. He reported no supporting evidence for his declaration

and also made no attempt to explore several important questions which should have been addressed prior to making such an attribution.

To begin with, the assumption that hormone levels are linked to reported problems with the menstrual cycle has lead researchers to commonly assert that women with menstrual cycle problems have an abnormal hormonal cycle compared to other women. However, many researchers have pointed out that these studies have shown inconclusive or weak results, and that women who report these problems do not have different hormonal patterns than those who do not report them (Backstrom et al., 1983; Bancroft, 1995; Ruble & Brooks-Gunn, 1982; Schechter et al., 1989).

There are many robust arguments proposed by researchers against the assumption that hormone levels should be associated with negative menstrual symptom reporting. Sanders and Bruce (1999) looked into stress hormone secretion in conjunction with reported mood states. They found that there was not a reliable relationship within women. In any case, Halbreich et al. (1986) wrote that there is a delay between the point at which the hormone is secreted and when it affects brain mechanisms. These examples show that even from a biological standpoint, there is a lack in consensus about how the biological process works and the timing elements of it.

One of the most compelling arguments against the theories underpinning these models is that they have not fully described all aspects of the phenomenon of a menstrual cycle syndrome before attempting to explain it (Walker, 1995):

“Several parts of Frank’s original observations have remained completely unquestioned – are women of reproductive age variable in temperament? Are men of the same age, post-menopausal women and prepubertal children invariable? If men and/or women vary in temperament, is this of clinical importance? Do women experience more physical and emotional changes before menstruation than at any other time – or are symptoms at that time selectively recalled or attributed to menstruation? Is premenstrual tension a dysfunction – or are other explanations possible?” (p. 796).

Further doubt is cast on Frank's assumption by answering these questions. The first question was whether or not men of the same age, post-menopausal women, and prepubertal children are invariable in their temperament, and so categorically different from menstruating women. As previously mentioned, Chernovetz et al. (1979) reported that men show similar results to women on menstrual symptoms questionnaires when not told that the symptoms are related to the menstrual cycle. Furthermore, research has shown that symptoms commonly associated with menstruation can also be generated in anovulatory postmenopausal women when they continue to take oestrogen and cyclical progestogen (Hammarback, Backstrom, Holst, von Shoultz, & Lyrenas, 1985; Magos et al., 1986). Frank's methodology is further criticised in Backstrom, Boyle, and Baird's (1981) statement that having a uterus or experiencing menstruation is not necessary in order to experience premenstrual tension syndrome.

With regard to the question about whether or not women experience more physical and emotional changes before menstruation than at any other time, as previously mentioned, Pazy et al. (1989) showed that 150 Israeli women who completed the MDQ rated their non-menstrual time as being more distressing than their menstrual time. This suggests the possibility that only when women know that they are being asked about symptoms related to the menstrual cycle do they report that the menstrual cycle time is more problematic.

The final consideration is of the issue of whether the symptoms at the time of menstruation are selectively recalled or attributed to menstruation. The previous paragraph suggests that symptoms are being selectively recalled or attributed. Additionally, Pazy et al. (1989) pointed out that many of the measurement tools used ask women to judge their menstrual or premenstrual phases with a *normal*, non-menstrual, non-premenstrual baseline. This automatically encourages the woman to think of the premenstrual and menstrual times as different or worse, and therefore also assumes that non-menstrual distress scores will be lower than menstrual distress scores.

Walker (1995) criticises the Psychosomatic and Social Psychological Models, as they are developments of the Biomedical Model. As these models are types of biopsychosocial models, this is a criticism of the biopsychosocial approach as well. This means that they have assumed the same unchecked lines of reasoning discussed in the previous arguments against the biomedical model, and are therefore flawed in all of the previously mentioned ways.

Walker (1995) has highlighted that there is a lack of awareness in the literature that the socio-cultural context of the researcher can influence the research that they produce. Both the Psychosomatic and the Social Psychological Models acknowledge that the woman experiencing menstrual symptoms may be affected by socio-cultural variables, but they do not recognise that the researcher is also affected by these variables, which may bias the research. The Biomedical Model doesn't recognise either of these points. Therefore it is suggested that all research findings are objective fact, although they may equally be biased and based on flawed assumptions.

Finally, much of the research in these models is flawed by the assumption that there is a simple one-way causal relationship between the variable being studied and the occurrence of premenstrual symptoms. Walker (1995) refers to this as an assumption of linearity. It tends to be taken for granted that the menstrual cycle must be the independent variable and the subject being studied is the dependent variable. However, studies have shown that the menstrual cycle itself can be affected by psychological states and is therefore a two-way relationship (Parlee, 1982; Walker & Bancroft, 1990).

A criticism of the biopsychosocial models is that they have not addressed the inter-relationships between the variables that are proposed to affect the disorder or characteristic being studied. Kinderman (2005) has proposed the use of a 'Psychological model', which discriminates between how the variables interact with one another. Kinderman suggests that biological, social environment and life circumstances influence psychological processes. It is the disruption of these psychological processes which is the final step in

determining whether or not a disorder or characteristic is displayed. Although this is considered to be a psychological model, it (like the biopsychosocial models) can also be considered to be multifactorial, as it acknowledges and incorporates biological, social, and circumstantial factors, as well as psychological. The main differentiation here is the distinction between exploring how these variables are inter-related.

This section has presented the strengths and limitations of models used for categorising menstrual research. The Biomedical model has been based on assumptions which have not been found to have a basis in biological fact, partly due to preconceptions of early researchers as to the nature of menstruation. The Psychosocial and Social Psychological Models are both based on the assumptions of the Biomedical Model, and therefore are subject to the same flaws in theory. In addition, the models need to include an increased awareness of researcher subjectivity and the assumption of linearity, both of which can bias the results of menstrual cycle research.

As can be seen from the above critique of the models, they all have flaws inherent to them, as they are born out of and overlap with a biomedical model, whose original assumptions remain unchecked. However, biopsychosocial models are preferable to the biomedical models in that they attempt to explain the relationship between attitudes toward menstruation and reported menstrual symptoms in a new way that provides more complex, yet increasingly complete answers. The addition of attention to the inter-relationship between biopsychosocial variables, as suggested by Kinderman (2005) may be helpful. Comprehensive solutions are something that the biomedical models have not achieved, but that a multifactorial model has the potential to deliver. Walker (1997) writes, "[The] biopsychosocial models bring together concepts of biological rhythmicity or hormonal fluctuation with psychological factors, such as beliefs and cognitions, and social factors such as stressors and life circumstances" (p. 188). Whilst the questions posed by Walker's (1995) criticisms still need to be addressed, a biopsychosocial approach to menstrual cycle research is the best way to proceed in the absence of concrete answers.

1.3.6 How menstrual attitudes and menstrual symptoms work together

All of the premises of the aforementioned models give credence to the association between menstrual attitudes and symptoms, with the exception of the Biomedical Model. As has been suggested through the discussion of the theories underlining the models, the way in which a woman thinks about and understands menstruation can affect her actual experience of the menstrual cycle, and how she represents it. It is important to remember, however, that the symptoms experienced by the individual can alternately affect the attitudes reported. Relationships between menstrual attitudes and symptoms have been found by various researchers (Bramwell, Biswas & Anderson 2002; Brooks, Ruble & Clark 1977; Brooks-Gunn & Ruble 1980; Ruble & Brooks Gunn, 1982; Vila & Beeck, 1980).

An example of the association between attitudes and symptoms has been shown in research by Chaturvedi and Chandra (1991). They used the Menstrual Attitudes Questionnaire (MAQ, Brooks-Gunn & Ruble, 1980) to evaluate the attitude scores of Christian Indian women. Their results showed that the women who had the attitude that menstruation is debilitating and unhealthy reported more distressful symptoms, while women who had the attitude that menstruation was natural experienced higher premenstrual well-being. The symptom-attitude relationship may be circular, with attitudes informing symptoms and symptoms affecting attitudes.

Sociocultural issues in the study of menstruation can be thought of as those which influence menstrual beliefs that also extend to the beliefs of the family in which the woman was raised (Chandra & Chaturvedi, 1992; Chaturvedi & Chandra, 1991). Buckley and Gottlieb (1988) write that women have internalised attitudes that menstruation is unclean, and that this causes shame and unease, resulting in poor body-image. This unease can be seen in the number and types of symptoms that women report (Chaturvedi & Chandra, 1991). Snowdon and Christian (1983) write, "It is now becoming increasingly recognized that the social significance of menstruation is learned and interacts with the physiological process to produce behaviours which are heavily affected by culturally determined factors" (p. 1).

1.3.7 Definitions of culture and cross-cultural psychology

This section seeks to explore the nature of cross-cultural research by first defining *culture*, and then by discussing the issues faced when classifying people into cultural groups. Finally *cross-cultural* and *cultural psychology* are defined.

Before engaging in cross-cultural research, it is necessary to try to formulate a robust definition of culture. The nature of the concept of culture is not simple, and many researchers in the field have their own opinions as to how culture should be defined. As an example, Matsumoto (1996) defines culture as "the set of attitudes, values, beliefs and behaviours shared by a group of people, but different for each individual, communicated from one generation to the next" (p. 16). Triandis (2002) more simply states that, "the first thing to pay attention to when we study culture is whether or not ideas are shared" (p. 2). Many researchers use a definition of culture that stresses the element of sharing (see also Cole, 1996; Marsella, 2003; Valsiner, 2003).

The next question concerning the nature of culture is that of *what* is shared between people in cultural groups. Triandis (2002) splits culture into "material culture" and "subjective culture." (p. 1). Material culture is made up of the physical and tangible elements of a society, such as clothing, architecture and cuisine. Subjective culture is related to the ways in which a society understands its social environment (Triandis, 1972). Whilst the idea of material culture can be quite easy to conceptualise, the concept of subjective culture seems to be more diffuse and difficult to pin down. It is perhaps better explained through Marsella's (2003) definition of culture, which states that culture is "shared learned meanings and behaviour that are transmitted within social activity contexts for purposes of promoting individual and societal adjustment, growth and development" (p. 4). For the purposes of this research a definition of culture which includes an understanding of shared subjective cultural aspects between individuals is most relevant.

The next question in understanding the nature of culture relates to how individuals come to be designated as constituting a cultural group which

shares these material and subjective aspects of culture. Previous cross-cultural researchers have often focused on nationalities as designating a cultural group, without consideration for differences between the nation's citizens in ethnicity, religion or language (Realo & Allik, 2002).

It is often assumed in cross-cultural research that groups of people forming visible and easy to categorise groups, such as nationalities, form a cultural group, and that they will therefore share the same attitudes and beliefs. However, if one critically examines this practice it is possible to see that there will always be a certain amount of variation between individuals in any type of group, and the task of trying to pinpoint a set of people that share similar and collective feelings about an issue is not simple or straightforward. Although Hofstede (1980) has been an advocate for using national cultures in research, he has also described national cultures as being 'subculturally heterogeneous', and acknowledges that individuals within a national culture do not share all common subcultures. McSweeney (2002) therefore states that all individuals within a nation possess a unique version of their own national culture.

Thus one of the difficulties that cross-cultural research must address is how to find a way to be able to identify groups of people who share the types of beliefs that the researcher is interested in studying. It can be difficult to ascertain whether or not the sample (and the attitudes shared by the sample) which the researcher has collected, are representative of the whole cultural group, or if those sampled form a sub-group with completely different preferences. Triandis (2002) writes, "sub-cultures emerge because people share other elements, such as gender, physical type, neighbourhood, occupation, standard of living, resources, climates, and so on" (p. 2). A critical appraisal of some cross-cultural research shows that many researchers do not take these potential differences within cultures into account, and for this reason many of the conclusions drawn from cross-cultural research may be flawed. Despite the methodological need to categorise according to shared beliefs, it is unfortunately not necessarily realistic to believe that it is possible to identify a sample of people as

belonging to a cultural group based on anything other than those characteristics which are most easily observable, such as geographical groupings. It is therefore necessary in cross-cultural research to pay attention to the existence of possible sub-groups within these cultures and acknowledge the differences that their influence might create when interpreting the results.

What is important to remember is that culture is multi-dimensional. There are dimensions of cultural difference between people, based on ethnicity, religion and other demographic factors, that determine the degree to which attitudes and behaviours are held in common. The proposed study will try to take into account a multidimensional model of cross-cultural research and will therefore make two types of comparisons, cross-national and intra-national, using two religious sub-cultures.

Having arrived at a shared understanding of how culture is defined and what culture represents, for the purposes of this study it is also necessary to discuss the nature of cross-cultural psychology. Hills (2002) describes cross-cultural psychology as "having two broad aims: to understand the differences between human beings who come from different cultural backgrounds, and to understand the similarities between all human beings" (p. 1). However other researchers have argued that cross-cultural psychology is involved in carrying out the first aim, whilst cultural psychology does the latter (Price-Williams, 1979; Price-Williams, 2002). Valsiner (2003) explicates further that cross-cultural research has been involved in "general and differential psychologies," whereas cultural psychology has grown along with "anthropology and developmental psychology studies." (p. 1). Cross-cultural psychology involves comparing characteristics across cultural groups, whereas cultural psychology looks at culture as it exists for the people involved with it.

Using these definitions as guidelines, this study proposes a cross-cultural psychological approach and therefore will explore psychological aspects of menstruation across different types of cultures. This section set out to define

both culture and cross-cultural psychology. Previous researchers have used various definitions for both of these terms. For the purposes of this research, culture is defined as shared subjective cultural aspects between individuals. Cross-cultural psychology is defined as the study of understanding variations between persons who come from different cultural environments.

This section also discussed the difficulties inherent in trying to delineate cultural group membership. This is a problem that faces every piece of cross-cultural research, and although it is never possible to account for all cultural influences within an individual, it is important to acknowledge that potentially variable cultural influences exist. This is consistent with taking a multidimensional perspective on cross-cultural methodology.

1.3.8 Exploring themes in cross-cultural psychology: *Emic/etic* and collectivist/individualist dimensions and psychological distress research

One of the main themes explored within the discipline of cross-cultural psychology concerns the degree to which psychological distress and disorder are universal or relative. A universal approach to cultural psychopathology would emphasise similarities between cultures in both diagnostic concepts and the underlying processes or experiences of distress. This approach is also known as being "etic" (p. 2, Ryder, Yang, & Heini, 2002). An *etic* stance would assert that human experience is universal and similar, but that culture obscures this fact. On the other hand, a relativist approach to cultural psychopathology states that culture influences all things, from the experience of the symptoms, to the expression of the symptoms, to the ways in which researchers and clinicians categorise and diagnose symptoms. According to this position, not only can distress symptoms present in different ways in different cultures, but even those that outwardly seem the same may be different in terms of the illness that they represent. This approach is also known as being "emic" (Ryder et al., 2002, p. 2). There is a growing recognition that there may be some universal underlying processes to experiencing psychological distress or even a disorder, but that it is culture which influences the expression of that experience (Ryder et al., 2002).

This can be applied to menstrual cycle experience and expression in the following ways: First, an *etic* stance might assume that menstrual distress is experienced similarly by all cultures, but that the expression of this experience differs depending on culture. Second, an *emic* stance would suggest that menstrual distress is both experienced and expressed differently, with both levels being influenced by culture. Third, an *etic* stance might suggest that psychological distress (or arousal) is experienced similarly by all cultures, but that it is expressed or labelled as menstrual distress at certain times of the month by certain cultures.

Another theme often discussed in cross-cultural psychology is the differences between collectivist and individualist cultures. Culture may influence the experience of symptoms through socio-morality associated with certain symptoms. Some symptoms within a culture are stigmatised more than others, which can produce feelings of guilt and shame for a person who experiences them. This is particularly common with depression and symptoms related to psychological distress in individualist cultures, such as Western society, which prioritises individual happiness, success and hard-work, and where the individual is seen to be responsible for their own happiness (Mesquita & Walker, 2003). The stigma attributed to these types of symptoms may work differently in more collectivist cultures. Angel and Thoits (1987) believe that more traditional societies tend to make less distinction between physical illness and psychological disturbances. This may serve to lessen the stigma surrounding psychological symptoms in these types of cultures.

These sections have introduced the cross-cultural psychological distress literature, focussing on the nature of cultural psychopathology, universalist and relativist views, and the concepts of collectivism and individualism. Previous menstrual cycle research has not formally endeavoured to integrate itself into the existing themes in cross-cultural psychology, such as universalist/relativist, collectivist/individualist. These theoretical perspectives on culture may offer valuable insights into menstrual cycle symptom and attitude reporting. The relationship between culture and psychological

distress is multifaceted and from previous research can be interpreted as a combination of both current cultural circumstances and of attributes handed down from previous generations.

1.3.9 Culture, Psychology, and Religion

It has been suggested by Tarakeshwar, Stanton, and Pargament (2003) that religion should be incorporated into cross cultural studies for four reasons: Firstly, religion has an important role in peoples' lives across cultures; secondly, religion is a substantial predictor of life domains across cultures; thirdly, religion greatly influences cross-cultural dimensions; and finally, because culture strongly influences religious belief and practices. For example, country of residence has been shown in previous studies to influence religious practices and beliefs (Roccas & Schwartz, 1997; Wikan, 1988). This means that the experience and expression of a particular religion can be influenced by the national culture that it is operating within. Thus, Catholics in the United States may have different beliefs and practices than Catholics in Italy. Kagitcibasi and Poortinga (2000) have recommended that researchers pay attention to and report not only the cultural level of analysis (culture-level vs individual-level analysis), but also which cultural level they are measuring (e.g., national culture vs a religious, ethnic, or regional subgroup). Tarakeshwar et al. (2003) suggest that the same applies when studying religious culture. They suggest that both religious affiliation and the religiosity of the subpopulations of a defined culture should be taken into consideration in research. These results suggest that interactions between religious affiliation and other types of culture are possible and should be further explored.

Over the last decade there has been an increase in the number of publications concerning religiosity and health (Weaver, Flannely, & Oppenheimer, 2003). Associations have been shown between religiosity and both physical health (Hannay 1980; Levin & Schiller, 1987; McIntosh & Spilka, 1990; Powell, Shahabi, & Thoreson, 2003; Tebbi, Mallon, Richards, & Bigler, 1987; Tix & Frazier, 1998.), and mental health (Furnham & Baguma, 1999; Hood, Spilka, Hunsberger, & Gorsuch, 1996; Jarvis, Kirmayer,

Weinfeld, & Lasry, 2005; Koenig, McCullough & Larson, 2001; Levin, Chatters, Ellison, & Taylor, 1996; Tarakeshwar et al., 2003; Weaver et al., 2003). Additionally the relationship between religiosity, religion and health may be different between religions due to variations in dietary restrictions and other cultural factors (Hood et al., 1996). Another explanation is that religion and religiosity help individuals to cope with stressful life events, as well as be more optimistic (Bjork, Lee, & Cohen, 1997; Hood et al., 1996).

There are many different potential ways to measure religiosity (Hood et al., 1996), however most often some tangible measure is used, such as attendance at a place of worship, or frequency of ritual in the home. Use of the term 'religiosity' in this thesis differs from use of the term 'religion' in that religion is the term used to describe the chosen set of institutionalized beliefs to which a person describes themselves as adhering, (as opposed to measures of religious attendance, importance, etc.). There is a basic difference between the two terms, with religiosity used to refer to the degree to which one adheres to their chosen set of beliefs.

1.3.10 Cultural versus cross-cultural menstrual cycle literature

Researchers in the past have approached menstrual cycle literature from both cultural and cross-cultural psychological stances. Much of the culture and menstruation literature has been qualitative and has focussed on ethnographies from various countries (e.g., Buckley & Gottlieb, 1988), on interviews with women about their experiences of menstruation (e.g., Bean, Leeper, Wallace, Sherman, & Jagger, 1979), or on how semiotics can influence how the body is thought about within a culture (e.g., Martin, 1989). On the other hand, the cross-cultural literature has tended to approach menstrual cycle research from a quantitative, cross-sectional survey or daily diary rating methodology. It is this type of cross-cultural research which is further explored in this section, as it is most relevant to the proposed research.

Prior research has shown differences in menstrual attitude and symptom reporting cross-culturally (van den Akker, Eves, Service et al., 1995; Brooks-

Gunn & Ruble, 1979; Brooks-Gunn & Ruble, 1980; Chandra & Chaturvedi, 1992; Chaturvedi & Chandra, 1991; Janiger et al., 1972; Johnson, 1987; Rothbaum & Jackson, 1990; Paige, 1973; Siegel, 1986; Snowdon & Christian, 1983). However, the ways in which the researchers have chosen to delineate cultural boundaries has varied widely, and at times has seemed to lack in logical and appropriate comparisons of types of cultures. Various types of cross-cultural groupings from previous studies will be discussed, looking at national, religious and ethnic cultural group studies.

1.3.11 Cross-cultural differences between nationalities: attitudes and symptom reporting

This section offers a critique of previous cross-cultural menstrual literature, focussing on the types of cultural comparisons that have been made, and examples of menstrual cycle differences that have been found between cultures. Problems with the methodology of some of these studies are also highlighted.

Much of the research on cross-cultural attitudes towards and experience of menstruation has used the MAQ and/or the MDQ. These studies typically compare two or more cultural groups on MDQ or MAQ factor scores and/or the individual items composing these factors in order to determine differences between cultures on these measures. Examples of cross-cultural national research using the MAQ and MDQ are presented below.

Differences in menstrual attitudes have been demonstrated across nationalities in cross-cultural studies using the MAQ by several menstrual cycle researchers (Bramwell et al., 2002; Chandra & Chaturvedi, 1992; Snowdon & Christian, 1983). Chandra & Chaturvedi (1992) compared a sample of Christian Indian women with a group of American women. Their research found that the national groups were similar in reports of menstruation as both debilitating and bothersome; however differences were found in attitudes of naturalness and denial, with the Indian sample scoring higher on these factors. Bramwell et al. (2002) also examined the attitudes of Indian women; however they compared the Indian women's attitudes with

British women's attitudes. The results of this study indicated that British women were more likely than Indian women to show higher agreement with attitudes relating to premenstrual moods and symptoms. The Indian sample were more likely than the British sample to agree that menstruation makes one tired and not to expect so much of oneself. Although one culture could not be said to have more positive attitudes than the other in the Bramwell et al. (2002) study, these studies are examples showing that differences in menstrual attitudes can be found across national cultures.

Other research in cross-cultural menstrual cycle studies has focussed on differences in symptom reporting between national cultures. A study using the MDQ was done by Ruble and Brooks-Gunn (1982), which analysed the scores of a group of adolescent girls from the United States. They then compared their results to those from a Finnish sample by Kantero and Widholm (1971). They found that the American girls reported more oedema and dysmenorrhoea than the Finnish girls. However, as the American girls were sampled nearly a decade later, the exact interpretation of these results must be considered carefully. Additionally, Janiger et al. (1972) looked at the differences in symptom reporting between women from Turkey, Nigeria, USA, Apache women from south-western USA, Greece, and Japan. They found that the Japanese sample reported fewer symptoms than the other national groups, whilst the Turkish and Nigerian samples had both the highest incidence and the highest scores. The American group scored in the middle of the other cultural groups. These studies are an example of research showing that differences in symptom reporting across national cultures has previously been found.

It is worthwhile noting that no research has yet been done comparing British and American samples directly on the attitudinal factors of the MAQ or the symptom reporting factors of the MDQ. However, Bramwell et al. (2002) did find that for the American sample collected by Brooks-Gunn and Ruble (1980) and their British sample, the factor loadings for the MAQ were similar (both differing from their Indian sample).

As discussed previously in this chapter, and as Bramwell et al. (2002) also point out, there is potential for variation between attitudes within national groups. Given that Section 1.3.6 has also discussed how attitudes and symptom reporting are related; we would also expect these variations in attitudes to have important consequences for symptom reporting. Bramwell et al. (2002) make their point about variation in attitude reporting based on differences in age and social class; however the same is likely true for variations in national culture by sub-culture.

Some menstrual cycle research has confused nationality with ethnicity. For example, Janiger et al. (1972) compared American women not only with women of other countries (e.g. Greece, Japan, Nigeria), but also with Apache women in Arizona, who were themselves US nationals. Janiger et al. (1972) do not give any explanation for separating the Apache women from their national culture, although they do refer to their cultural delineations as 'ethnic cultures'. This is not appropriate because we have no information regarding the ethnicities of the women included in the American culture, and can only guess that the ethnicities of the women in the Greek, Japanese, Turkish, and Nigerian cultures were homogenously the same as the national label would suggest. Treating the Apache ethnic sub-culture as though they were not part of the American national culture may have confounded results received from that sub-culture. Failure to differentiate between that which constitutes a national culture and that which constitutes an ethnic sub-culture in a particular piece of research may obscure the true results of a study, as it becomes impossible to distinguish where any cultural differences come from.

A critical analysis of the methodology employed by Janiger et al. (1972) reveals how this failure to differentiate between levels of culture can muddle the results. Sub-cultures sometimes report very differently from the cultures they are within, and these differences between sub-cultures can be larger than those between cultures (Realo & Allik, 2002). However, competing with this assertion, Smith and Bond (1998) have reported, 'the cultural groups within a nation are bound by the same sets of laws and governmental policies with respect to trade, taxation, immigration, media, religion,

education, and language" (p. 40). In addition, Realo and Allik (2002) write that the World Health Survey has found that the values of different religious groups within a nation are more related to each other within the nation than to their respective religious groups outside of the nation. There is therefore support for both the idea that the Apache subgroup would be similar to its national culture, and that it would be significantly different. This means that the results from Janiger et al.'s study where the Apache ethnic subgroup was separated from the national group raises several questions which should have been addressed: Would any differences found in the Apache women be due to a distinctive aspect of an Apache ethnic sub-culture? On the other hand, could any differences instead be attributable to existing regional differences, which are not exclusive to the Apache people, but instead pertain to all people of that region of the United States? Equally, it becomes impossible to ascertain whether any similarities found would be because the Apache sub-culture has menstrual beliefs that are historically distinct but similar to the American national culture, or because Apache women have adapted the beliefs of the rest of the nation and these beliefs are no longer distinctly from an Apache sub-culture. The problem with the Janiger et al. (1972) study is not that they sampled a sub-culture of a national culture, but that no mention or attention is paid to how this might affect conclusions drawn from their results. As previously mentioned, Kagitcibasi and Poortinga (2000) recommended that researchers pay attention to, and report not only the cultural level of analysis, but also which cultural level they are measuring, as the interplay between culture and sub-culture can have intricate effects on psychology and reported behaviour that are difficult to tease apart.

These examples of national culture studies highlight the differences in menstrual attitude and symptom reporting that that can be found between national cultures. This type of study is informative; however, the degree to which the results can be relied upon to explain true cross-cultural differences is dependent on the methodology used to delineate cultural groups. Additionally, results are dependent on the homogeneity of the attitudes and symptoms of the groups sampled and how well the women sampled

represent those groups. As previously discussed, shared common beliefs have been identified as an important aspect of being considered part of the same cultural group.

1.3.12 Cross-cultural differences between religions: attitudes and symptom reporting

Other researchers have used religion to demarcate group membership (Bramwell & Zeb, 2006; Brooks-Gunn, 1985; Chaturvedi & Chandra, 1991; Good & Smith, 1980; Paige, 1973; Rothbaum & Jackson, 1990; Siegel, 1986; Snowdon & Christian, 1983). These studies have examined various religious cultures within a national culture. Some of the studies have focused on attitudes, others on symptoms, and most have combined these two elements. Again, many of the attitude studies have used the MAQ and many of the symptoms studies have used the MDQ.

In an example of a cross-cultural study using religious group as a cultural index, Siegel (1986) used the MAQ and the MDQ to investigate the menstrual attitudes and symptoms of Jewish women participants. She investigated the attitudes and symptom reporting of women in two groups, one of which attended *Mikvah* (a Jewish monthly ritual washing ceremony that is meant to take place after menses is completed), and the other of which did not attend. Siegel found very little difference between these two groups. A critical analysis of these results suggests this may be because the women she sampled actually belonged to the same religious cultural group and that although they differed in religious practice, they shared similar beliefs about menstrual symptoms and attitudes. A related explanation is that it may be possible that regardless of participation in the monthly ritual, all of the women were aware of its existence, and this was enough to affect their attitudes and symptoms in a similar way. Rothbaum and Jackson (1990) carried out similar research with Jewish *Mikvah* attendees and non-attendees, along with Protestant and Catholic women. This study also found little difference between the two Jewish groups. It did find that *Mikvah* non-attendees and Protestants both thought of menstruation as bothersome, when evaluated by daily diary, and that Catholic women's scores on the MAQ

correlated with scores on the MDQ, whilst they did not for Protestants. The implications of these research studies show that using religious group as a cultural indicator can be used to find menstrual-related differences, if the women within the designated cultural groups actually form distinct cultures. (Other researchers have also found differences in menstrual cycle reporting for religious cultural groups, however they are discussed in Section 1.3.14 due to their inclusion of anxiety or negative affect measures).

Similar to the previously mentioned problems with not differentiating between the types of culture being studied, there have been methodological problems with the ways in which religious cultures have been categorised in previous studies. The World Health Organization (WHO) study by Snowdon and Christian (1983) reported significant differences across religious affiliations for physical characteristics of menstruation, such as duration and amount of bleeding. The main criticism of their method of grouping women into religious classifications is that certain religious groups were made up to a great extent of only one or two nationalities. For example, the Protestant group was mainly comprised of the United Kingdom sample, as most of the other countries incorporated into the study did not have many Protestants or included only non-Christian respondents. Thus, the differences reported between these religions might not be at a religious cultural level, but rather due to being part of a national culture. Religious groups can constitute a sub-group in a national culture, or conversely, national culture can compose a sub-group within a religious culture. Culture is therefore multi-dimensional, with people concurrently belonging to several different cultural groups, and specific criteria must be created in order to interpret any results gained from research in an accurate manner.

The subject of this thesis expands upon the work of Zeb (2003) (published in Bramwell & Zeb, 2006), who examined menstrual cycle differences in attitudes and symptoms across Hindu, Christian and Muslim cultures in the UK. Her work found differences, both in attitude and symptom reporting between cultures, and also in the degree that these two characteristics correlated with each other. The religious cultures were found to have diverse

patterns of correlation between attitudes and symptoms. This study aims to replicate these findings in different cultural groups, but take into account the multi-dimensional nature of culture, providing a more complete picture of the complexities of menstrual cycle experience.

1.3.13 Cross-cultural differences between ethnicities

It is also worth mentioning that other types of cross-cultural research have been done using ethnic groups within a nation or region, an example of which is van den Akker, Eves, Service et al.'s (1995) study. This research showed differences reported between three British ethnic groups in levels of symptomatology in the premenstrual and menstrual phases. This type of study is useful, as it shows that participation in a particular sub-culture within a nationality is significant in the differential reporting of menstrual symptoms.

These sections have presented previous types of cross-cultural psychology research in the menstrual cycle field. They have also demonstrated the methodological flaws in some of this previous research. The studies discussed above highlight that differences in menstrual attitudes and symptomatology have previously been found between cultures. However, the difficulties that exist in carrying out cross-cultural studies can also be seen manifested in the discussed body of research. One of the limitations of the previous research has been that the authors have not discussed the implications of the fact that cultures necessarily have divisions within them, or sub-cultures, based on other demographic factors, e.g. ethnicity or religion. Cross-cultural menstrual cycle research in the past has not endeavoured to tease out one cultural identity from another, which has made it difficult to accurately attribute differences in menstrual symptoms and attitudes.

The research studies presented above, however, have provided many avenues for further development. This study attempts to take into account that culture is multidimensional. Due to its multidimensional nature and complexity it is not feasible or practical to break cultures down sufficiently to exactly pinpoint each individual's socio-cultural composition. Despite this it is

important to strive to go beyond the one-dimensional approach to cross-cultural research, which has dominated this field in the past.

1.3.14 Menstruation and psychological distress in a cross-cultural context

Some of the research surrounding menstrual psychological distress has already been discussed in the Literature Review. The previous sections have discussed both cross-cultural research about the menstrual cycle and cross-cultural factors in psychological distress symptom reporting. These two areas of study come together in cross-cultural research tying together both menstruation and psychological distress. It has been often stated in the literature that depression and anxiety are highly associated with menstrual symptom reporting (Paige, 1973; Roca et al., 1999; Strine et al., 2005; Watts et al., 1980), and with the premenstrual and menstrual phases (Golub, 1976a; Golub, 1976b; Halbreich & Kas, 1977).

Brooks-Gunn (1985) explored differences between Protestants and Catholics in menstrual characteristics, menstrual symptoms, and religiosity. She found that for Catholics higher flow was related to higher symptom reporting of the symptoms pain, negative affect and water retention (as previously stated, negative affect may make individuals vulnerable to developing anxiety and depression, Clark et al., 1994; Watson & Clark, 1984; Watson et al., 1994). These factors were less associated for Protestants.

Another example of this type of research was done by Paige (1973), who found that there were significant differences in anxiety across religious cultures and that this had an impact on menstrual symptom reporting. Her study reported that attitudes toward religion are related to the female role and to menstrual symptom reporting for American Catholic and American Jewish women; however the relationship between attitudes and symptoms is comprised differently for each group. Protestant women were not found to have a significant relationship between their religion and menstrual symptoms and attitudes. This seems to be an important finding, but the details of the study are uncertain, as the article is from a popular science

magazine (*Psychology Today*), and much of the statistical information needed to further evaluate this relationship is missing from the article along with much of the scientific methodology.

Good and Smith (1980) also looked at anxiety, menstrual cycle reporting, religion and sex roles. They found that for Catholics, instead of menstrual cycle reporting being correlated with anxiety and feminist sex roles, it was correlated with anxiety and masculinity. Similar to Paige's (1973) findings, there were no such correlations for the Protestant sample. However, when they separated out pill users from non-pill users, the results became even more complex. Menstrual distress was found to correlate with anxiety for Catholics who weren't on the pill, but not for Catholics who were using the pill. Contrariwise, menstrual distress correlated with anxiety for Protestants who were using the pill, but not for Protestants who weren't using the pill. These results also need to be interpreted with caution, however, as the subgroups of religion/pill use were very small (Catholics using pill = 11, Protestants using pill = 11, Catholics not using pill = 25, Protestants not using pill = 13). Additionally, ANOVAs performed on the same data found no differences between pill users and non-users, and a further analysis with pill usage and religion as independent variables showed no main effects or interaction effects for the dependent variable menstrual distress. The authors conclude that the results suggest that religion and anxiety should be used in further research to explore their roles as distress-mediating factors. Given the relationship between anxiety/depression and menstrual cycle symptom reporting, and that anxiety and depression reporting have been found to have a cultural component, an important area of research may be the interaction between anxiety and culture. Further research is clearly needed in this subject to pull together menstruation, anxiety/depression, and culture in a more comprehensive way.

1.3.15 Conclusions

Conclusions from the evaluation of the literature from this introduction suggest there is still much discrepancy about the nature of menstrual cycle symptom reporting and therefore about the terminology and methodology

that would best describe and measure it. There is also disagreement about the theoretical foundations underlying menstrual symptom reporting. Therefore, in an attempt to better understand the factors which influence a woman's reported menstrual symptoms, a multifactorial biopsychosocial approach is most appropriate. Biopsychosocial approaches take into account the biology, psychology, and social culture of the individual. It is this type of multifactorial model which will be built upon in this research, as it aims to compare cross-cultural differences between women in menstrual cycle attitude and symptom reporting.

Cross-cultural psychology was also introduced and defined in the literature review. The section then explored some of the traditional themes in cross-cultural psychology research. Additionally the cross-cultural menstrual cycle literature was discussed and explored to identify the strengths and weaknesses of prior studies. Finally, it was identified that more research is needed which brings together menstruation and psychological distress in a cultural context.

Whilst previous cross-cultural research in menstruation has done much to advance our understanding of menstrual attitudes and symptoms, some of it has also been flawed, as it has portrayed a scenario where women only fit into and identify with the one cultural group that the researcher is interested in studying. The methodology advanced by the previous literature has employed a unidimensional way of looking at culture that has not taken into consideration that women can be concurrently part of more than one cultural group. Because culture is multidimensional, previous cross-cultural research may be confounded by having utilised a unidimensional approach.

Although challenging, attempting to separate different forms of culture is necessary to investigate the ways in which various types of culture influence women's perceptions of the menstrual cycle, and how this may affect menstrual psychological and physiological symptomatology. An attempt has been made to address these issues in the presented research, which focuses on women's menstrual attitudes and symptoms cross-culturally, using two

different indices of culture: religion and nationality. This research assesses national and religious culture with the view compare two different types of culture. This is in order to explore whether the association with menstrual attitudes and symptom reporting can be distinguished for certain types of culture and/or if there is an interaction between the types of culture. As previously mentioned, other cross-cultural researchers have found differences in reported experiences and expressions of factors between the same religious subculture operating within different national cultures (Roccas & Schwartz, 1997; Wikan, 1988). This opens up possibilities that differences in menstrual attitudes and symptom reporting could be found just between nationalities, just between religions, or that there might be an interactive effect for the two.

Although this work follows on from that of Zeb (2003), published in Bramwell and Zeb (2006), there are some notable differences. Zeb (2003) found variations in menstrual cycle attitudes and symptom reporting between three religious cultures that were from two ethnic groups and had the same national background. However, this research did not independently examine both indices of culture and did not look for interaction effects between them. Additionally, there was no cross-over of cultural indices, as all ethnically Caucasian women were Christian and those who were ethnically of the Indian subcontinent were Hindu or Muslim. However, they found that the Muslim religious culture (assumed to be ethnically from the Indian subcontinent) scored similarly to the Caucasian Christian culture. This indicated that future research which is designed to specifically separate out types of culture could be useful in examining which types of culture are influential in determining women's attitudes and experience of menstruation. This research seeks to do just that; it goes a step further to assess religious culture operating in two different national cultures. Hence, the research aims to differentiate within and between national and religious cultures. Other research in the field of menstrual cycle research has looked at two types of culture simultaneously, but not with the view to distinguish between them in this way. This thesis therefore presents a unique approach for studying and understanding menstrual cycle research.

1.4 Study One aims, objectives and hypotheses

Aim: The aim of this study is to identify and explore differences and similarities between cultures (American vs. British, Protestant vs. Catholic), and between types of cultures (religious or national) in menstrual attitudes and menstrual distress.

Objective 1: The first objective of this study is to assess the demographic characteristics of the sample.

Objective 2: The second objective of this study is to measure differences between groups in levels of religiosity.

Objective 3: The third objective of this study is to investigate nationality (American and British) and religion (Catholic and Protestant) as cultural indicators to determine their relationship to menstrual attitudes and menstrual distress.

Objective 4: The fourth objective of this study is to assess the degree of association between measures of attitudes towards menstruation and measures of menstrual distress.

Hypotheses

The results section reflects the following two hypotheses:

Hypothesis 1: Cultures will vary significantly in reported menstrual attitudes and distress.

Hypothesis 2: Menstrual attitudes and distress will be positively correlated, with negative attitudes towards menstruation showing higher levels of negative symptom reporting.

1.5 Study One methods

This study used a cross-sectional between-groups study design.

This questionnaire-based study was first piloted in order to identify any potential difficulties in carrying out the research. The first section of the method will focus on the rationale for choosing the cultures researched in the study. The second section focuses on measures used in the study, which were also used in the pilot study. The third section then outlines the participants, procedure and results of the pilot study. The fourth section summarises the design of Study One, and is followed by a section detailing the participants in Study One. Finally the data analysis strategy and ethics approval information are presented.

1.5.1 Rationale for culture choice

The participants for this study were recruited from the United States and the United Kingdom, and had been brought up in either predominantly Protestant or Catholic families. As previously mentioned, two different types of culture (national and religious) were chosen in order to employ a multidimensional model of culture. This has suggested by Tarakeshwar et al. (2003) and Kagitcibasi and Poortinga (2000) following results showing that religious culture can be affected by the national culture that it operates within (Roccas & Schwartz, 1997; Wikan, 1988). A convenience sampling strategy has been employed in this study, as there was no structured way of contacting people for the given study. For the purposes of this research, more subtle religious differences between groups have been used, and two types of Christianity have been utilised as cultural groups. There is precedent in the literature for using denominations of Christianity to research menstrual cycle attitudes and symptoms (Brooks-Gunn, 1985; Paige, 1973, Rothbaum & Jackson, 1990; Siegel, 1986; Snowdon & Christian, 1983), and although they are somewhat similar in ideology, differences have previously been found in these studies concerning menstrual attitudes and symptom reporting. Additionally, the study was also interested to see whether interactions could be found

between religion and nationality which might suggest that religious culture was affected by national culture. The United Kingdom and the United States were chosen as national cultural groups as they had a large number of Protestants and Catholics, and were also most accessible to the researcher.

1.5.2 Measures

All questionnaires and participant hand-outs for the study can be found in Appendix 1. The questionnaires used include the MAQ, the MDQ, the Hospital Anxiety and Depression Scale (HADS), a demographics questionnaire, and a religiosity questionnaire.

The Menstrual Attitudes Questionnaire (MAQ)

The participants were asked to fill out the MAQ (Brooks-Gunn & Ruble, 1980). This questionnaire was chosen due to its frequent use by other researchers, making it easy to compare outcomes with other studies in the same field. The questionnaire was originally designed to highlight the multi-dimensional quality of menstrual attitudes. The items were made to encompass four categories: beliefs about physiological aspects associated with menstruation, coping styles for menstruation, effects on performance due to menstruation, and general evaluations of menstruation. The MAQ is comprised of 33 questions that combine to form five factors. These factors correspond to attitudes of menstruation as debilitating, positive, predictable, bothersome, and denial of any menstrual effects. Each item is rated on a seven-point scale and can be either positively or negatively expressed. Higher scores denote more negative attitudes. Other researchers have found internal congruence scores (Cronbach's alpha) are high, ranging between .90 and .97 (Brooks-Gunn & Ruble, 1980). Additionally these researchers found congruence between the same factors between two samples to be .77 to .91. Chandra and Chaturvedi (1992) found that their (Indian) modified version of the MAQ had good test-retest reliability, with the range of concordance for each item and total scores to be between 82% and 96%. Cronbach's alpha scores for the 5 factors using data from this study are moderate: Debilitating (Factor 1) = .79, Bothersome (Factor 2) = .67, Natural (Factor 3) = .64, Predictable (Factor 4) = .73, Denial (Factor 5) = .75.

The Menstrual Distress Questionnaire (MDQ)

The participants also completed the MDQ (Moos, 1968). The MDQ is also often used in studies of menstrual distress and is therefore easily compared to other research. This questionnaire was designed to identify menstrual symptoms for both clinicians and researchers. The MDQ consists of 47 items that form eight factors. These factors are labelled as pain, water retention, autonomic reactions, negative affect, impaired concentration, behaviour change, arousal, and control. The questionnaire was written for an American population, and therefore changes in terminology needed to be made to accommodate the British sample used in this study. In accordance with Clare and Wiggins (1979), two changes were made to menstrual symptom terminology: 'hot flushes' instead of 'hot flashes', and 'stomach pains' for 'cramps'. Clare and Wiggins (1979) made these changes following discussions with Moos. No items were deleted from the questionnaire; all 47 items originally suggested by Moos were retained. Each item is rated on a scale of 0-4. Higher scores indicate worse symptomatology. Moos constructed this questionnaire based on the responses of over 2000 women. The internal consistency (Kuder-Richardson coefficient) is estimated by other researchers to be moderate to high (.82 to .98), and it also has high test-retest reliability (.80 to .96) (Markum, 1976). The Cronbach's alpha score using data from this study showed the MDQ to have a high internal reliability (.95). Despite that the MDQ has been criticised for problems with validity and normative sample issues, it is widely used in menstrual cycle research and offers the best opportunity for comparison with other research (Monagle et al., 1993).

The Hospital Anxiety and Depression Scale (HADS)

The HADS (Zigmond & Snaith, 1983) was originally developed to detect anxiety and depression in a non-psychiatric outpatient setting, although a large study review (747 articles) reported that it performs well in assessing severity and caseness of anxiety disorders and depression in the general population (Bjelland, Dahl, Haug, & Neckelmann, 2002). The usefulness of this questionnaire in non-psychiatric setting to screen for emotional disorders has been advanced in a recent meta-analysis by Brennan, Worrall-Davies,

McMillan, Gilbody, and House (2010). The HADS has been reported to be the third most commonly used self-report screening instrument (Tyrer & Methuen, 2007), and has been recommended for use in both clinical settings and the general population (Montazeri, Vahdaninia, Ebrahimi, & Jarvandi, 2003). The HADS has also previously been used to research the menstrual cycle (Perz & Ussher, 2006; Tangen & Mykletun, 2008). For the purposes of this study, the questionnaire was renamed the General Feelings Questionnaire, in order to try to avoid any bias which might occur due to the stigma associated anxiety and depression (for more information about the stigma associated with anxiety and depression, see Alonso et al., 2008; Berger, Wagner, & Baker, 2005; Blair & Ramones, 1996; Cooper-Patrick et al., 1997; Davies, 2000; Sirey et al., 2001).

The HADS is composed of 14 questions, seven of which concern depressive symptoms, and the other seven relating to state anxiety symptoms (as opposed to trait anxiety, for a review see Reiss, 1997; Spielberger, Gorsuch, & Luschene, 1970). Each item is rated 0-3, with higher values indicating higher levels of anxiety or depression. Some of the items have reversed scoring. There is a possible maximum score of 21 on the anxiety subscale and also on the depression subscale. Totals of seven or below are classified as being in the *normal* range of anxiety or depression, 8-10 are considered as a borderline mood disorder and 11 and above represent probable anxiety or depression caseness (Thomas et al., 2005; Zigmond & Snaith, 1983). Zigmond and Snaith (1983) state that "if the scale is to be used in research the cut off point for a 'case' may be either the upper or lower end of the borderline range" (p. 365). Self-assessment scales, such as the HADS, are useful screening tools, but cannot be used to diagnose individuals. Clinical examination is necessary for a definitive diagnosis (Snaith, 2003). Thus, where 'caseness' appears in this thesis, the term refers to probable caseness only, as a true diagnosis cannot be made from the scores obtained through this questionnaire.

Hopwood, Howell, and Maguire (1991) found that the HADS misclassified depression 25 per cent of the time, whilst the anxiety subscale misclassified

anxiety only 12 per cent of the time. Hall, A'Hern, and Fallowfield (1999) found that the HADS was better at classifying anxiety than depression (72% and 37.4%, respectively), especially when lowering the threshold to seven. However, other researchers have found the HADS performs well in assessing severity and caseness of anxiety disorders and depression in the general population (Bjelland et al., 2002). Additionally, there are no indications from the literature that other self-rating scales differentiate significantly better between anxiety and depression (Herrmann, 1997). Other researchers have found that internal congruence scores (Cronbach's alpha = 0.89) are high, as are test-retest reliability scores (correlation = 0.72, $p < 0.001$) for each subscale and correlation = 0.74 for the entire scale (Savard, Laberge, Gauthier, & Bergeron, 1998). Cronbach's alpha scores for internal consistency were moderate for both factors in the present study: Anxiety = .77, Depression = .72. Instructions were changed for the American population from placing a "tick" in the box opposite the reply to placing an "x" in the box opposite the reply, to avoid any culture-specific terminology difficulties.

The demographics questionnaire

The demographics page was designed for the study and included age, parity, employment status and description, religious categorisation, country of birth/length of time living in England/USA, gynaecological health status, and current medications used. The content of this questionnaire was modelled after the demographic questions used in several studies closely related to this one in the field of cross-cultural menstrual research (see van den Akker, Eves, Service et al., 1995; Chandra & Chaturvedi, 1992; Rothbaum & Jackson, 1990).

Age, parity and employment status were all included, as they have been found in previous literature to be correlated to menstrual distress (Sternfeld, Swindle, Chawla, Long, & Kennedy, 2002). Religion was determined by asking several questions. Women were first asked which religion they considered themselves to be. They were then asked whether or not this was the religion which they had grown up with. If the answer was no they were

asked to indicate which religion they had been brought up in. Because this study is interested in the predominant religious culture of the woman's family, this was the religion that the woman was classified as belonging to. This was due to the view that attitudes from this religion would be ingrained at an early age through parental socialisation (Le, Berenbaum, & Raghavan, 2002). We hypothesised that attitudes and distress would be passed down along religious cultural pathways, even if the religion itself had not been. Previous research has shown that these beliefs may be tied to an underlying culture that is passed along through generations and not subject to a large amount of change, even when the religion or level of religiosity does (Rice & Steele, 2004). Country of residence was included in order to ensure that the women were born and brought up in the national culture being sampled. Finally, gynaecological and medical status questions were asked to identify any potential exclusion criteria (i.e. menopausal, amenorrhoea or major medical illness).

The religiosity questionnaire

The religiosity questionnaire was also designed for the study and consisted of ten questions about current and previous religious attitudes and activities. Hood et al. (1996) write, "operational definitions in the psychology of religion are always referenced to some tangible religious indicator... church attendance, answers to questions about the importance of religion in one's life, [or] statements dealing with the details of religious beliefs..." (p. 7). With this in mind, questions were created to ask about religion in the context of personal beliefs and practices and parental beliefs and practices while the participant was living at home with her parents. Questions asked include frequency of attendance at place of worship, the importance of religion in daily life, frequency of prayer and religious activities in the home, importance of different sources of religious knowledge while growing up, and a comparison of current religious beliefs to those she was brought up with (See Appendix 1). Holden and Edwards (1989) believe that these types of attitudes and practices are linked to early religious socialisation, and Tarakeshwar et al. (2003) state that these types of questions are appropriate for exploratory analysis for integrating religious constructs into cross-cultural

literature. Other studies measuring religiosity have used similar questionnaire items (see Jarvis et al., 2005; Rice & Steele, 2004). Internal congruence was adequate (Cronbach's alpha), at .82.

The British and American instructions were written differently, with the British questionnaires asking the participants to "tick" the boxes and the American participants being asked to place an "x" in the boxes, again to avoid any cross-cultural confusion in terminology.

1.5.3 Pilot study

A pilot study was undertaken to examine the feasibility of doing research about menstrual attitudes and distress across religious and national groups. The pilot study was also used to test the new religiosity questionnaire, which had been created specifically for the study. Effect sizes were then obtained from the results of the study.

Initially, a diary study was piloted using the aforementioned questionnaires over a six week period. Using this design, women were asked to fill out the demographics questionnaire first, and then if all of the criteria for participation were met, were to be asked to fill out the MDQ every day for six weeks. Upon completion of the six-week period, the women were to be sent the MAQ, religiosity questionnaire and the HADS as one-off questionnaires. The purpose of using the questionnaires as a prospective measure was to avoid stereotyped answers, which as mentioned previously, has been reported by some researchers when women are asked about menstruation symptoms retrospectively.

Nearly all of the women who were approached to fill in the questionnaires said that they would not be willing to dedicate themselves for six weeks, and that it was too much to ask. Five women were eventually recruited to this pilot study: two Jewish, two Catholic, and one Protestant. The women were contacted either in person or by phone on a weekly basis to remind them to fill in the questionnaires. Two of the women handed the questionnaires back in at the end of six weeks. One of the two had completed every

questionnaire and the other had only completed a few of the questionnaires. All of the women admitted to not filling in the questionnaires on time or on a daily basis. The women stated that they either did not have time to complete the questionnaire everyday or else that they had forgotten. It was consequently felt by the researcher that a prospective diary study was not feasible, as even the sole participant who had filled out all of the questionnaires did so retrospectively and at one sitting. The decision was then made to make the study retrospective and to hand out the questionnaires to be filled out as a 'one-off'. The revised pilot study was then carried out in the United States and in the United Kingdom. At that time, Catholic, Protestant and Jewish women were going to be the focus of the main study. Because of lack of participation from the Jewish organisations contacted, only Catholic and Protestant women were surveyed.

Pilot study participants

Face validity of the questionnaires was investigated by piloting them with women in the US and the UK. The participants for the pilot study were nine American Catholic women, eight American Protestant women, nine British Catholic women, and nine British Protestant women. All women were premenopausal, not pregnant, not breast feeding/lactating, and not within six months of having a baby. The women were recruited by using a snowballing method through friends, neighbours, and co-workers.

Pilot study results

The pilot study showed that it would be practicable to conduct this study on a larger scale in both countries and across both Protestant and Catholic religions. There were difficulties in accessing Jewish populations both in the United States and in the United Kingdom. Several attempts at writing letters and making phone calls to Jewish organisations were not fruitful, and the decision was made to focus on two religions.

The feedback from the returned questionnaires was mainly positive. Problems were, however, identified with the religiosity questionnaire. Changes were made regarding the classification of religions, as this had not

elicited clear answers from the British sample. The question of religious affiliation was included in the British questionnaires twice, to better ensure that it was filled out (once in the demographics questionnaire and once in the religion questionnaire). Instead of asking an open-ended question about religious affiliation in the religiosity questionnaire, tick boxes were made with the choices of Protestant and Catholic next to them. This helped some of the more specific Protestant denominations understand that they were to fall into the Protestant group, as they had classified themselves as Christian.

The questions regarding the importance of different sources of religious information while growing up also had to be modified. The question had been set up as a ranking system (1-4 with 1 being the most important and 4 being the least important). Many of the participants were not using all four numbers to rank the choices and often only ranking one as most important. This was changed so that the women would need to circle a number (1-4 with 1 being not at all important, and 4 being mostly important) for each of the possible sources.

Some MAQ and MDQ factors showed trends toward differences between groups, whilst other mean differences were negligible (see Table 1). Where differences were perceptible, effect sizes (ES) varied between 0.26 and 0.86. Power analysis (Cohen, 1988) showed that an N of 70 participants per group would provide 80 per cent power to detect differences between groups.

1.5.4 Participants

Inclusion criteria consisted of women from either the US or UK who were either Protestant or Catholic and had menstruated within the last three months. There was no upper-bound cut-off age used to exclude respondents, however, females under the age of 16 excluded. In the United Kingdom the women were recruited from a northern industrial city, and in the United States women were recruited from primarily an urban area of the northern Midwest. A more in-depth discussion of the sampling characteristics can be found in the discussion.

Table 1. Factors showing trends between cultural groups for the MAQ and MDQ and their effect sizes (ES)

Participant categories	MAQ Trends	MDQ Trends
American women and British women	Menstruation as a Debilitating Event (ES=0.34)	Pain (ES=0.51), Autonomic Reactions (ES=0.36), Negative Affect (ES=0.43), and Control (ES=0.30)
British Catholics and American Catholics	Menstruation as a Debilitating Event (ES=0.43)	Pain (ES=0.57), Autonomic Reactions (ES=0.26), Negative Affect (ES=0.69), Impaired Concentration (ES=0.43), Behaviour Change (ES=0.64), and Control (ES=0.35)
British Protestants and American Protestants	Menstruation as a Bothersome Event (ES=0.86)	Pain (ES=0.45), Autonomic Reactions (ES=0.45), and Impaired Concentration (ES=0.47)
American Catholics and American Protestants	Menstruation as a Debilitating Event (ES=0.41), Menstruation as a Bothersome Event (ES=0.70), Menstruation as a Natural Event (ES=0.76), and the Denial of Any Effect of Menstruation (ES=0.59)	Negative Affect (ES=0.42), Impaired Concentration (ES=0.76), Behaviour Change (ES=0.73), and Arousal (ES=0.28)
British Catholics and British Protestants	Menstruation as a Debilitating Event (ES=0.60), Menstruation as a Bothersome Event (ES=0.43), Menstruation as a Natural Event (ES=0.62), and the Denial of Any Effect of Menstruation (ES=0.44)	Water Retention (ES=0.31)

1.5.5 Procedure

Initially, the researcher attempted to avoid recruiting women from traditionally over-sampled populations, such as university students and employees and health professionals. In the UK, churches and schools affiliated with churches were written to and followed-up by phone calls to try to get access to women participants. These attempts were not successful, as these organisations had concerns about privacy. One Catholic Church allowed the researcher to attend and to try to recruit women before and after services. This proved difficult due to the large proportion of those church attendees who were of a menstruating age being mothers who were busy looking after

small children. Consequently, most of the participants were recruited through traditional (university-related) channels.

In the UK women were enlisted from a Moms and Toddlers group affiliated with a Catholic church, a university (mostly administrative staff and postgraduate students), and local tanning and hair salons. In the US, women were found in university offices, hair salons, day care centres, and through snowballing methods using friends, neighbours and co-workers. As an incentive, women were offered a chance to participate in a lucky draw. The women were asked to provide a name and phone number if they wished to participate and assured that this information would not be kept together with their completed questionnaires. In the United States, women were offered \$100 in the form of a gift certificate from a pre-designated choice of stores/restaurants, and in the United Kingdom women were offered £100 in the form of a gift certificate from a pre-designated choice of stores. At the end of the recruitment process, a winner from each country was randomly chosen.

In the United Kingdom, women were given the questionnaire along with a prepaid, pre-addressed envelope and asked to mail the questionnaires in upon completion. In the United States, the women were asked to complete the questionnaires and seal them in an envelope to be collected by the researcher or to return to the friend/neighbour/co-worker who had contacted them through snowballing recruitment methods.

To encourage a high response rate, the study:

1. Used a self-completed questionnaire.
2. Provided an information sheet explaining the aims and objectives of the study and the uses of the data collected.
3. Provided assurances about the anonymity of all data collected.
4. Kept the questionnaire as short as possible to reduce the burden on respondents.
5. Pre-tested the questionnaires to improve ease of completion.

6. Offered incentive in the form of £100/\$100 gift voucher to one respondent in each country.

Using a self-completed questionnaire for data collection had the advantage of limiting or removing interviewer effects on responses to questions which deal with sensitive matters. It also allowed a larger sample to be completed for a given set of resources than an interviewer-administered questionnaire, and has been shown to provide information of comparable quality (McColl et al., 2001).

Because the women who participated were volunteers, it is difficult to calculate the true response rate. The number of envelopes used was 712 and 377 responses were collected (55 of which had to be excluded because country of birth was not US or UK or because they had not had a period in the last three months). The response rate can therefore be estimated at 52.95 per cent. This is a very high response rate for this kind of study, but as has already been mentioned, the women were participating on a volunteer basis, which may have meant that because they had already verbally agreed to complete the questionnaires, they were more likely to do so.

As previously mentioned, other researchers have found that obscuring the intent of the study may provide more accurate results about menstrual distress (Pazy et al., 1989; Walker, 1997). This was not possible in this study due to the nature of the questions in the MAQ, which asked specifically about attitudes relating to the menstrual cycle.

1.5.6 Data analysis

Data were analysed using the statistical software SPSS (Statistical Package for the Social Sciences) versions 12, 13, 14, 15 and 17.

1.5.7 Ethics approval

The research proposal was subjected to ethical review following the procedures in place in the University of Liverpool Division of Clinical

Psychology. Ethics approval was subsequently granted and can be found in Appendix 2.

1.6 Study One results

The results section is split into eight segments:

1. Description of the respondents
2. Description of responses to the Religiosity Questionnaire
3. Correlations between religiosity and menstrual attitudes and distress
4. ANOVA results for Exploratory Analysis: Religion versus religiosity
5. ANOVA results for Hypothesis 1: Cultures will vary significantly in menstrual attitudes and distress
 - a. Main Effects
 - b. Interaction Effects
6. ANOVA results for Exploratory Analysis: Anxiety/Depression as a third variable
 - a. Anxiety as a third factor
 - b. Main Effects
 - c. Interaction Effects
7. ANOVA results for Exploratory Analysis: Child status as a third variable
 - a. Child status as a third factor
 - b. Main Effects
 - c. Interaction Effects
8. Multivariate linear regression analyses: MAQ and MDQ factors as outcome variables; nationality, religion, anxiety, child status, the interaction between religion and nationality, and the interaction between nationality and anxiety status as explanatory variables
9. Pearson Product-Moment Correlation results for Hypothesis 2: Menstrual attitudes and distress will be correlated

1.6.1 Description of the respondents: Socio-demographic profile of the sample

There were 322 women who participated in the study. Of these 322, 173 were British (53.72%) and 149 were American (46.27%). When split into their religious groups, 141 of these 322 women were Catholic (43.79%) and 181 were Protestant (56.21%). The categories were further broken down into national/religious groups. Seventy of the 322 women were British Catholics (21.74%), 103 of the women were British Protestants (31.99%), 71 of the

women were American Catholics (22.05%), and 78 of the women were American Protestants (24.22%).

General demographics

Age

The mean age for the sample as a whole (in age \pm Standard Deviation (SD)) was 31.92 ± 8.60 years, with the youngest being 17 and the oldest being 51. Mean age for the British Catholic group was 32.93 ± 8.84 , and the age spread was 17-51. The British Protestants had a mean age of 30.69 ± 8.02 , and the age spread was 17-49. For the American Catholics, there was a mean age of 33.77 ± 8.96 , and the lowest age was 18, with the highest age being 51. Finally, the American Protestants had a mean age of 30.92 ± 8.53 , and an age spread of 19-50. A one-way analysis of variance test was performed on the dependent variable age with the four groups (British Catholic, British Protestant, American Catholic, and American Protestant) as independent variables. The analysis showed that there was not a significant difference (NS) in age between these four groups ($F(3,316)=2.50$, NS).

Parity

Parity was examined for the group as a whole. Women were asked both whether or not they had children and also how many children they have. Chi-square tests revealed significant differences between nationalities for child status (having children versus not having children), with American women being more likely to have children (chi square=13.72, $df=1$, $p<0.01$). Chi-square tests also revealed that Catholics were significantly more likely than Protestants to have children (chi square=8.84 with $df=1$, $p<0.01$).

Number of children was examined to determine whether there was a significant difference between groups. A Kruskal-Wallis one-way ANOVA was performed on the four groups, as the distribution was positively skewed. This analysis (which included women who had responded that they had no children) revealed that there was a significant difference in number of children between the four groups (chi square=29.85, $df=3$, $p<0.01$). A Mann-Whitney *U* test was then used to determine which groups the

differences in number of children were between. The test showed that there was a significant difference across religions, with Catholic women having more children than Protestant women (Mann-Whitney $U = 10323.50$, $p < 0.01$, Catholic median = 1, Protestant median = 0). There was also a significant difference in number of children between nationalities, with American women having more children than British women (Mann-Whitney $U = 9435.50$, $p < 0.01$, British median = 0, American median = 1).

Weekly work hours

The participants were asked how many hours a week they worked, categorised as full-time, part-time, or none. As can be seen from Table 2, the results for no job were so low that it was not possible to use a chi-squared test due to more than 20 per cent of cells having an expected count of less than five. Because the incidence of having no job was so low, and because it was similarly spread across the groups, it was removed from the chi-squared analysis. There was not a significant difference between any groups for full-time or part-time work (chi square=2.97, df=3, NS).

Table 2. Number of women having full-time, part-time and no work for the national/religious groups

	US Full- Time	UK Full- Time	Overall Full- Time	US Part- Time	UK Part- Time	Overall Part- Time	US No Job	UK No Job	Overall No Job
Protestant	65	80	145	11	20	31	2	3	5
Catholic	58	51	109	10	16	26	3	3	6
Overall	123	131	254	21	36	57	5	6	11

1.6.2 Reproductive status

Breast feeding/lactation

Women were asked whether or not they were currently lactating, as lactation can cause periods to cease. Lactating participants were only included if they had experienced a recent period (within the last three months). Despite this inclusion criterion, it was decided to check whether there were differences in incidence of lactation between the groups. In total, only three women were currently lactating when they filled out the questionnaires. There was one

lactating woman in each of the four national/religious groups excluding British Catholics. There was not a significant difference between groups for breastfeeding/lactating ($p=1.00$, Fisher's Exact Test).

Hormonal contraception

Participants were asked whether or not they were currently using hormonal contraception. Women who were using certain types of contraceptives that suppress menstruation were not included due to not having experienced a recent period (within the previous three months). Participants using hormonal contraception were only included if they were having regular periods. All together, one-third of the women were using hormonal contraception ($n=104$). There were no significant differences in the number of women using hormonal contraception between the four groups (chi square=0.40, $df=3$, NS).

Recent birth

Women who had given birth recently (within the last six months) were only included if they had experienced a recent period. Analyses were done to check whether or not there were differences between the samples in number of women who had recently given birth. Four women in total had given birth in the six months previous to filling out the questionnaires. All of these four women were from the American sample, with one being Catholic and three being Protestant. Fisher's exact test was used and showed a significant difference in recent births between nationalities ($p=0.045$, Fisher's exact test), with Americans being more likely to have given birth recently than British. There was not a difference between religions ($p=0.63$, Fisher's exact test). Due to the small numbers involved, this was not thought to be a potential significant confounding factor.

Menopause

Some of the women considered themselves to be menopausal, but reported having had a recent period. Women who considered themselves to be going through menopause were included if they had recently menstruated. Eleven women in total considered themselves to be going through/have gone

through menopause. There was not a significant difference in number of women who considered themselves to be going through menopause between the four groups ($p=0.42$, Fisher's Exact Test).

Hormone replacement therapy (HRT)

Women who reported they were using hormone replacement therapy were included in the sample due to the fact that they were still experiencing periods. Only two women were currently using HRT when they filled out the questionnaires, both of which were British Protestants. There was not a significant difference in number of women who reported that they were using HRT between the four groups ($p=0.35$, Fisher's Exact Test).

Currently menstruating

Women were asked whether or not they were currently in the bleeding phase of their periods whilst filling out the questionnaires. Fifty-one out of the 322 women (15.84%) were having their menstrual period when they filled out the questionnaires. There was not a significant difference across the four groups in number of women who were experiencing a menstrual bleed on the same day that they filled out the questionnaire ($\chi^2=0.77$, $df=3$, NS).

Cycle day

The day of the cycle that the woman would have been likely to be on was calculated using the reported first day of her last period, along with the date that she filled the questionnaires out. The mean day was 16.59 ± 12.88 , the median was 14 and the mode was 13. The spread between values was 1-114. A Kruskal-Wallis one-way ANOVA was used due to the distribution of data being positively skewed. This showed that there was not a significant difference in the day of the cycle that the questionnaire was filled out for the four groups ($\chi^2=6.33$, $df=3$, NS).

Length of cycle

Women were asked how long their cycle typically lasts. The mean number of days was 29.50 ± 9.60 , the median number of days was equal to the mode, at 28. The maximum value was 90 and the minimum value was 14, with a

slight positive skew in the data. A Kruskal-Wallis one-way ANOVA was used, and the analysis determined that there was not a significant difference between the four groups in the reported length of the menstrual cycle (chi square=3.24, df=3, NS).

1.6.3 Anxiety and depression levels

The HADS was used to investigate levels of anxiety and depression in the sample. The percentage of participants who scored above seven on the depression subscale of the HADS (cut-off point recommended as best for correctly classifying a possible mood disorder with a low proportion of false negatives by Hall et al., 1999; Zigmond & Snaith, 1983), indicating the presence of a possible depressive mood disorder, was 7.4 per cent. Forty-four per cent of women participants scored highly enough, 7 or above (again, recommended by Hall et al., 1999; Zigmond & Snaith, 1983), on the anxiety subscale on the HADS to suggest the possibility of an anxious mood disorder.

Chi-square tests showed no differences in depression status between national groups (chi square=0.22, df=1, NS), or between religious groups (chi square=0.41, df=1, NS). There were also no differences in anxiety status (caseness versus non-caseness) across national groups (chi square=1.65, df=1, NS), or across religious groups (chi square=0.17, df=1, NS).

Analyses of variance (ANOVAs) were performed using the overall anxiety factor score as a dependent variable, with nationality (US versus UK) and religion (Protestant versus Catholic) as the independent variables. These showed no significant differences between groups. (Depression: National groups ($F(1,314)=1.07$, NS), Religious groups ($F(1,318)=0.12$, NS), National/Religious group interaction ($F(1,314)=1.19$, NS), Anxiety: National groups ($F(1,318)=0.03$, NS), Religious groups ($F(1,314)=0.17$, NS), National/Religious group interaction ($F(1,314)=0.06$, NS)).

Anxiety and depression medication

There was a significant difference in incidence of anxiety or depression medication used between nationalities. Twenty-two of the 322 women (6.83%) were taking anxiety or depression medication, with Americans taking significantly more of this type of medication than their British counterparts ($p=0.045$, Fisher's Exact Test). The percentage of Americans in the sample taking anxiety or depression medication was 10.06 per cent, while the percentage of the British sample that was taking anxiety or depression medication was 4.05 per cent. There was not a significant difference in number of women taking anxiety or depression medication between the two religion groups ($p=1.00$, Fisher's Exact Test).

1.6.4 General health

Women were also asked whether or not they had other current health problems. There was a section where women could mark yes/no, and a section where they could explicate about the nature of these health problems. Fifty-seven of the 322 women (17.70%) reported having health problems at the time of filling out the questionnaires. There was not a significant difference in incidence of women reporting health problems between the four groups ($\text{chi-square}=3.40$, $\text{df}=3$, NS). The most popular response was asthma, with 3.1 per cent of the answers. No other answer had more than one response.

1.6.5 Religious converts

In total, 27 of the 322 women (8.39%) had converted to a different religion than their parents had belonged to. The participants showed no significant differences between any of the four groups for number of converts from parent's religion to their current religion ($\text{chi square}=6.31$, $\text{df}=3$, NS). Table 3 shows the number of women who converted from a particular religion to another religion. As can be seen from the table, the most common tendency was for women to convert from Catholicism to Protestantism.

Table 3. Number of women converting between religions

Religion Converted From	Religion Converted To	Number Converting
Catholic	Protestant	12
Protestant	Catholic	5
Catholic	Atheist	2
Protestant	Jewish	1
Protestant	Other	1

1.6.6 Description of the respondents to the religiosity questionnaire

The religiosity questionnaire was analysed to highlight differences and similarities in the religious demographics of the groups sampled. The results are presented below in terms of percentages and medians across national and religious cultural groups (see Tables 4-6). Median score was not provided for Question 2, as this was used to check whether or not Question 1 was a true reflection of the woman's church attendance.

As can be seen from Tables 4-6, Americans had higher overall religiosity scores than British women. American women rated church attendance (theirs and parents'), home religious practice (theirs and parents'), and the importance of religion (theirs and parents') higher than British women. This was further evidenced by Student's t-test, which showed higher mean scores for religiosity for the American sample than the British sample ($t=-9.98$, $df=320$, $p<.05$).

A similar but smaller result was found for Catholic women, who scored higher on religion questionnaire items than Protestant women. Catholic women rated church attendance (theirs and parents'), home religious practice (theirs and parents'), and importance of religions (theirs and parents') more highly than did Protestant women. This result was also shown to be significant using Student's t-test ($t=2.72$, $df=320$, $p<.05$), confirming that Catholics had higher mean scores than Protestants.

The cultural groups all rated their current religiosity as being about the same as it was before, with about 50 per cent of participants across all groups choosing this answer. Questions 9-13 asked the women what/who was most

influential in teaching them about their religion. As can be seen from Table 6, most women across all groups reported that their parents were most influential in teaching them about their religion. The importance of other influences (religious leaders, religious texts, others in the place of worship) was more variable across religions.

Question 13 asked the participants which other influences (not listed) might have been paramount in their religious upbringing. The most popular answer was school, with 13 per cent of the total responses. The British sample had a much higher percentage of women citing school as an influential factor (23% of British, 1% of Americans). Other recurring responses were friends and grandparents, with 4.0 per cent and 3.1 per cent of the total vote, respectively. Catholics had a higher percentage of "grandparent" responses than the Protestants (5.7% of Catholics, 1.1% of Protestants).

Table 4. Answers to the religiosity questionnaire across religious and national groups by percentage: Church attendance

	British	American	Catholic	Protestant
RQ1: Church Attendance Last Month	0.6% Daily 18.1% Weekly 5.3% Couple times 4.7% Once 71.3% Not attended	0.0% Daily 32.9% Weekly 20.8% Couple times 9.4% Once 36.9% Not attended	0.0% Daily 31.9% Weekly 12.8% Couple times 5.7% Once 49.6% Not attended	0.6% Daily 19.6% Weekly 12.3% Couple times 7.8% Once 59.8% Not attended
Median answer:	Not attended	Couple times	Not attended	Not attended
RQ2: Usual Church Attendance	72.5% Yes 0.6% No, daily 2.3% No, weekly 1.1% No, couple/month 6.7% No, several/year 12.3% No, special occasions only 4.1% No, don't usually attend	55.7% Yes 12.1% No, daily 10.1% No, weekly 3.4% No, couple/month 10.1% No, several/year 7.4% No, special occasions only 1.3% No, don't usually attend	62.4% Yes 7.1% No, daily 7.1% No, weekly 3.5% No, couple/month 6.4% No, several/year 9.9% No, special occasions only 3.5% No, don't usually attend	66.5% Yes 5.0% No, daily 5.0% No, weekly 1.1% No, couple/month 10.1% No, several/year 10.1% No, special occasions only 2.2% No, don't usually attend
RQ3: Parent's Church Attendance	1.2% Daily 42.4% Weekly 7.0% Couple/month 0.6% Monthly 5.2% Several/year 27.9% Special occasions 15.7% Never	2.7% Daily 71.1% Weekly 12.1% Couple/month 2.0% Monthly 2.7% Several/year 7.4% Special occasions 2.0% Never	2.1% Daily 70.2% Weekly 5.0% Couple/month 0.7% Monthly 3.5% Several/year 14.2% Special occasions 4.3% Never	1.7% Daily 44.4% Weekly 12.8% Couple/month 1.7% Monthly 4.4% Several/year 21.7% Special occasions 13.3% Never
Median answer:	Weekly	Weekly	Weekly	Weekly

Table 5. Answers to the religiosity questionnaire across religious and national groups by percentage: Religious activities in home and importance of religion

RQ4: Religious Activities in Home	18.6% Daily 6.4% Weekly 5.8% Couple /month 1.2% Monthly 4.7% Several/year 14.5% Special occasions 48.8% Never	53.0% Daily 14.8% Weekly 7.4% Couple/month 3.4% Monthly 4.0% Several/year 10.7% Special occasions 6.7% Never	38.3% Daily 11.3% Weekly 6.4% Couple/month 2.0% Monthly 2.8% Several/year 15.6% Special occasions 22.1% Never	31.7% Daily 9.4% Weekly 8.1% Couple/month 2.2% Monthly 5.6% Several/year 10.6% Special occasions 33.9% Never
Median answer:	Special occasions	Daily	Couple/month	Weekly-Couple/month
RQ5: Parent's Religious Activities in Home	18.6% Daily 11.6% Weekly 2.9% Couple/month 1.2% Monthly 4.1% Several/year 14.5% Special occasions 47.1% Never	46.6% Daily 13.5% Weekly 6.1% Couple/month 3.4% Monthly 6.8% Several/year 14.2% Special occasions 9.5% Never	36.9% Daily 15.6% Weekly 3.5% Couple/month 2.1% Monthly 5.7% Several/year 14.2% Special occasions 22.0% Never	27.4% Daily 10.1% Weekly 5.0% Couple/month 2.2% Monthly 5.0% Several/year 14.5% Special occasions 35.8% Never
Median answer:	Several/year	Weekly	Weekly-Couple/month	Couple/month
RQ6: Importance of Religion	22.9% Don't adhere 34.1% Not very 27.6% Somewhat 15.3%Very	5.4% Don't adhere 3.4% Not very 33.1% Somewhat 58.1%Very	7.2% Don't adhere 18.7% Not very 34.5% Somewhat 39.6%Very	20.7% Don't adhere 35.2% Not very 26.8% Somewhat 31.8%Very
Median answer:	Somewhat	Very	Somewhat	Somewhat
RQ7: Importance of Religion for Parents	13.5% Didn't adhere 28.8% Not very 31.8% Somewhat 25.9%Very	2.0% Didn't adhere 3.4% Not very 33.8% Somewhat 60.8%Very	5.0% Didn't adhere 8.6% Not very 33.1% Somewhat 53.2%Very	10.6% Didn't adhere 23.5% Not very 32.5% Somewhat 33.5%Very
Median answer:	Somewhat	Very	Somewhat	Somewhat

Table 6. Answers to the religiosity questionnaire across religious and national groups by percentage: Current religious beliefs and religious influences

RQ8: Current Religious Beliefs vs. Previous Beliefs	15.2% Now more 49.7% Now same 35.1% Now less	22.4% Now more 56.5% Now same 21.1% Now less	18.1% Now more 53.6% Now same 28.2% Now less	18.9% Now more 52.2% Now same 28.9% Now less
RQ9: Degree of Parental Influence on Religion	17.8% Not at all 29.6% A little 20.1% Somewhat 32.5% Mostly	3.0% Not at all 13.6% A little 17.4% Somewhat 65.9% Mostly	6.9% Not at all 16.8% A little 18.3% Somewhat 58.0% Mostly	14.7% Not at all 27.1% A little 19.4% Somewhat 38.8% Mostly
RQ10: Degree of Religious Leader Influence on Religion	35.0% Not at all 23.8% A little 30.0% Somewhat 11.3% Mostly	12.1% Not at all 28.2% A little 43.5% Somewhat 16.0% Mostly	20.6% Not at all 26.2% A little 40.5% Somewhat 12.7% Mostly	27.9% Not at all 25.5% A little 32.7% Somewhat 13.9% Mostly
RQ11: Degree of Religious Text Influence on Religion	37.3% Not at all 29.8% A little 25.5% Somewhat 7.5% Mostly	14.5% Not at all 38.2% A little 38.9% Somewhat 8.4% Mostly	22.8% Not at all 39.4% A little 30.7% Somewhat 7.1% Mostly	30.3% Not at all 29.1% A little 32.1% Somewhat 8.5% Mostly
RQ12: Degree of Other Person at Place of Worship Influence on Religion	51.0% Not at all 22.3% A little 18.5% Somewhat 8.3% Mostly	30.5% Not at all 22.1% A little 32.8% Somewhat 14.5% Mostly	41.9% Not at all 27.4% A little 18.5% Somewhat 12.1% Mostly	41.5% Not at all 18.3% A little 29.9% Somewhat 10.4% Mostly
RQ13: Other	0.0% Not at all 13.6% A little 35.6% Somewhat 50.8% Mostly	0.0% Not at all 6.5% A little 29.0% Somewhat 64.5% Mostly	0.0% Not at all 4.4% A little 31.1% Somewhat 64.4% Mostly	0.0% Not at all 17.8% A little 35.6% Somewhat 46.7% Mostly

Correlations between indicators of level of religiosity on the religiosity questionnaire

Religiosity was measured in three ways. The first indicator was church attendance, followed by religious ritual practice in the home, and finally importance of religion in the individual's life. As the data was normally distributed, Pearson product-moment correlations were computed between the three indicators of religiosity. All indicators were found to significantly positively correlate with each other (Church attendance*Religious Ritual in home $r=0.42$, Church attendance*Importance of religion $r=0.67$, Religious ritual in home*Importance of religion $r=0.74$).

Correlations between religiosity and MAQ and MDQ factors

Pearson product-moment correlations were calculated between the three indicators of religiosity and the MAQ and MDQ factors. Significant but weak negative correlations were found for all three markers of religiosity and the MAQF2 factor Bothersome (church attendance $r=-0.13$, religious ritual in the home $r=-0.13$, and religious importance $r=-0.13$). All of these showed a pattern of increased levels of religiosity being associated with decreased levels of bothersome attitudes about menstruation.

Again, significant but weak negative correlations were found for all three markers of religiosity and the MDQF5 factor Impaired Concentration (church attendance $r=-0.13$, religious ritual in the home $r=-0.12$, and religious importance $r=-0.20$). Once more, higher levels of religiosity were found to be associated with decreased levels of Impaired Concentration symptoms.

Two of the three indicators of religiosity were also correlated with other factors on the MDQ, which relate to mood. Church attendance showed a weak negative correlation with Behaviour Change ($r=-0.13$), and Religious Importance showed a weak negative correlation with Negative Affect ($r=-0.12$).

1.6.7 ANOVA results for exploratory analysis: Religion versus religiosity

A series of 2x2 analysis of variance tests were used to test for the main effects of religion (Catholic and Protestant) and religiosity (High versus Low) and also for the interaction of religion and religiosity on MAQ and MDQ factor total scores.

Religion versus religiosity analyses were performed in order to explore the possibility that main effects for religion in subsequent analyses could be due to levels of religiosity in either of the religious cultural groups instead of due to cultural membership to a particular religion. For example, if only those who were highly religious within the Catholic cultural group displayed significantly different mean scores from those who were highly religious within the Protestant cultural group, this would explain the differences between groups for these analyses. This would also mean that in order to be considered part of a religious cultural group one must be highly religious, with low religiosity participants not displaying the cultural attitudes of their self-reported religious cultural group.

The analysis split the participants up into religious cultural groups, and also into high and low religiosity groups. The dichotomous variable religiosity was formed by adding up the scores from the three indicators of religiosity (church attendance, religious ritual in the home, and importance of religion) and splitting the total score at the mean value, with half of the total scores on either side. This resulted in scores of 3-8 being classified as low levels of religiosity, and scores of 9-14 (the highest score) being classified as high levels of religiosity. Three was the lowest score achievable, as adding a value of one for each of the three indicators would result in three. Fourteen was the highest number achieved by any participant, although 16 was the highest possible score. The split between number of high and low religiosity was 147 (high religiosity) and 174 (low religiosity). Table 7 shows all results (main effects and interaction effects) for the MAQ factor totals, and Table 8 shows all results for the MDQ factor totals.

Religion

MAQ

There were no significant main effects for religion on any factors of the MAQ.

MDQ

There were no significant main effects for religion on any factors of the MDQ.

Religiosity

MAQ

A significant main effect for level of religiosity was found for the MAQ factor Bothering (F(4,317)=5.84, $p < 0.01$). Those with high levels of religiosity scored lower on the factor than those with low levels of religiosity, indicating that high religiosity respondents reported less bothersome attitudes towards menstruation.

MDQ

A significant main effect was also found for the MDQ factor Impaired Concentration (F(4,317)=4.92, $p < 0.01$). Those with low levels of religiosity scored higher on the factor than those with high levels of religiosity, showing that low religiosity respondents reported experiencing more impaired concentration allied to menstruation.

Interactions between religion and religiosity

MAQ

There were no significant interactions between religion and religiosity on any factors of the MAQ.

MDQ

There were no significant interactions between religion and religiosity for any of the MDQ factors.

Table 7. Means, standard deviations, and ANOVA test results for the MAQ with religion and religiosity as independent variables

	Catholic Mean ± SD	Protestant Mean ± SD	High Religiosity Mean ± SD	Low Religiosity Mean ± SD	Main Effect – Religion	Main Effect – Religiosity	Interaction Result
Menstruation as a Debilitating Event (MAQF1)	45.99 ± 10.90	44.82 ± 10.86	45.01 ± 11.27	45.61 ± 10.56	F(3,318)=0.99, NS	F(3,318)=0.45, NS	F(3,318)=0.21, NS
Menstruation as a Bothersome Event (MAQF2)	31.60 ± 6.38	30.68 ± 6.32	29.89 ± 6.70	32.09 ± 5.88	F(3,318)=3.19, NS	F(3,318)=10.56, p<0.01	F(3,318)=0.51, NS
Menstruation as a Natural Event (MAQF3)	21.54 ± 3.89	22.18 ± 3.36	22.12 ± 3.95	21.71 ± 3.29	F(3,318)=2.90, NS	F(3,318)=1.66, NS	F(3,318)=0.18, NS
Anticipation and the Prediction of the Onset of Menstruation (MAQF4)	25.93 ± 6.18	25.64 ± 5.63	25.76 ± 5.93	25.77 ± 5.83	F(3,318)=0.15, NS	F(3,318)=0.03, NS	F(3,318)=0.79, NS
The Denial of Any Effect of Menstruation (MAQF5)	16.82 ± 6.67	16.32 ± 5.86	17.16 ± 6.50	16.02 ± 5.95	F(3,318)=0.30, NS	F(3,318)=2.61, NS	F(3,318)=0.54, NS

Table 8. Means, standard deviations, and ANOVA test results for the MDQ with religion and religiosity as independent variables

	Catholic Mean ± SD	Protestant Mean ± SD	High Religiosity Mean ± SD	Low Religiosity Mean ± SD	Main Effect – Religion	Main Effect – Religiosity	Interaction Result
Pain (MDQF1)	12.65 ± 3.62	12.55 ± 3.80	12.48 ± 3.71	12.68 ± 3.73	F(3,318)=0.11, NS	F(3,318)=0.20, NS	F(3,318)=0.31, NS
Water Retention (MDQF2)	9.44 ± 2.81	9.17 ± 2.84	9.31 ± 2.74	9.26 ± 2.90	F(3,318)=0.40, NS	F(3,318)=0.00, NS	F(3,318)=0.01, NS
Autonomic Reactions (MDQF3)	5.48 ± 1.87	5.56 ± 2.00	5.34 ± 1.95	5.67 ± 1.93	F(3,318)=0.04, NS	F(3,318)=2.42, NS	F(3,318)=0.35, NS
Negative Affect (MDQF4)	17.16 ± 5.50	16.92 ± 5.60	16.42 ± 5.44	17.53 ± 5.61	F(3,318)=0.41, NS	F(3,318)=3.26, NS	F(3,318)=0.14, NS
Impaired Concentration (MDQF5)	12.14 ± 4.22	12.06 ± 4.72	11.29 ± 4.05	12.78 ± 4.75	F(3,318)=0.36, NS	F(3,318)=8.76, p<0.01	F(3,318)=0.38, NS
Behaviour Change (MDQF6)	8.42 ± 2.96	8.38 ± 3.27	8.09 ± 2.95	8.65 ± 3.28	F(3,318)=0.09, NS	F(3,318)=2.93, NS	F(3,318)=0.64, NS
Arousal (MDQF7)	7.43 ± 2.54	7.45 ± 2.53	7.51 ± 2.77	7.38 ± 2.31	F(3,318)=0.02, NS	F(3,318)=0.18, NS	F(3,318)=0.08, NS
Control (MDQF8)	6.61 ± 1.24	6.73 ± 1.72	6.62 ± 1.37	6.73 ± 1.65	F(3,318)=0.33, NS	F(3,318)=0.20, NS	F(1,318)=0.67, NS

1.6.8 ANOVA results for hypothesis 1: Cultures will vary significantly in menstrual attitudes and distress

A series of 2x2 analysis of variance tests were used to test for the effects of nationality (American and British) and religion (Catholic and Protestant), and also for the interaction of nationality and religion on MAQ and MDQ factor total scores. The results are presented below in terms of significant differences across nationalities, then across religions, and finally interactions between nationality and religion. Table 9 shows all results (main effects and interaction effects) for the MAQ factor totals, and Table 10 shows all results for the MDQ factor totals.

Nationality

MAQ

There were significant main effects for the independent variable 'nationality' on three factors out of five of the MAQ: Menstruation as a Debilitating Event (MAQF1), Menstruation as a Natural Event (MAQF3) and The Denial of Any Effect of Menstruation (MAQF5). The British sample scored significantly higher than the American sample for Menstruation as a Debilitating Event ($F(1,318)=8.39, p<0.01$). For Menstruation as a Natural Event, the American sample scored significantly higher than the British sample ($F(1,318)=6.64, p<0.01$). The American sample also scored significantly higher than the British sample on The Denial of Any Effect of Menstruation factor ($F(1,318)=12.51, p<0.01$).

MDQ

There were significant main effects for the independent variable 'nationality' on four factors out of eight of the MDQ: Water Retention (MDQF2), Autonomic Reactions (MDQF3), Negative Affect (MDQF4), and Impaired Concentration (MDQF5). There was a significant difference in scores between the nationalities for Negative Affect ($F(1,318)=10.32, p<0.01$), Impaired Concentration ($F(1,318)=33.10, p<0.01$), Water Retention ($F(1,318)=4.22, p<0.05$) and Autonomic Reactions ($F(1,318)=3.98, p<0.05$), with British women reporting worse symptoms than American women.

Religion

MAQ

There was not a significant main effect for religion on any of the MAQ factors.

MDQ

There was not a significant main effect for religion on any of the MDQ factors.

Interactions between nationality and religion

MAQ

There was not a significant interaction between nationality and religion for any of the factors of the MAQ.

MDQ

There was not a significant interaction between nationality and religion for any of the factors of the MDQ.

Table 9. Means, standard deviations and ANOVA test results for the MAQ with nationality and religion as independent variables

	British Mean \pm SD	American Mean \pm SD	Catholic Mean \pm SD	Protestant Mean \pm SD	Main Effect – Nationality	Main Effect – Religion	Interaction Result
Menstruation as a Debilitating Event (MAQF1)	46.90 \pm 10.95	43.51 \pm 10.53	45.99 \pm 10.90	44.82 \pm 10.86	F(1,318)=8.39, p<0.01	F(1,318)=1.34, NS	F(1,318)=0.03, NS
Menstruation as a Bothersome Event (MAQF2)	31.26 \pm 6.37	30.88 \pm 6.35	31.60 \pm 6.38	30.68 \pm 6.32	F(1,318)=0.72, NS	F(1,318)=1.51, NS	F(1,318)=3.70, NS
Menstruation as a Natural Event (MAQF3)	21.47 \pm 3.59	22.40 \pm 3.59	21.54 \pm 3.89	22.18 \pm 3.36	F(1,318)=6.64, p<0.01	F(1,318)=2.85, NS	F(1,318)=1.64, NS
Anticipation and the Prediction of the Onset of Menstruation (MAQF4)	26.08 \pm 6.24	25.40 \pm 5.39	25.93 \pm 6.18	25.64 \pm 5.63	F(1,318)=1.34, NS	F(1,318)=0.22, NS	F(1,318)=0.73, NS
The Denial of the Effect of Menstruation (MAQF5)	15.42 \pm 5.56	17.85 \pm 6.70	16.82 \pm 6.67	16.32 \pm 5.86	F(1,318)=12.51, p<0.01	F(1,318)=0.25, NS	F(1,318)=0.22, NS

Table 10. Means, standard deviations, and ANOVA test results for the MDQ with nationality and religion as independent variables

	British Mean ± SD	American Mean ± SD	Catholic Mean ± SD	Protestant Mean ± SD	Main Effect – Nationality	Main Effect - Religion	Interaction Result
Pain (MDQF1)	12.55 ± 3.54	12.64 ± 3.92	12.65 ± 3.62	12.55 ± 3.80	F(1,318)=0.05, NS	F(1,318)=0.06, NS	F(1,318)=0.10, NS
Water Retention (MDQF2)	9.57 ± 2.93	8.96 ± 2.68	9.44 ± 2.81	9.17 ± 2.84	F(1,318)=4.22, p<0.05	F(1,318)=0.94, NS	F(1,318)=0.41, NS
Autonomic Reactions (MDQF3)	5.71 ± 2.03	5.30 ± 1.82	5.48 ± 1.87	5.56 ± 2.00	F(1,318)=3.98, p<0.05	F(1,318)=0.10, NS	F(1,318)=1.49, NS
Negative Affect (MDQF4)	17.90 ± 5.67	16.01 ± 5.25	17.16 ± 5.50	16.92 ± 5.60	F(1,318)=10.32, p<0.01	F(1,318)=0.30, NS	F(1,318)=0.84, NS
Impaired Concentration (MDQF5)	13.36 ± 4.78	10.63 ± 3.66	12.14 ± 4.22	12.06 ± 4.72	F(1,318)=33.10, p<0.01	F(1,318)=0.28, NS	F(1,318)=0.64, NS
Behaviour Change (MDQF6)	8.53 ± 3.14	8.24 ± 3.14	8.42 ± 2.96	8.38 ± 3.27	F(1,318)=0.91, NS	F(1,318)=0.01, NS	F(1,318)=1.41, NS
Arousal (MDQF7)	7.38 ± 2.41	7.51 ± 2.67	7.43 ± 2.54	7.45 ± 2.53	F(1,318)=0.16, NS	F(1,318)=0.01, NS	F(1,318)=0.22, NS
Control (MDQF8)	6.79 ± 1.66	6.54 ± 1.34	6.61 ± 1.24	6.73 ± 1.72	F(1,318)=1.72, NS	F(1,318)=0.30, NS	F(1,318)=0.59, NS

1.6.9 ANOVA results for exploratory analysis: Anxiety/Depression as a third variable

Due to the strong associations between anxiety caseness and the menstrual cycle and also the large number of women exhibiting anxiety caseness in this sample (44%); anxiety caseness was analysed as a third variable with the MAQ and MDQ scores. (Depression was not used since only 7.4 per cent of the sample tested positive for possible depression caseness, as indicated by the depression subscale of the HADS). This analysis was carried out with nationality and religion also as independent variables in order to check for significant interactions between the variables as well as a main effect for anxiety. Any significant main effects and interactions would then be added into regression analyses.

HADS as a third variable

Anxiety was used as a third independent variable in a series of 2x2x2 analyses of variance tests. The factor totals were analysed for main effect and interaction significance. The results are presented below in terms of significant differences across nationalities, across religions, and then across levels of anxiety (anxiety caseness vs. anxiety non-caseness) as measured by the HADS (see Table 11 for means, standard deviations, and ANOVA results for the MAQ and Table 12 for means, standard deviations and ANOVA results for the MDQ). Finally, interactions between nationality and religion, nationality and anxiety, and religion and anxiety are presented (see Tables 13 and 14 for means, standard deviations, and ANOVA test results relating to the 2-way interactions).

This study was originally powered for the *a priori* hypothesis of differences between nationality and religion in a 2x2 analysis of variance design. The addition of anxiety caseness as a third independent variable in order to perform these exploratory analyses slightly changed the analysis of variance results. The ANOVA became more complex, and levels of standard error increased whilst N per group decreased. This resulted in a few of the main effects being dropped, as they ceased to be statistically significant. Surprisingly, in one case, a new main effect appeared. This section outlines

where these changes to the ANOVA results occurred, and reports the main effect significance for anxiety caseness and any interactions between the independent variables.

Nationality

MAQ

The results for the MAQ factors were the same for nationality as in Section 1.6.8.

MDQ

Negative Affect (MDQ4) and Impaired Concentration (MDQF5) continued to be significant main effects across nationalities when anxiety caseness was added as a third variable. However, both Water Retention (MDQF2) and Autonomic Reactions (MDQF3) dropped from significance.

Religion

MAQ

With HADS anxiety caseness added as a third variable, religion was found to have a significant main effect for one of the MAQ factors, Menstruation as a Natural Event (MAQF3). Protestants scored significantly higher than Catholics on this variable, indicating that Protestants view menstruation as a more natural event ($F(1,314)=4.05, p<0.05$).

MDQ

The results for the MDQ factors were the same for religion as in Section 1.6.8.

HADS anxiety caseness

MAQ

There was a significant main effect for anxiety caseness, as indicated by the HADS, on two of the five MAQ factors: Menstruation as a Debilitating Event (MAQF1) and Menstruation as a Bothersome Event (MAQF2). Those participants with higher anxiety scored significantly higher for Menstruation

as a Debilitating Event ($F(1,314)=12.39, p<0.01$) and for Menstruation as Bothersome Event ($F(1,314)=4.70, p<0.05$).

MDQ

There were significant main effects for anxiety caseness on six of the eight factors of the MDQ: Pain (MDQF1), Autonomic Reactions (MDQF3), Negative Affect (MDQF4), Impaired Concentration (MDQF5), Behaviour Change (MDQF6) and Control (MDQF8). For all six main effects, those with higher anxiety scored higher than those with lower anxiety: Pain ($F(1,314)=14.52, p<0.01$), Autonomic Reactions ($F(1,314)=10.46, p<0.01$), Negative Affect ($F(1,314)=34.08, p<0.01$), Impaired Concentration ($F(1,314)=25.28, p<0.01$), Behaviour Change ($F(1,314)=26.09, p<0.01$), and Arousal ($F(1,314)=14.57, p<0.01$).

Table 11. Anxiety caseness means, standard deviations and ANOVA main effect results for the MAQ factors

	Anxiety Caseness Mean \pm SD	Anxiety Non-caseness Mean \pm SD	Anxiety Caseness Main Effect ANOVA Test Result
Menstruation as a Debilitating Event (MAQF1)	47.89 \pm 10.35	43.32 \pm 10.88	F(7,314)=12.39, p<0.01
Menstruation as a Bothersome Event (MAQF2)	31.98 \pm 5.83	30.38 \pm 6.67	F(7,314)=4.70, p<0.05
Menstruation as a Natural Event (MAQF3)	21.64 \pm 3.82	22.10 \pm 3.43	F(7,314)=1.45, NS
Anticipation and the Prediction of the Onset of Menstruation (MAQF4)	26.50 \pm 5.64	25.19 \pm 5.99	F(7,314)=3.14, NS
The Denial of Any Effect of Menstruation (MAQF5)	16.35 \pm 6.27	16.69 \pm 6.19	F(7,314)=0.01, NS

Table 12. Anxiety caseness means, standard deviations and ANOVA main effect results for the MDQ factors

	Anxiety Caseness Mean \pm SD	Anxiety Non-caseness Mean \pm SD	Anxiety Caseness Main Effect ANOVA Test Result
Pain (MDQF1)	13.51 \pm 3.73	11.87 \pm 3.55	F(7,314)=14.57, p<0.01
Water Retention (MDQF2)	9.57 \pm 2.94	9.06 \pm 2.72	F(7,314)=1.98, NS
Autonomic Reactions (MDQF3)	5.94 \pm 2.11	5.19 \pm 1.74	F(7,314)=10.46, p<0.01
Negative Affect (MDQF4)	19.04 \pm 5.52	15.44 \pm 5.05	F(7,314)=34.08, p<0.01
Impaired Concentration (MDQF5)	13.59 \pm 5.10	10.92 \pm 3.56	F(7,314)=25.28, p<0.01
Behaviour Change (MDQF6)	9.40 \pm 3.41	7.60 \pm 2.65	F(7,314)=26.09, p<0.01
Arousal (MDQF7)	7.73 \pm 2.60	7.21 \pm 2.46	F(7,314)=14.57, p<0.01
Control (MDQF8)	6.99 \pm 1.92	6.43 \pm 1.07	F(7,314)=1.98, NS

Table 13. Means, standard deviations and ANOVA 2-way interaction results for the MAQ factors with nationality, religion and anxiety caseness as independent variables

	British Anxiety Caseness Mean \pm SD	British Anxiety Non-caseness Mean \pm SD	American Anxiety Caseness Mean \pm SD	American Anxiety Non-caseness Mean \pm SD	Catholic Anxiety Caseness Mean \pm SD	Catholic Anxiety Non-caseness Mean \pm SD	Protestant Anxiety Caseness Mean \pm SD	Protestant Anxiety Non-caseness Mean \pm SD	Nationality * Anxiety Caseness Interaction ANOVA Test Result	Religion * Anxiety Caseness Interaction ANOVA Test Result
Menstruation as a Debilitating Event (MAQF1)	48.72 \pm 11.16	45.26 \pm 10.55	46.75 \pm 9.10	41.33 \pm 10.91	48.02 \pm 10.12	44.30 \pm 11.29	47.78 \pm 10.60	42.58 \pm 10.56	F(7,314)=0.86, NS	F(7,314)=0.30, NS
Menstruation as a Bothersome Event (MAQF2)	31.95 \pm 6.03	30.64 \pm 6.62	32.02 \pm 5.59	30.11 \pm 6.74	32.63 \pm 5.77	30.75 \pm 6.76	31.45 \pm 5.86	30.10 \pm 6.62	F(7,314)=0.35, NS	F(7,314)=0.12, NS
Menstruation as a Natural Event (MAQF3)	21.04 \pm 3.80	21.86 \pm 3.36	22.47 \pm 3.72	22.35 \pm 3.51	20.63 \pm 4.38	22.30 \pm 3.26	22.47 \pm 3.07	21.95 \pm 3.57	F(7,314)=2.18, NS	F(7,314)=7.96, p<0.01
Anticipation and the Prediction of the Onset of Menstruation (MAQF4)	26.63 \pm 6.16	25.58 \pm 6.31	26.32 \pm 4.88	24.79 \pm 5.65	26.56 \pm 5.50	25.40 \pm 6.68	26.45 \pm 5.79	25.03 \pm 5.45	F(7,314)=0.37, NS	F(7,314)=0.01, NS
The Denial of Any Effect of Menstruation (MAQF5)	14.82 \pm 5.54	15.96 \pm 5.55	18.45 \pm 6.65	17.44 \pm 6.74	17.34 \pm 6.88	16.39 \pm 6.51	15.54 \pm 5.65	16.91 \pm 5.97	F(7,314)=2.19, NS	F(7,314)=2.39, NS

Table 14. Means, standard deviations and ANOVA 2-way interaction results for the MDQ factors with nationality, religion and anxiety caseness as independent variables

	British Anxiety Caseness Mean \pm SD	British Anxiety Non- caseness Mean \pm SD	American Anxiety Caseness Mean \pm SD	American Anxiety Non- caseness Mean \pm SD	Catholic Anxiety Caseness Mean \pm SD	Catholic Anxiety Non- caseness Mean \pm SD	Protestant Anxiety Caseness Mean \pm SD	Protestant Anxiety Non- caseness Mean \pm SD	Nationality * Anxiety Caseness Interaction ANOVA Test Result	Religion * Anxiety Caseness Interaction ANOVA Test Result
Pain (MDQF1)	13.07 \pm 3.51	12.08 \pm 3.53	14.10 \pm 3.97	11.65 \pm 3.59	12.98 \pm 3.68	12.36 \pm 3.57	13.94 \pm 3.74	11.50 \pm 3.52	F(7,314)=4.44, p<0.05	F(7,314)=5.24, p<0.05
Water Retention (MDQF2)	9.65 \pm 3.06	9.49 \pm 2.82	9.47 \pm 2.80	8.62 \pm 2.56	9.66 \pm 2.66	9.26 \pm 2.94	9.50 \pm 3.17	8.91 \pm 2.56	F(7,314)=1.57, NS	F(7,314)=0.07, NS
Autonomic Reactions (MDQF3)	5.91 \pm 2.02	5.53 \pm 2.03	5.98 \pm 2.24	4.84 \pm 1.30	5.52 \pm 1.63	5.44 \pm 2.06	6.29 \pm 2.38	5.00 \pm 1.44	F(7,314)=4.83, p<0.05	F(7,314)=9.03, p<0.01
Negative Affect (MDQF4)	19.23 \pm 5.68	16.70 \pm 5.42	18.77 \pm 5.34	14.15 \pm 4.30	18.70 \pm 5.41	15.87 \pm 5.27	19.31 \pm 5.64	15.12 \pm 4.88	F(7,314)=4.19, p<0.05	F(7,314)=1.42, NS
Impaired Concentration (MDQF5)	14.83 \pm 5.16	12.03 \pm 3.98	11.90 \pm 4.54	9.78 \pm 2.63	12.92 \pm 4.51	11.49 \pm 3.88	14.14 \pm 5.51	10.49 \pm 3.24	F(7,314)=0.25, NS	F(7,314)=4.91, p<0.05
Behaviour Change (MDQF6)	9.33 \pm 3.44	7.80 \pm 2.66	9.50 \pm 3.41	7.39 \pm 2.65	8.97 \pm 2.99	7.96 \pm 2.88	9.76 \pm 3.70	7.33 \pm 2.45	F(7,314)=1.21, NS	F(7,314)=5.02, p<0.05
Arousal (MDQF7)	7.37 \pm 2.40	7.40 \pm 2.43	8.23 \pm 2.79	7.02 \pm 2.48	7.53 \pm 2.44	7.35 \pm 2.63	7.90 \pm 2.72	7.11 \pm 2.33	F(7,314)=5.85, p<0.05	F(7,314)=1.28, NS
Control (MDQF8)	7.07 \pm 2.05	6.54 \pm 1.17	6.87 \pm 1.72	6.33 \pm 0.96	6.67 \pm 1.48	6.56 \pm 1.01	7.24 \pm 2.19	6.34 \pm 1.17	F(7,314)=0.18, NS	F(7,314)=4.44, p<0.05

Interactions between nationality and religion

MAQ

The results for the MAQ factors were the same for the interaction between nationality and religion as in Section 1.6.8.

MDQ

The results for the MDQ factors were the same for the interaction between nationality and religion as in Section 1.6.8.

Interactions between nationality and HADS anxiety caseness

MAQ

There were no significant interactions between nationality and HADS anxiety caseness for the MAQ.

MDQ

There were significant interactions between nationality and HADS anxiety caseness on four of the eight factors of the MDQ: Pain (MDQF1) ($F(1,314)=4.44$, $p<0.05$), Autonomic Reactions (MDQF3) ($F(1,314)=4.83$, $p<0.05$), Negative Affect (MDQF4) ($F(1,314)=4.19$, $p<0.05$), and Arousal (MDQF7) ($F(1,314)=5.85$, $p<0.05$). As can be seen from Figures 1 – 4, the interactions for symptom reporting follow a consistent pattern. The direction of these interactions show that anxious American respondents rate their menstrual symptoms significantly higher than non-anxious Americans, whilst differences between British women are smaller (negative affect) or non-significant. Tables 15 - 18 accompany Figures 1 - 4, showing where the significant differences between groups were found.

Figure 1. Interaction between nationality and anxiety caseness for the MDQ factor Pain

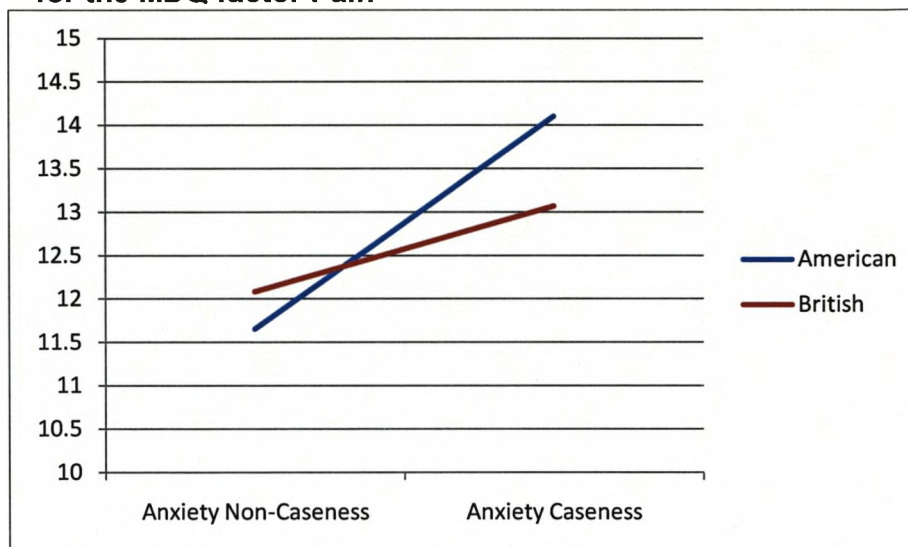


Table 15. Bonferroni t' follow up test significance for the interaction between nationality and anxiety caseness for the MDQ factor Pain

Nationality + HADS Anxiety Caseness	Nationality + Anxiety Caseness
British Non-caseness	American Non-caseness British Caseness American Caseness
American Non-caseness	British Non-caseness British Caseness American Caseness
British Caseness	British Non-caseness American Non-caseness American Caseness
American Caseness	British Non-caseness American Non-caseness British Caseness

Figure 2. Interaction between nationality and anxiety caseness for the MDQ factor Autonomic Reactions

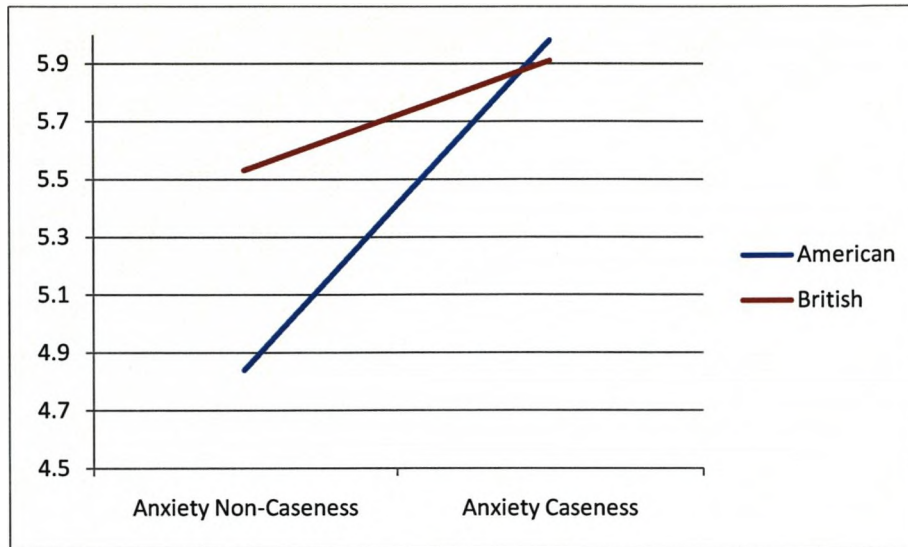


Table 16. Bonferroni t' follow up test significance for the interaction between nationality and anxiety caseness for the MDQ factor Autonomic Reactions

Nationality + HADS Anxiety Caseness	Nationality + Anxiety Caseness
British Non-caseness	American Non-caseness British Caseness American Caseness
American Non-caseness	British Non-caseness British Caseness American Caseness
British Caseness	British Non-caseness American Non-caseness American Caseness
American Caseness	British Non-caseness American Non-caseness British Caseness

Figure 3. Interaction between nationality and anxiety caseness for the MDQ factor Negative Affect

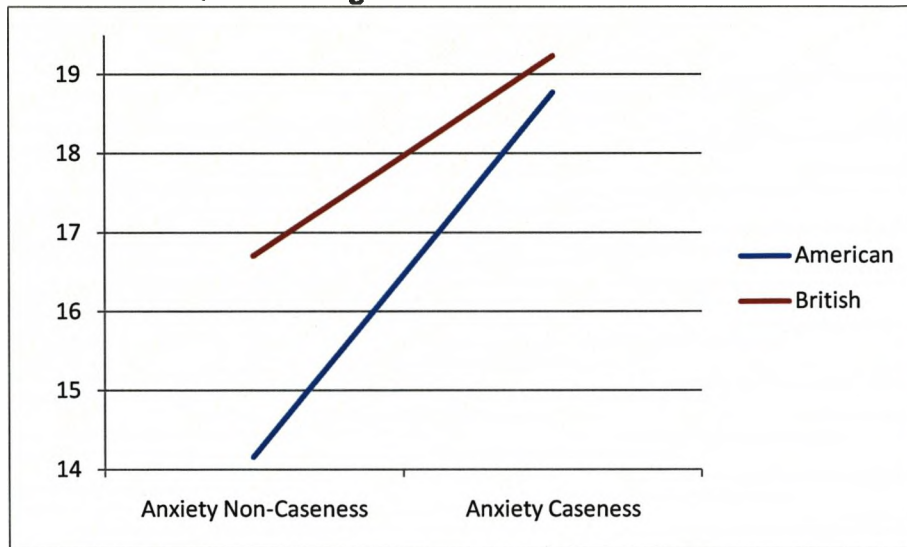


Table 17. Bonferroni t' follow up test significance for the interaction between nationality and anxiety caseness for the MDQ factor Negative Affect

Nationality + HADS Anxiety Caseness	Nationality + Anxiety Caseness
British Non-caseness	American Non-caseness British Caseness American Caseness
American Non-caseness	British Non-caseness British Caseness American Caseness
British Caseness	British Non-caseness American Non-caseness American Caseness
American Caseness	British Non-caseness American Non-caseness British Caseness

Figure 4. Interaction between nationality and anxiety caseness for the MDQ factor Arousal

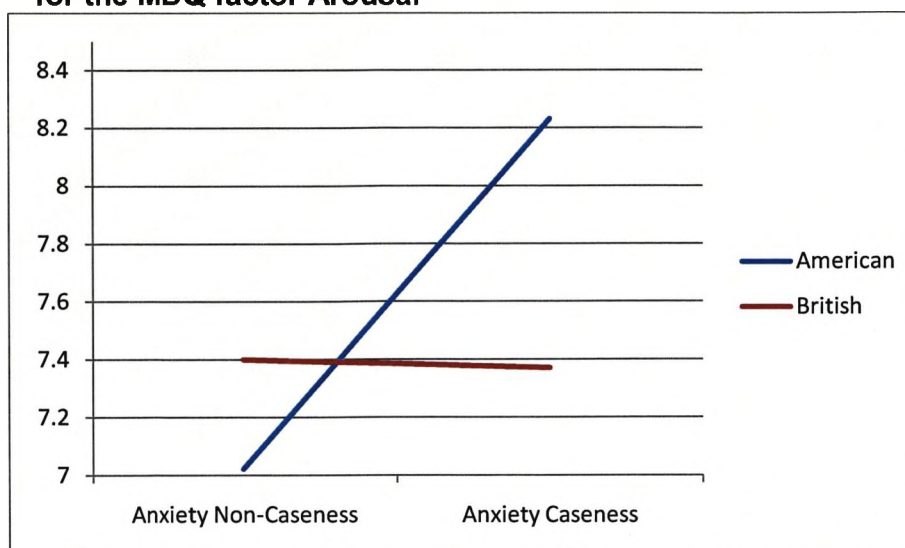


Table 18. Bonferroni t' follow up test significance for the interaction between nationality and anxiety caseness for the MDQ factor Arousal

Nationality + HADS Anxiety Caseness	Nationality + Anxiety Caseness
British Non-caseness	American Non-caseness British Caseness American Caseness
American Non-caseness	British Non-caseness British Caseness American Caseness
British Caseness	British Non-caseness American Non-caseness American Caseness
American Caseness	British Non-caseness American Non-caseness British Caseness

Interactions between religion and HADS anxiety caseness

MAQ

There was one significant interaction between religion and HADS anxiety caseness for the MAQ, which occurred for the factor Menstruation as a Natural Event (MAQF3), ($F(1,314)=7.96, p<0.01$). The direction of the interaction, as shown in Figure 5, is such that Catholics with anxiety scored

much lower on the MAQ factor Menstruation as a Natural Event than did Protestants with anxiety or Catholics without anxiety. Table 19 accompanies Figure 5. This shows that in this sample, Catholics with anxiety have the attitude that menstruation is less natural than Catholics without anxiety or Protestants with anxiety.

Figure 5. Interaction between religion and anxiety caseness for the MAQ factor Menstruation as a Natural Event

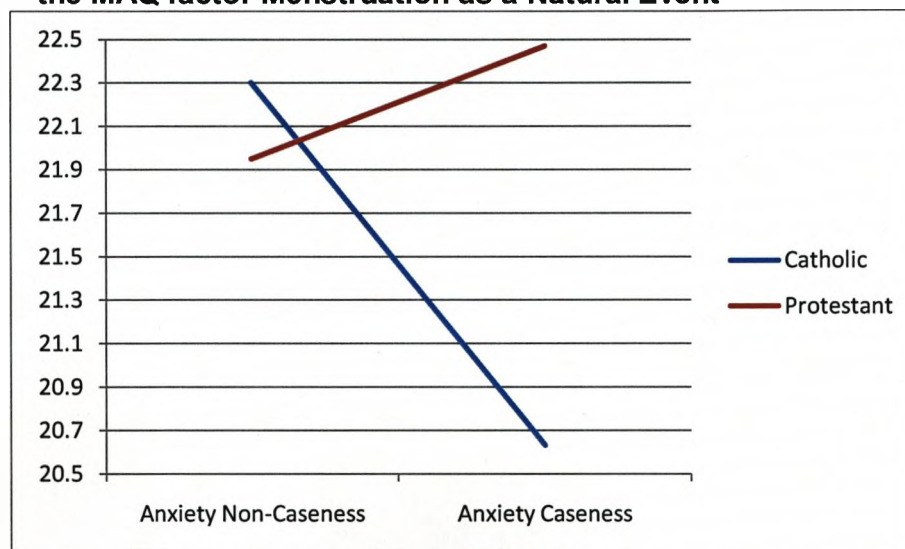


Table 19. Bonferroni t' follow up test significance for the interaction between religion and anxiety caseness for the MAQ factor Menstruation as a Natural Event

Religion + HADS Anxiety Caseness	Religion + Anxiety Caseness
Catholic Non-caseness	Protestant Non-caseness Catholic Caseness Protestant Caseness
Protestant Non-caseness	Catholic Non-caseness Catholic Caseness Protestant Caseness
Catholic Caseness	Catholic Non-caseness Protestant Non-caseness Protestant Caseness
Protestant Caseness	Catholic Non-caseness Protestant Non-caseness Catholic Caseness

MDQ

There were significant interactions between religion and HADS anxiety caseness on five of the eight factors of the MDQ: Pain (MDQF1) ($F(1,314)=5.24$, $p<0.05$), Autonomic Reactions (MDQF3) ($F(1,314)=9.03$, $p<0.01$), Impaired Concentration (MDQF5) ($F(1,314)=4.91$, $p<0.05$), Behaviour Change (MDQF6) ($F(1,314)=5.02$, $p<0.05$) and Control (MDQF8) ($F(1,314)=4.44$, $p<0.05$). Similar to the nationality and HADS anxiety score interactions for the MDQ, there was a pattern for the religion and HADS anxiety scores. As can be seen from Figures 6 – 10, the general direction of these interactions showed that anxious Protestant women rated menstrual symptoms significantly higher than non-anxious Protestants, whilst differences in Catholic women were smaller (Behaviour Change) or non-significant. Tables 20 - 24 accompany Figures 6 – 10.

Figure 6. Interaction between religion and anxiety caseness for the MDQ factor Pain

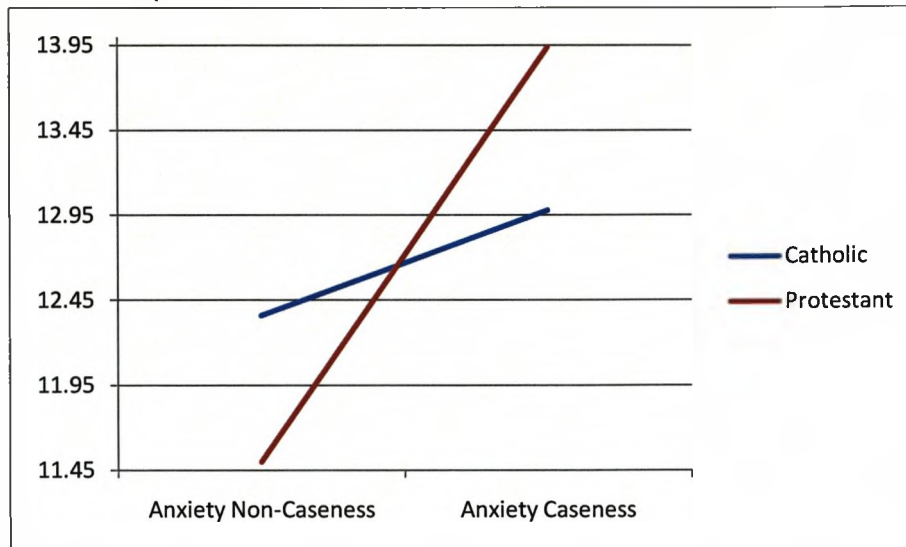


Table 20. Bonferroni t' follow up test significance for the interaction between religion and anxiety caseness for the MDQ factor Pain

Religion + HADS Anxiety Caseness	Religion + Anxiety Caseness
Catholic Non-caseness	Protestant Non-caseness Catholic Caseness Protestant Caseness
Protestant Non-caseness	Catholic Non-caseness Catholic Caseness Protestant Caseness
Catholic Caseness	Catholic Non-caseness Protestant Non-caseness Protestant Caseness
Protestant Caseness	Catholic Non-caseness Protestant Non-caseness Catholic Caseness

Figure 7. Interaction between religion and anxiety caseness for the MDQ factor Autonomic Reactions

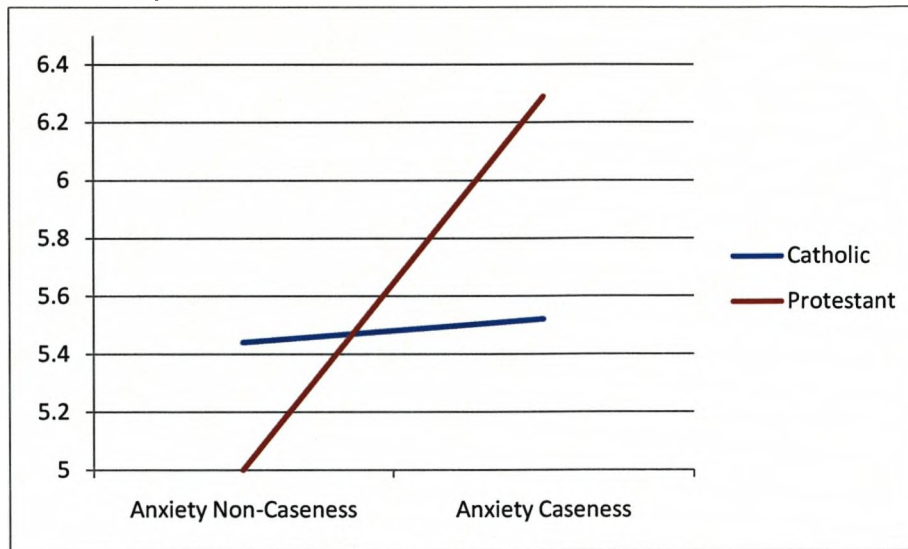


Table 21. Bonferroni t' follow up test significance for the interaction between religion and anxiety caseness for the MDQ factor Autonomic Reactions

Religion + HADS Anxiety Caseness	Religion + Anxiety Caseness
Catholic Non-caseness	Protestant Non-caseness Catholic Caseness Protestant Caseness
Protestant Non-caseness	Catholic Non-caseness Catholic Caseness Protestant Caseness
Catholic Caseness	Catholic Non-caseness Protestant Non-caseness Protestant Caseness
Protestant Caseness	Catholic Non-caseness Protestant Non-caseness Catholic Caseness

Figure 8. Interaction between religion and anxiety caseness for the MDQ factor Impaired Concentration

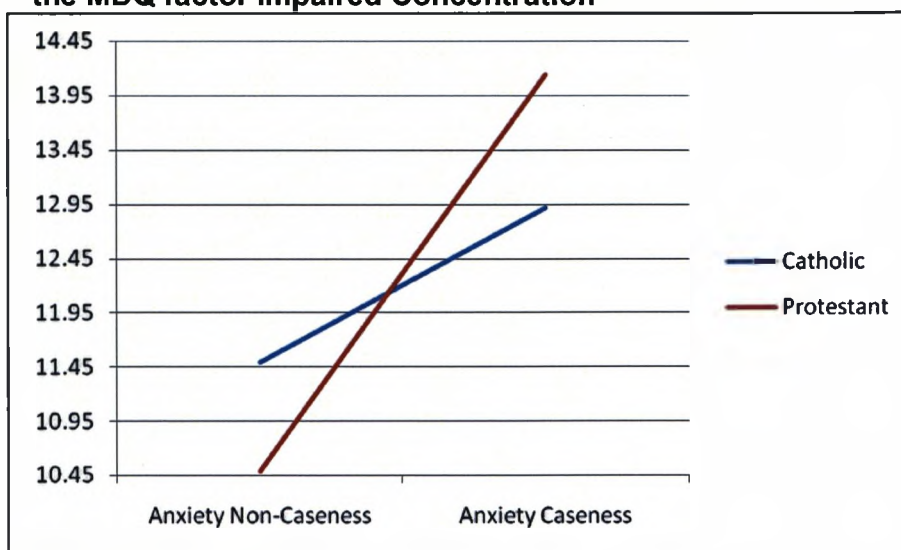


Table 22. Bonferroni t' follow up test significance for the interaction between religion and anxiety caseness for the MDQ factor Impaired Concentration

Religion + HADS Anxiety Caseness	Religion + Anxiety Caseness
Catholic Non-caseness	Protestant Non-caseness Catholic Caseness Protestant Caseness
Protestant Non-caseness	Catholic Non-caseness Catholic Caseness Protestant Caseness
Catholic Caseness	Catholic Non-caseness Protestant Non-caseness Protestant Caseness
Protestant Caseness	Catholic Non-caseness Protestant Non-caseness Catholic Caseness

Figure 9. Interaction between religion and anxiety caseness for the MDQ factor Behaviour Change

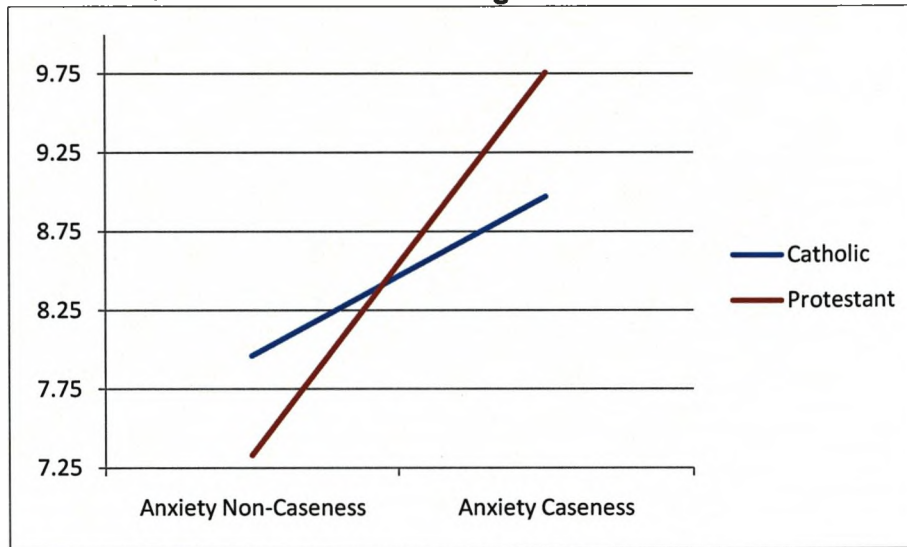


Table 23. Bonferroni t' follow up test significance for the interaction between religion and anxiety caseness for the MDQ factor Behaviour Change

Religion + HADS Anxiety Caseness	Religion + Anxiety Caseness
Catholic Non-caseness	Protestant Non-caseness Catholic Caseness Protestant Caseness
Protestant Non-caseness	Catholic Non-caseness Catholic Caseness Protestant Caseness
Catholic Caseness	Catholic Non-caseness Protestant Non-caseness Protestant Caseness
Protestant Caseness	Catholic Non-caseness Protestant Non-caseness Catholic Caseness

Figure 10. Interaction between religion and anxiety caseness for the MDQ factor Control

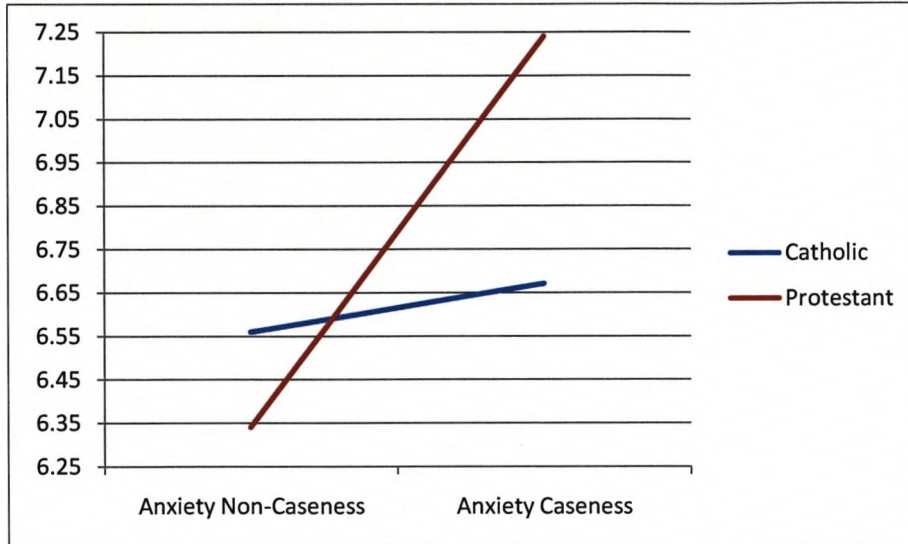


Table 24. Bonferroni t' follow up test significance for the interaction between religion and anxiety caseness for the MDQ factor Control

Religion + HADS Anxiety Caseness	Religion + Anxiety Caseness
Catholic Non-caseness	Protestant Non-caseness Catholic Caseness Protestant Caseness
Protestant Non-caseness	Catholic Non-caseness Catholic Caseness Protestant Caseness
Catholic Caseness	Catholic Non-caseness Protestant Non-caseness Protestant Caseness
Protestant Caseness	Catholic Non-caseness Protestant Non-caseness Catholic Caseness

1.6.10 ANOVA results for exploratory analysis: Child status as a third variable

As reported in the demographics section, Catholics and Americans had been found to be significantly more likely to have children than Protestants and British (chi square=8.84, df=1, $p<0.01$, and chi square=13.72, df=1, $p<0.01$, respectively). This analysis was carried out with nationality and religion also as independent variables in order to check for significant interactions between the variables as well as a main effect for child status. Significant main effects and interactions would then be added into regression analyses.

A series of three-way ANOVAs were conducted on the mean scores of the MAQ and the MDQ factors with nationality, religion and child status (defined as having a child versus not having any children) as independent variables. The MAQ and MDQ factor totals were analysed for main effect and interaction significance. The results for nationality and religion main effect significance have already been presented in a previous section, and are the same as were reported in section 1.6.8. No main effects were dropped due to lack of power when the analysis was changed to include child status as a third variable.

This section will report main effect significance for the independent variable child status, and will then move on to report any interactions between nationality and child status and religion and child status. Table 25 shows the means, standard deviations and ANOVA test scores for child status for the MAQ and Table 26 shows the means, standard deviations and ANOVA test scores for child status for the MDQ. Tables 29 and 30 show the means, standard deviations and ANOVA test scores for the 2-way interactions.

Child status

MAQ

There were no significant main effects for child status on the MAQ.

Table 25. Child status means, standard deviations and ANOVA main effect results for the MAQ factors

	With Children Mean \pm SD	Without Children Mean \pm SD	Child Status Main Effect ANOVA Test Result
Menstruation as a Debilitating Event (MAQF1)	45.24 \pm 10.26	45.41 \pm 11.40	F(7,314)=0.05, NS
Menstruation as a Bothersome Event (MAQF2)	31.63 \pm 6.33	30.62 \pm 6.35	F(7,314)=1.99, NS
Menstruation as a Natural Event (MAQF3)	21.99 \pm 3.42	21.82 \pm 3.77	F(7,314)=0.13, NS
Anticipation and the Prediction of the Onset of Menstruation (MAQF4)	26.08 \pm 5.60	25.50 \pm 6.09	F(7,314)=0.97, NS
The Denial of Any Effect of Menstruation (MAQF5)	16.17 \pm 6.27	16.86 \pm 6.18	F(7,314)=3.51, NS

Table 26. Child status means, standard deviations and ANOVA main effect results for the MDQ factors

	With Children Mean \pm SD	Without Children Mean \pm SD	Child Status Main Effect ANOVA Test Result
Pain (MDQF1)	12.57 \pm 3.74	12.60 \pm 3.71	F(7,314)=0.10, NS
Water Retention (MDQF2)	9.50 \pm 2.73	9.10 \pm 2.91	F(7,314)=2.40, NS
Autonomic Reactions (MDQF3)	5.49 \pm 1.94	5.55 \pm 1.95	F(7,314)=0.01, NS
Negative Affect (MDQF4)	16.67 \pm 5.80	17.33 \pm 5.33	F(7,314)=0.31, NS
Impaired Concentration (MDQF5)	11.82 \pm 4.58	12.33 \pm 4.43	F(7,314)=0.00, NS
Behaviour Change (MDQF6)	8.01 \pm 3.06	8.72 \pm 3.17	F(7,314)=4.35, p<0.05
Arousal (MDQF7)	7.30 \pm 2.52	7.56 \pm 2.54	F(7,314)=0.52, NS
Control (MDQF8)	6.64 \pm 1.52	6.71 \pm 1.54	F(7,314)=0.02, NS

MDQ

There was one significant main effect for child status on the MDQ factor Behaviour Change (MDQF6). Women without children scored significantly higher than women with children on the MDQF6 ($F(7,314)=4.35$, $p<0.05$), indicating that women with children report less behaviour change than women without children.

Interactions between nationality and child status

MAQ

There were two significant interactions between nationality and child status for the MAQ: Menstruation as a Debilitating Event (MAQF1) ($F(7,314)=4.20$, $p<0.05$), and Menstruation as a Bothersome Event (MAQF2) ($F(7,314)=4.74$, $p<0.05$). As can be seen from Figures 11 and 12, there was a tendency for British women with children to score higher on MAQF1 and MAQF2 than American women with children. Tables 27 and 28 accompany Figures 11 and 12. This shows that having children is associated with American women's decreased reported experience of negative menstrual symptomatology, but increases British women's reported negative menstrual symptomatology.

MDQ

There were no significant interactions between nationality and child status for the MDQ.

Figure 11. Interaction between nationality and child status for the MAQ factor Menstruation as a Debilitating Event

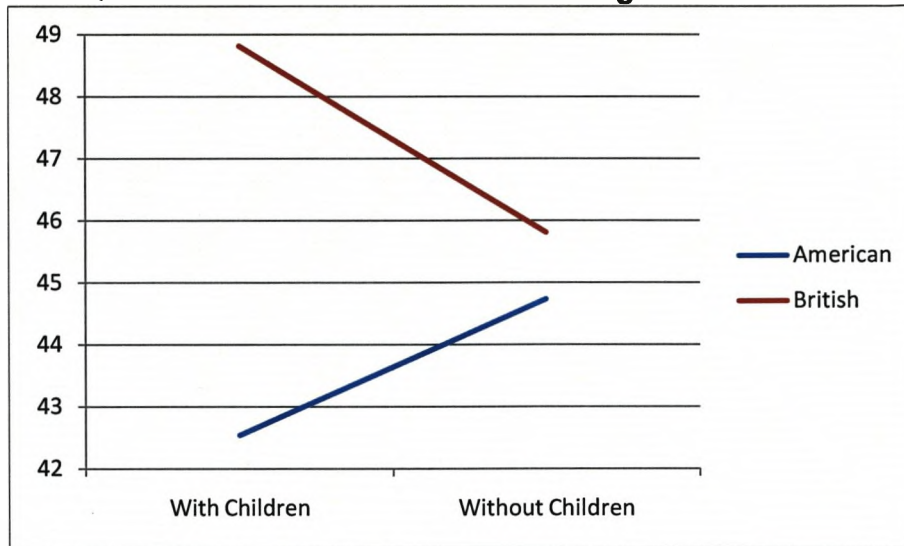


Table 27. Bonferroni t' follow up test significance for the interaction between nationality and child status for the MAQ factor Menstruation as a Debilitating Event

Nationality + Child Status	Nationality + Child Status
British w/child	American w/child British w/out child American w/out child
American w/child	British w/child British w/out child American w/out child
British w/out child	British w/child American w/child American w/out child
American w/out child	British w/ child American w/child British w/out child

Figure 12. Interaction between nationality and child status for the MAQ factor Menstruation as a Bothersome Event

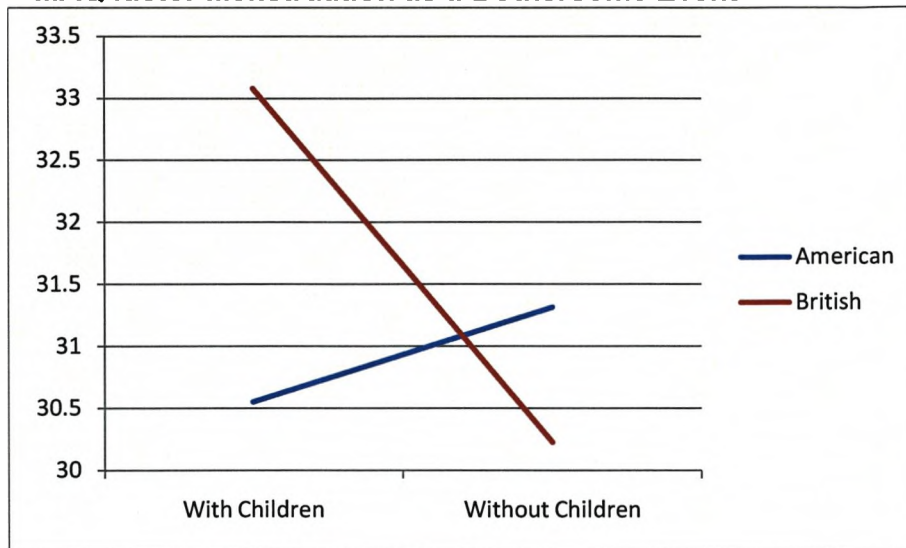


Table 28. Bonferroni t' follow up test significance for the interaction between nationality and child status for the MAQ factor Menstruation as a Bothersome Event

Nationality + Child Status	Nationality + Child Status
British w/child	American w/child British w/out child American w/out child
American w/child	British w/child British w/out child American w/out child
British w/out child	British w/child American w/child American w/out child
American w/out child	British w/ child American w/child British w/out child

Interactions between religion and child status

MAQ

There were no significant interactions between religion and child status for the MAQ.

MDQ

There was one significant interaction between religion and child status for the MDQ factor Arousal ($F(1,314)=4.10, p<0.05$). As can be seen from Figure 13, whilst Protestant women with children reported lower menstrual arousal symptoms than those without children, this pattern was reversed for Catholic women, who reported lower menstrual arousal when childless. However, follow-up tests did not show significant differences between any marginal means, therefore a table has not been created to accompany the graph.

Figure 13. Interaction between religion and child status for the MDQ factor Arousal

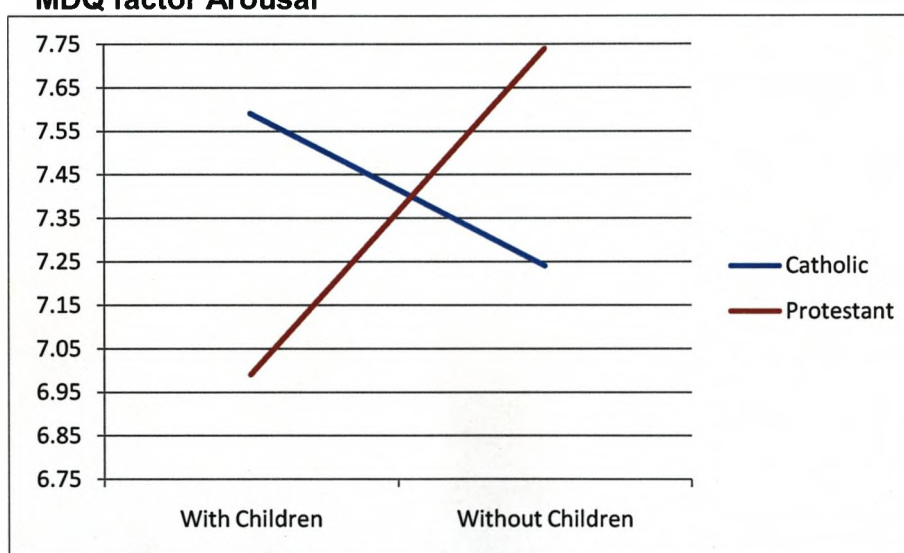


Table 29. Means, standard deviations and ANOVA 2-way interaction results for the MAQ factors with nationality, religion and child status as independent variables

	British With Children Mean \pm SD	British Without Children Mean \pm SD	American With Children Mean \pm SD	American Without Children Mean \pm SD	Catholic With Children Mean \pm SD	Catholic Without Children Mean \pm SD	Protestant With Children Mean \pm SD	Protestant Without Children Mean \pm SD	Nationality * Child Status Interaction ANOVA Test Result	Religion * Child Status Interaction ANOVA Test Result
Menstruation as a Debilitating Event (MAQF1)	48.81 \pm 10.27	45.81 \pm 11.22	42.59 \pm 9.47	44.73 \pm 11.77	46.10 \pm 10.83	45.84 \pm 11.08	44.27 \pm 9.57	45.17 \pm 11.63	F(7,314)=4.20, p<0.05	F(7,314)=0.39, NS
Menstruation as a Bothersome Event (MAQF2)	33.08 \pm 6.25	30.22 \pm 6.22	30.55 \pm 6.21	31.31 \pm 6.56	32.19 \pm 6.66	30.87 \pm 5.97	31.00 \pm 5.93	30.48 \pm 6.58	F(7,314)=4.74, p<0.05	F(7,314)=1.11, NS
Menstruation as a Natural Event (MAQF3)	21.08 \pm 3.24	21.69 \pm 3.76	22.66 \pm 3.40	22.05 \pm 3.81	21.92 \pm 3.74	21.06 \pm 4.04	22.06 \pm 3.05	22.25 \pm 3.56	F(7,314)=1.76, NS	F(7,314)=0.99, NS
Anticipation and the Prediction of the Onset of Menstruation (MAQF4)	27.41 \pm 5.60	25.32 \pm 6.48	25.09 \pm 5.42	25.81 \pm 5.37	26.17 \pm 5.87	25.63 \pm 6.58	25.99 \pm 5.32	25.42 \pm 5.82	F(7,314)=3.28, NS	F(7,314)=0.08, NS
The Denial of Any Effect of Menstruation (MAQF5)	14.54 \pm 5.53	5.92 \pm 5.53	17.38 \pm 6.54	18.47 \pm 6.90	16.50 \pm 6.95	17.22 \pm 6.34	15.80 \pm 5.45	16.65 \pm 6.10	F(7,314)=0.01, NS	F(7,314)=0.04, NS

Table 30. Means and standard deviations and ANOVA 2-way interaction results for the MDQ factors with nationality, religion and child status as independent variables

	British With Children Mean \pm SD	British Without Children Mean \pm SD	American With Children Mean \pm SD	American Without Children Mean \pm SD	Catholic With Children Mean \pm SD	Catholic Without Children Mean \pm SD	Protestant With Children Mean \pm SD	Protestant Without Children Mean \pm SD	Nationality * Child Status Interaction ANOVA Test Result	Religion * Child Status Interaction ANOVA Test Result
Pain (MDQF1)	13.02 \pm 3.43	12.28 \pm 3.59	12.25 \pm 3.95	13.16 \pm 3.86	12.55 \pm 3.70	12.76 \pm 3.54	12.05 \pm 3.97	12.51 \pm 3.81	F(7,314)=3.85, NS	F(7,314)=0.16, NS
Water Retention (MDQF2)	10.10 \pm 2.65	9.26 \pm 3.05	9.06 \pm 2.72	8.83 \pm 2.64	9.63 \pm 2.75	9.21 \pm 2.89	9.36 \pm 2.72	9.05 \pm 2.92	F(7,314)=0.53, NS	F(7,314)=0.18, NS
Autonomic Reactions (MDQF3)	5.90 \pm 2.05	5.60 \pm 2.02	5.19 \pm 1.82	5.45 \pm 1.83	5.38 \pm 1.90	5.59 \pm 1.85	5.61 \pm 2.00	5.52 \pm 2.01	F(7,314)=1.13, NS	F(7,314)=0.14, NS
Negative Affect (MDQF4)	18.40 \pm 5.94	17.62 \pm 5.52	15.39 \pm 5.38	16.83 \pm 4.99	16.88 \pm 5.66	17.49 \pm 5.32	16.43 \pm 5.99	17.23 \pm 5.35	F(7,314)=2.78, NS	F(7,314)=0.17, NS
Impaired Concentration (MDQF5)	13.87 \pm 5.15	13.06 \pm 4.55	10.29 \pm 3.40	11.08 \pm 3.96	11.86 \pm 4.35	12.49 \pm 4.06	11.77 \pm 4.85	12.24 \pm 4.65	F(7,314)=1.85, NS	F(7,314)=0.04, p<0.05
Behaviour Change (MDQF6)	8.54 \pm 3.36	8.52 \pm 3.01	7.61 \pm 2.77	9.08 \pm 3.42	7.99 \pm 2.85	8.95 \pm 3.04	8.03 \pm 3.31	8.59 \pm 3.25	F(7,314)=3.16, NS	F(7,314)=0.06, NS
Arousal (MDQF7)	7.06 \pm 2.25	7.56 \pm 2.49	7.48 \pm 2.70	7.55 \pm 2.65	7.59 \pm 2.69	7.24 \pm 2.34	6.99 \pm 2.28	7.74 \pm 2.64	F(7,314)=0.66, p<0.05	F(7,314)=4.10, p<0.05
Control (MDQF8)	6.87 \pm 1.69	6.75 \pm 1.66	6.47 \pm 1.36	6.64 \pm 1.33	6.54 \pm 1.25	6.70 \pm 1.24	6.76 \pm 1.77	6.71 \pm 1.69	F(7,314)=0.69, NS	F(7,314)=0.44, NS

1.6.11 Multivariate Linear Regression Analyses: MAQ and MDQ factors as outcome variables

MAQ and MDQ factor scores were used in multiple linear regression analyses as continuous outcome variables with Religion, Nationality, Child status, Anxiety level, Religiosity, the interaction between Religion and Anxiety level, and the interaction between Nationality and Anxiety level as explanatory variables. All of these variables had previously been shown to be associated with menstrual cycle attitudes and/or symptoms. Therefore, multiple linear regression analyses were used to determine which, if any, of the variables could explain MAQ and MDQ reporting independently of the other variables.

MAQ

The only explanatory variable significantly associated with any of the 5 MAQ factors was religiosity. Religiosity was found to be associated with the menstrual attitude Botherome, independent of the other factors (see Tables 31 – 35).

MDQ

Anxiety level was the only explanatory variable that was significantly related to all MDQ factors. Anxiety was able to explain the variance in MDQ factors 1-8 even when taking into account nationality, religion, child status, religiosity, the interaction between religion and anxiety and the interaction between nationality and anxiety. Those women reporting higher levels of anxiety also reported higher levels of MDQ symptomatology. No other variables we found to be significantly related to MDQ symptom reporting (see Tables 36 – 43).

**Table 31. Multiple linear regression analysis for the MAQ factor
Menstruation as a Debilitating Event**

Explanatory Variable	Unstandardized B coefficient	Standard Error	Standardized B coefficient	t statistic	P value
Constant	45.94	3.62		12.68	0.00
Nationality	-0.88	10.81	-0.04	-0.08	0.94
Religion	-5.19	10.73	-0.24	-0.48	0.63
Child status	0.16	1.24	0.01	0.13	0.90
Anxiety Level	0.52	0.29	0.16	1.79	0.07
Religiosity	0.31	0.19	0.10	1.58	0.11
Religion*Anxiety Level	4.16	10.61	0.42	0.39	0.70
Nationality*Anxiety Level	-3.33	10.66	-0.33	-0.31	0.76

**Table 32. Multiple linear regression analysis for the MAQ factor
Menstruation as a Bothersome Event**

Explanatory Variable	Unstandardized B coefficient	Standard Error	Standardized B coefficient	t statistic	P value
Constant	31.26	2.14		14.59	0.00
Nationality	0.32	6.40	0.03	0.05	0.96
Religion	-1.18	6.35	-0.09	-0.19	0.85
Child status	1.36	0.73	0.11	1.86	0.06
Anxiety Level	0.12	0.17	0.06	0.69	0.49
Religiosity	-0.35	0.12	-0.20	-3.01	0.00
Religion*Anxiety Level	0.19	6.28	0.03	0.03	0.98
Nationality*Anxiety Level	0.27	6.31	0.05	0.04	0.97

**Table 33. Multiple linear regression analysis for the MAQ factor
Menstruation as a Natural Event**

Explanatory Variable	Unstandardized B coefficient	Standard Error	Standardized B coefficient	t statistic	P value
Constant	18.80	1.23		15.25	0.00
Nationality	1.81	3.68	0.25	0.49	0.62
Religion	0.38	3.65	0.05	0.10	0.92
Child status	0.00	0.42	0.00	0.01	0.99
Anxiety Level	0.15	0.10	0.14	1.48	0.14
Religiosity	0.01	0.07	0.01	0.20	0.84
Religion*Anxiety Level	0.33	3.61	0.10	0.09	0.98
Nationality*Anxiety Level	-0.90	3.63	-0.27	-0.25	0.80

**Table 34. Multiple linear regression analysis for the MAQ factor
Anticipation and the Prediction of the Onset of Menstruation**

Explanatory Variable	Unstandardized B coefficient	Standard Error	Standardized B coefficient	t statistic	P value
Constant	23.99	2.01		11.95	0.00
Nationality	-4.82	5.99	-0.41	-0.80	0.42
Religion	3.74	5.95	0.32	0.63	0.53
Child status	0.61	0.69	0.05	0.88	0.38
Anxiety Level	0.28	0.16	0.16	1.70	0.09
Religiosity	0.09	0.11	0.06	0.83	0.41
Religion*Anxiety Level	-3.86	5.88	-0.72	-0.66	0.51
Nationality*Anxiety Level	3.77	5.91	0.70	0.64	0.52

Table 35. Multiple linear regression analysis for the MAQ factor The Denial of Any Effect of Menstruation

Explanatory Variable	Unstandardized B coefficient	Standard Error	Standardized B coefficient	t statistic	P value
Constant	16.22	2.11		7.70	0.00
Nationality	0.86	6.29	0.07	0.14	0.89
Religion	1.29	6.24	0.10	0.21	0.84
Child status	-1.26	0.72	-0.10	-1.75	0.08
Anxiety Level	-0.10	0.17	-0.05	-0.57	0.57
Religiosity	-0.06	0.11	-0.04	-0.57	0.57
Religion*Anxiety Level	-1.86	6.17	-0.33	-0.30	0.76
Nationality*Anxiety Level	1.98	6.20	0.34	0.32	0.75

Table 36. Multiple linear regression analysis for the MDQ factor Pain

Explanatory Variable	Unstandardized B coefficient	Standard Error	Standardized B coefficient	t statistic	P value
Constant	10.57	1.24		8.50	0.00
Nationality	-5.26	3.71	-0.71	-1.42	0.16
Religion	5.30	3.68	0.71	1.44	0.15
Child status	-0.07	0.43	-0.01	-0.17	0.86
Anxiety level	0.25	0.10	0.23	2.51	0.01
Religiosity	-0.01	0.07	-0.01	-0.10	0.92
Religion*Anxiety Level	-5.34	3.64	-1.58	-1.47	0.14
Nationality*Anxiety Level	5.48	3.66	1.59	1.50	0.14

Table 37. Multiple linear regression analysis for the MDQ factor Water Retention

Explanatory Variable	Unstandardized B coefficient	Standard Error	Standardized B coefficient	t statistic	P value
Constant	8.27	0.95		8.71	0.00
Nationality	-1.18	2.83	-0.21	-0.42	0.68
Religion	0.55	2.81	0.10	0.20	0.84
Child status	0.38	0.33	0.07	1.17	0.25
Anxiety level	0.27	0.08	0.32	3.50	0.00
Religiosity	0.07	0.05	0.09	1.39	0.17
Religion*Anxiety Level	-0.74	2.78	-0.29	-0.27	0.79
Nationality*Anxiety Level	0.28	2.80	0.11	0.10	0.92

Table 38. Multiple linear regression analysis for the MDQ factor Autonomic Reactions

Explanatory Variable	Unstandardized B coefficient	Standard Error	Standardized B coefficient	t statistic	P value
Constant	4.88	0.65		7.50	0.00
Nationality	-1.44	1.94	-0.37	-0.74	0.46
Religion	1.19	1.93	0.31	0.62	0.54
Child status	0.04	0.22	0.01	0.17	0.87
Anxiety level	0.14	0.05	0.25	2.72	0.01
Religiosity	-0.01	0.04	-0.01	-0.18	0.86
Religion*Anxiety Level	-1.11	1.91	-0.63	-0.58	0.56
Nationality*Anxiety Level	1.10	1.92	0.61	0.57	0.57

Table 39. Multiple linear regression analysis for the MDQ factor Negative Affect

Explanatory Variable	Unstandardized B coefficient	Standard Error	Standardized B coefficient	t statistic	P value
Constant	16.13	1.76		9.17	0.00
Nationality	-4.17	5.25	-0.38	-0.79	0.43
Religion	1.96	5.22	0.18	0.38	0.71
Child status	-0.35	0.60	-0.03	-0.59	0.58
Anxiety level	0.55	0.14	0.33	3.88	0.00
Religiosity	0.01	0.09	0.01	0.12	0.90
Religion*Anxiety Level	-2.27	5.16	-0.45	-0.44	0.66
Nationality*Anxiety Level	2.53	5.18	0.49	0.49	0.63

Table 40. Multiple linear regression analysis for the MDQ factor Impaired Concentration

Explanatory Variable	Unstandardized B coefficient	Standard Error	Standardized B coefficient	t statistic	P value
Constant	13.46	1.41		9.54	0.00
Nationality	-4.62	4.21	-0.51	-1.10	0.27
Religion	1.37	4.18	0.15	0.33	0.74
Child status	0.02	0.48	0.00	0.05	0.96
Anxiety level	0.31	0.11	0.23	2.71	0.01
Religiosity	0.02	0.08	0.02	0.25	0.80
Religion*Anxiety Level	-1.56	4.13	-0.38	-0.38	0.71
Nationality*Anxiety Level	1.98	4.15	0.48	0.48	0.63

Table 41. Multiple linear regression analysis for the MDQ factor Behaviour Change

Explanatory Variable	Unstandardized B coefficient	Standard Error	Standardized B coefficient	t statistic	P value
Constant	7.78	1.03		7.57	0.00
Nationality	-0.75	3.07	-0.12	-0.25	0.81
Religion	0.35	3.05	0.06	0.11	0.91
Child status	-0.69	0.35	-0.11	-1.95	0.05
Anxiety level	0.22	0.08	0.24	2.69	0.01
Religiosity	-0.01	0.06	-0.01	-0.12	0.91
Religion*Anxiety Level	-0.47	3.01	-0.17	-0.16	0.88
Nationality*Anxiety Level	0.75	3.02	0.26	0.25	0.80

Table 42. Multiple linear regression analysis for the MDQ factor Arousal

Explanatory Variable	Unstandardized B coefficient	Standard Error	Standardized B coefficient	t statistic	P value
Constant	6.52	0.87		7.54	0.00
Nationality	-1.70	2.58	-0.34	-0.66	0.51
Religion	2.04	2.56	0.40	0.80	0.43
Child status	-0.35	0.30	-0.07	-1.19	0.24
Anxiety level	0.16	0.07	0.21	2.31	0.02
Religiosity	0.02	0.05	0.03	0.51	0.61
Religion*Anxiety Level	-2.02	2.53	-0.88	-0.80	0.43
Nationality*Anxiety Level	1.85	2.55	0.79	0.73	0.47

Table 43. Multiple linear regression analysis for the MDQ factor Control

Explanatory Variable	Unstandardized B coefficient	Standard Error	Standardized B coefficient	t statistic	P value
Constant	5.93	0.51		11.55	0.00
Nationality	-0.59	1.53	-0.19	-0.38	0.70
Religion	0.52	1.52	0.17	0.34	0.73
Child status	-0.02	0.18	-0.01	-0.12	0.90
Anxiety level	0.12	0.04	0.26	2.91	0.00
Religiosity	0.01	0.03	0.03	0.50	0.62
Religion*Anxiety Level	-0.39	1.51	-0.28	-0.26	0.79
Nationality*Anxiety Level	0.34	1.51	0.24	0.23	0.82

1.6.12 Pearson product-moment correlation results for hypothesis 2:

Menstrual attitudes and distress will be correlated

Pearson product-moment correlations were computed for the five factors of the MAQ and for the eight factors of the MDQ. Full results are shown in Table 44. As can be seen from the table, attitudes and experience of symptoms are related. Negative attitudes tended to correlate with negative symptom reporting.

Because these correlational analyses are hypothesis driven, it was not appropriate to correct for multiple analyses (Perneger, 1998; Sainani, 2009). Additionally, Perneger (1998) points out that Bonferroni adjustments may not be suitable for most research due to being designed to correct statistical analyses related to the general null hypothesis (that all null hypotheses are true simultaneously). In fact most research, including this research, is concerned with assessing differences between each variable in its own right. Therefore Bonferroni tests "provide a correct answer to a largely irrelevant question." (p. 1236, Perneger, 1998). Perneger advises that multiple comparisons are best dealt with by explaining which tests have been performed, and why they were performed. As mentioned in Hypothesis 2, it is proposed that menstrual attitudes and distress will be positively correlated, with negative attitudes towards menstruation showing higher levels of negative symptom reporting. Pearson's product-moment correlational analyses have been used to determine correlation and statistical significance.

Table 44. MAQ and MDQ factors correlation co-efficients

	MAQF2	MAQF3	MAQF4	MAQF5	MDQF1	MDQF2	MDQF3	MDQF4	MDQF5	MDQF6	MDQF7	MDQF8
Debilitating (MAQF1)	0.15	NS	0.52	-0.30	0.36	0.36	0.33	0.48	0.43	0.49	0.17	0.22
Bothersome (MAQF2)		-0.18	NS	NS	0.19	NS	0.12	0.13	NS	0.14	NS	NS
Natural (MAQF3)			NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Prediction (MAQF4)				-0.36	0.50	0.64	0.40	0.63	0.42	0.44	0.22	0.20
Natural (MAQF5)					-0.19	-0.27	-0.15	-0.26	-0.24	-0.20	NS	NS
Pain (MDQF1)						0.59	0.64	0.57	0.51	0.60	0.35	0.38
Water Retention (MDQF2)							0.49	0.67	0.51	0.48	0.34	0.24
Autonomic Reactions (MDQF3)								0.54	0.53	0.52	0.37	0.54
Negative Affect (MDQF4)									0.68	0.67	0.45	0.37
Impaired Concentration (MDQF5)										0.74	0.39	0.49
Behaviour Change (MDQF6)											0.40	0.39
Arousal (MDQF7)												0.33

1.7 Study one discussion

The discussion section for Study One is presented in terms of key results, followed by a discussion of the demographic and sampling characteristics of the sample. The main findings of both the *a priori* hypotheses and exploratory analyses are then examined in detail, with special attention to expected results, the results found in this study and how they compare to previous research findings. The implications, including the implications of anxiety levels, and methodological issues relating to the results of this research are then discussed in a broader context, leading into implications for future research and conclusions.

1.7.1 Summary of key results

The aim of this study was to identify and explore differences and similarities between cultures in menstrual attitudes and menstrual distress and to look for interactions between types of culture. The results from this study highlight that although some differences in menstrual cycle symptom and attitude reporting do exist between nationalities, differences between cultures and interactive effects between types of culture were largely not found. However, patterns of interaction were suggested between religious/national cultural groups and anxiety. Although these interactive effects were not shown to contribute significantly to menstrual cycle symptom and attitude reporting in the multivariate linear regression models, patterns of interaction are visible from the interaction graphs, suggesting the possibility that with more power these differences in culture and anxiety might show a complex relationship. Anxiety level was found to be a major deciding factor in whether or not women reported high levels of menstrual symptomatology, however it did not affect reported attitudes to the same extent.

1.7.2 Demographic and sampling background

This section begins with a review of demographic factors which showed significant differences between groups, followed by a more in-depth discussion of anxiety/depression in these samples and the populations from which they were extracted, and the HADS questionnaire. Next,

inclusion/exclusion criteria and sampling characteristics are explored in greater detail, and are followed by an examination of the role of religiosity in describing the sample.

The demographic characteristics which were included in the questionnaire were chosen based on results from previous research which showed that differences in menstrual symptoms might exist based on age (Deuster, Adera, & South-Paul, 1999; Gold et al., 2007; Moos, 1968), parity (Moos, 1968; Woods et al., 1982), work hours (Sternfeld et al., 2002; Woods et al., 1982), reproductive status (Woods et al., 1982), current mood disorder (Alonso & Coe, 2001; Christensen & Oei, 1989; Gold et al., 2007; Golub et al., 1976a and 1976b; Gruba & Rorbaugh, 1975; Hart & Russell, 1986; Haskett et al. 1984; Kuczmierczyk et al., 1995; Landen & Eriksson, 2003; Lane & Francis, 2003; Mira et al. 1985; Moos et al., 1969; Morse et al., 1988; Negriff et al., 2009; Paige, 1973; Roca et al., 1999; Strine et al., 2005; Watts et al., 1980), and other general health problems. Uptake of anxiety and depression medication was included in the questionnaire because it was postulated that this might affect the MAQ/MDQ results.

There were several areas of discrepant results which prompted further investigation. First of all, the group was found to be highly anxious. The HADS identified 44 per cent of the overall sample as having a current possible anxious mood disorder, with no significant differences in HADS anxiety or depression scores between the national and religious cultural groups.

It is difficult to find results from studies that have sampled women from a general population and reported anxiety and depression percentages similar to the way this research has. Zigmond and Snaith (1983), in the journal article which introduced the HADS, found that 31 per cent of their sample scored highly enough to be considered to have a possible depressive mood disorder, and 54 per cent of the sample scored highly enough to be considered to have a possible anxious mood disorder. Perz and Ussher (2006) reported in a study of PMS sufferers which also used the HADS that

40.8 per cent scored highly enough to be considered to have an anxious mood disorder, whilst 11.8 per cent scored highly enough to be considered to have a depressive mood disorder. The results found by Perz and Ussher (2006) are similar to those found by Study One for anxiety and depression levels of the sample.

Perz and Ussher (2006) explain the high levels of anxiety and comparably low levels of depression in their sample as being affiliated with a tendency to self-silence anger and distress. They suggest that women are able to self-silence during non-premenstrual times of the menstrual cycle, but tend to not do so during the premenstrual phase of the cycle. They explain that on the one hand, this decreases levels of depression by allowing women to express their distress, however it increases levels of anxiety, as women tend to self-pathologise anger and distress as PMS.

There may be other explanations for the low depression percentage results in this study (7.4% found to score highly on the depression subscale). There have been conflicting reports in the literature about the separateness of the anxiety and depression subscales of the HADS. Although a large study review of 747 articles by Bjelland et al. (2002) has found the scale to be useful in assessing severity and caseness of anxious and depressive disorders, it has also been reported that previous literature has found the HADS to be better at identifying anxiety than depression (Hall et al., 1999; Hopwood et al., 1991). More recently, Golden, Conroy, and O'Dwyer (2007) have reported that the HADS Depression subscale has a low sensitivity (52%). The area under the ROC curve was also lower than the area in the Beck Depression Inventory (BDI), showing both lower specificity and sensitivity. However, the HADS anxiety subscale actually showed a sensitivity of 88 per cent for correctly identifying depression (the same percentage as the BDI). It also had a larger area under the ROC curve (0.84) than the BDI or the HADS Depression subscale. Whilst the findings of the Golden et al. (2007) study suggest that the anxiety subscale might also be measuring depression, it also suggests that the BDI has the same shortcoming. This is in agreement with Herrmann's (1997) suggestion that

other self-rating scales do not differentiate significantly better between anxiety and depression.

The Golden et al. (2007) results suggest that the HADS anxiety subscale may also identify depression. This does not indicate that the subscale is not able to identify anxiety correctly (again, see references from Section 1.5.2). There is some concern in the literature about overlap between anxiety and depressive mood disorders in general. Previous research has suggested that anxiety and depression may not actually be separate disease entities (Jacob et al., 1998; Tyrer, 2001). Prior studies have estimated the relationship between self-report anxiety and depression to be between .40 and .70 (Watson, Clark, & Carey, 1988). Previous research has shown that there are links between anxiety, depression and negative affect (Clark et al., 1994; Watson & Clark, 1984; Watson et al., 1994), however research by Watson et al. (1988) suggests that low Positive Affect is related to depression, but not to anxiety. Additionally, physiological hyperarousal is related to anxiety, but not depression (Clark & Watson, 1991). They recommend a tripartite model which would consist of assessing general distress (common to both), physiological tension and hyperarousal (specific to anxiety), and anhedonia (specific to depression).

Because the HADS does not measure the separate dimensions suggested above, it may actually be identifying whether or not a possible mood disorder exists, anxious *and* depressive, although the literature suggests it may be more likely to be anxious. It was important, in any case, to explore these possible mood disorders, or anxiety levels further to try to determine what sort of effect these levels of anxiety might have on menstrual attitudes and symptom levels. These results are discussed later in this section.

Usage of anxiety or depression medication was shown to be significantly different between the two national groups, with American women being more likely to take these drugs. This was interesting because there were not any significant differences between the groups on actual levels of anxiety. However, it may be that levels would have differed, had the American women

using these medications not been taking them. Statistics from the US estimate that 10 per cent of the population is currently using this kind of medication, and statistics for the UK similarly report 9.8 per cent (U.S. Department of Health and Human Services, 2007; Lawrenson, Tyrer, Newson, & Farmer, 2000). It is very difficult to determine the true number of people taking antidepressant medication due to the stigma surrounding using the medication and non-compliance. Some patients may not be aware that they are taking the medication for anxiety or depression reasons and believe that the medication is to increase appetite or to help with other anxiety-related disorders, such as irritable bowel syndrome.

Only 22 of the 322 women surveyed in this study reported that they were using anxiety or depression medication, seven of which were from the UK, and 15 of which were from the US. Despite that the US number was twice the UK figure; the numbers were small enough that this was not thought to be a major contributing factor to the outcomes of the study. The percentage of American women reporting that they were taking antidepressants is consistent with the statistics reported previously as the national US level (15 of 149=10%). However, the percentage of British women reporting that they are using antidepressants falls below the above reported national statistics (7 of 173=4%). It may be that stigma attributed to taking antidepressants is higher in the UK, and that this caused underreporting of antidepressant usage.

Parity was also shown to differ significantly between both national and religious groups. Catholic women were both more likely to have children than Protestants and more likely to have a higher number of children. The American sample was more likely to have children than those in the British sample and also a greater number per family. Parity was explored in greater depth in further analyses to determine whether or not these findings would have any impact on the nationality or religion main effect results, or would yield any interesting interactions with cultural group. These results are considered later on in the discussion.

1.7.3 Inclusion/Exclusion criteria

The inclusion criterion of having experienced a period within the last three months was used due to the natural variability in duration of menstrual cycle, and the likelihood that having a strict 30-day rule may have unnecessarily excluded the experiences of healthy women (Vollman, 1977). Women using birth control were also included if they were using birth control which allowed them to menstruate regularly (within the last three months). This group of women have often been left out of menstrual cycle research due to the lack of cyclical variability in hormone levels that hormonal contraception produces (Sadler et al., 2010; Paige, 1971). Indeed some research advocates using oral contraceptives to treat PMS (Pearlstein, Bachmann, Zacur, & Yonkers, 2005; Sulak, 2005; Yonkers et al., 2005;).

However, other research has shown that women on the contraceptive pill do report similar levels of menstrual symptomatology (van den Akker, Sharifian et al., 1995; Elliot & Harkins, 1992; Sternfeld et al., 2002). Because pill usage was not significantly different across groups it was felt that this was unlikely to be a contributing factor to any differences found between groups.

1.7.4 Sampling characteristics

Every effort was made to recruit women similarly in both the US and the UK, and along Protestant and Catholic cultural group lines. However, there were some basic sampling differences across cultural groups.

United States

In the United States, both the Protestants and the Catholics were sampled from a largely urban area in the Northern Midwest (population 155,461) (City of Fargo, 2010; City-Data.com, 2010; Office of National Statistics, 2001). Many of the businesses and the livelihoods of people in the urban area are based around services to agriculture, and are still tied to rural life. Over 90 per cent of the population is Caucasian. More than three-quarters of the state's population are members of a Christian church, the second highest rate of membership in any American state. Most church members belong to Protestant denominations, the largest of which is the Lutheran church.

Nearly one-third of churchgoers are members of the Roman Catholic Church (Veeder & Goodman, 2007). There still exists somewhat of a divide between Protestant and Roman Catholic groups, partially fostered by the differences in religion tending to coincide with differences in ancestry. The Protestant groups, especially Lutherans, tend to be descended from Scandinavian people, mostly Norwegian (35.9%) (U.S. Census Bureau, 2000). The Catholic group is largely comprised of German-Russian people. They are the descendants of Germans who immigrated to Russia before the First World War, but remained in enclaves with distinctively German culture. There was a large emigration of these groups to the Midwest in the early 1800s, a small percentage of which were Catholic Russian Germans (Carlson, 1981). Many of the Catholic Russian Germans immigrated to the US state which was sampled in Study One. Descendants of Russian Germans comprise roughly 40.6 per cent of the state's population (U.S. Census Bureau, 2000). Based on immigration patterns, in the areas sampled the population would have been biased toward larger numbers of Norwegian Lutheran descendants, although similar numbers of each religious group were recruited for the purposes of this study.

United Kingdom

In the UK, the participants came from an urban area in the Northwest of England (population 439,473) (National Statistics Online (ONS), 2001). Over 90 per cent of the population is Caucasian. The percentage of this urban area that is Christian is 79.5 per cent (Liverpool City Council, 2006). Although England is predominantly Protestant (26.4%, Catholics 9.1% - British Social Attitudes Survey, 2005), this area of the country has a high percentage of Catholics, many of whom would be likely to have Irish ancestry. Again, the divide between religious groups was also somewhat tied to differences between ethnic groups.

1.7.5 The role of religiosity in describing the sample

As expected, American women were found to be more religious than British women in this sample (Pew Global Attitudes Project, 2002). Given the results showing that higher levels of religiosity correlated with lower levels of

Bothersome attitudes and lower reports of Negative Affect, Impaired Concentration, and Behaviour Change, it could have been expected that American women would therefore have scored lower than British women on these factors. Indeed, partial support for this assumption was found in the results. Differences were found between the American and the British sample for the MDQ factors Negative Affect and Impaired Concentration. Increased religiosity in the American sample may have either caused or amplified the differences between nationalities for these factors. However, it is worth noting that there was no difference between nationalities for the MAQ factor Bothersome or the MDQ factor Behaviour Change, both of which showed significant differences between high religious and low religious groups.

Other researchers in menstrual cycle literature have examined the role of religiosity. Rothbaum & Jackson (1990) found that their cultural groups differed in respect to religiosity, with Jewish Mikvah non-attenders being less religious than Jewish Mikvah attenders, Catholics or Protestants. However, although they controlled for religion in their analyses, they did not test to see if those who were higher in religiosity were more likely to report certain attitudes or symptoms. Brooks-Gunn (1985) found associations between religiosity and the menstrual cycle, although her research was concerned with menstrual cycle characteristics (length and flow). This is different to showing a relationship between religiosity and menstrual cycle attitudes and symptoms. Paige (1973) measured religiosity by one question (frequency of church attendance) and found that it correlated with femininity. She also found that femininity correlated with menstrual distress. Again, this is not the same as comparing religious and non-religious women on ratings of menstrual cycle attitudes and symptoms. Therefore, no previous research has been done which demonstrates the association of religiosity with menstrual cycle symptoms, however, as previously mentioned, research in other areas of health show that religiousness can have a protective effect against illness (Powell et al., 2003; Tebbi et al., 1987; Tix & Frazier, 1998).

This study also found significant differences between the Protestants and Catholics in religiosity, with Catholics scoring higher than Protestants in degree of religiousness. This is different from Rothbaum and Jackson's (1990) results where the Protestants in the U.S. were found to be more religious than Catholics, although the differences found between groups in their research did not achieve significance. The implications of these findings are further discussed in the next section.

There seems to be a negative relationship between degree of religiosity and psychological distress found in other literature. Jarvis et al. (2005) found that frequency of attendance at a place of worship was associated with lower levels of psychological distress, as measured by the General Health Questionnaire (Goldberg, 1972). However, in their study, frequency of religious rituals performed at home was not related. The Study One research found that attendance at a place of worship, frequency of religious rituals performed at home, and importance of religion were all significantly related to having the MAQ attitude that menstruation is Bothersome and experiencing MDQ symptoms of Impaired Concentration, with religion being associated with lower scores for these two factors. Attendance at a place of worship was also related to lower scores for the MDQ symptoms of Behaviour Change, and importance of religion was associated with lower scores for the MDQ symptoms of Negative Affect. The factors showing a relationship with religiosity seem to be the most closely related to measures of psychological distress, suggesting that in this study religion was associated with lower psychological distress scores.

Interestingly, all groups of women were likely to rate their parents as being the most influential in their religious upbringing. This is probably related to the fact that most women reported themselves to be similar in overall religiousness to how they were before and not to have changed in overall religiousness. Attitudes about religion have been shown to be ingrained at an early age through parental socialization (Le et al., 2002). Previous research has found a very strong tendency for children who are brought up in a religious denomination to continue to identify with that particular familial

denomination through adolescence and young adulthood (Benson, Donahue, & Erickson, 1989; Hadaway, 1980; Kluegel, 1980). There was also substantial agreement found on both religious and political issues both for child-parent and for parent-grandparent dyads, which suggests that parental influences may continue into adulthood for these subjects (Glass, Bengtson, & Dunham, 1986). Additionally, de Vaus (1983) found that peer groups may play a role in religious socialization of an individual, but that this role seems to be less influential than the role that parents play. This potentially reveals part of the method by which religious culture is handed down through the generations.

This section has reviewed the differences across cultures in demographics, focussing on differences in child status between the samples and on differences in anxiety and depression levels and their measurement. Also, this section examined in greater detail the characteristics of the populations, highlighting the similarities and differences between the samples. Finally, the section reviewed religiosity of the two samples, discussing the higher religiosity levels of Catholics and Americans.

Interestingly, this research found that there is a significant negative association between religiosity and the menstrual cycle attitude *Bothersome*, and also for the menstrual symptom factors *Impaired Concentration*, *Behaviour Change*, and *Negative Affect*, with more highly religious individuals reporting less symptoms. Although this effect is consistent with the literature showing a protective effect of religiosity on psychological distress (Jarvis et al., 2005), this is the first time that it has been shown to be related to psychological menstrual cycle symptom reporting.

1.7.6 Exploratory analyses: Religion versus religiosity - is there a difference?

This section reviews the results for religion and level of religiosity main effects and interactions and discusses the importance of distinguishing between the two in interpreting the implications of this research.

Religion and level of religiosity were included in an analysis of variance test. It was hypothesised that religious culture, along with attitudes and distress patterns would be handed down as part of a family culture, even where belief and practice in that religion has diminished. As previously mentioned, research has shown that these beliefs may be tied to an underlying culture that is passed along through generations and not subject to a large amount of change, even when the religion or level of religiosity does (Rice & Steele, 2004). Yet, the possibility remained that those women who came from families which did not practice their religion might not be as much part of the religious culture as those from families who did practice the religion (i.e. lapsed Catholics might display menstrual attitudes and distress that are not consistent with and representative of the Catholic culture). This would mean that differences found between religions (if any) would only reflect the attitudes and symptom reporting of the more religious members of the cultural group. If this had been the case, we would have expected to see interactions between religion and religiosity, with religiosity causing different patterns of menstrual cycle attitude and symptom reporting either for only religious Catholics and Protestants or for only non-religious Catholics and Protestants. These interactions were not found, suggesting that having a family history of belonging to a religious culture is sufficient to adopt those cultural beliefs and attitudes, even when the individual no longer practices the religion. This supports the notion that people share characteristics according to religious group, regardless of the zeal of their religious belief.

Both the factors of Bothersome (MAQ) and Impaired Concentration (MDQ) were found to differ significantly between those with high levels of religiosity and those with low levels of religiosity. In both of these cases religiosity was found to be associated with less negative attitude and symptom reporting. This is consistent with the results from the correlations between the indicators of religiosity and the MAQ and MDQ factors. This result shows that differences between more religious participants and less religious participants were found for the attitude Bothersome and the symptom factor Impaired Concentration, however the pattern of reporting was similar for Protestants and Catholics, with more religious individuals scoring more highly

on these factors in both religions. Religiosity was shown to be associated with these factors, but similarly associated for both religions.

There were no significant main effects found between religions. This is an interesting finding due to significant differences having been found between the religions in degree of religiosity (Catholics scored more highly than Protestants). It would therefore have been expected that Catholics would have scored more highly than Protestants for the attitude Bothering, and the menstrual symptom factor Impaired Concentration. This was not found and perhaps suggests that differences in religiosity between the two religions were not great enough to elicit a significant difference between groups on these factors.

The association between religiosity and menstrual cycle symptom reporting is exciting, as it is an area that has not previously been explored in the menstrual cycle psychology literature. Although it is worth noting that the results of both the correlational and ANOVA analyses for religiosity could have been due to other explanatory variables. For example, Paige (1973) found that religiosity is correlated with indices of traditional femininity, and that levels of adherence to a traditional female role were greater for Catholics than for Protestants. Additionally, self-esteem and locus of control are both themes that show associations with religiosity in studies (Hood et al., 1996) and could also have an effect on menstrual cycle symptom reporting. Additionally the results could have been affected by social desirability (Watson, Morris, Foster, & Hood, 1986), or repressive effects (Jay, 2005).

1.7.7 Hypothesis 1: Cultures will vary significantly in menstrual attitudes and distress

Nationality and religion main effects and interaction effects results are reviewed in this section, comparing the results from this study to previous literature. It was expected that differences would be found between cultures in menstrual attitudes and distress. As already mentioned, previous studies have found such differences between national, ethnic and religious cultures (see Sections 1.3.11 – 1.3.13). This study found differences between

nationalities with British women reporting that menstruation was more debilitating, and in addition reporting more severe physical and psychological symptoms for water retention, autonomic reactions, negative affect and impaired concentration. The American women, by contrast, reported menstruation to be more natural; in addition, they were also more likely to deny that menstruation has any effect on women's physical or psychological health.

From these results it can be postulated that American women may be denying that their menstrual periods have any effect on physical/psychological health. This would explain the lower levels of reporting for menstrual symptoms when compared to the British sample. An additional explanation is that the British cultural belief that menstruation is debilitating may have contributed to higher reports of menstrual symptomatology. As mentioned in the Literature Review, it is difficult to determine whether high levels of negative symptomatology cause negative attitudes, or if it is the attitudes which result in the report of more negative symptoms. These results did not examine causality; however it is likely that both of these happen in a reinforcing circular pattern.

There were no differences found across religious cultural groups. This may not be unusual since some of the previous research did not find differences between cultures, whilst other research did. Rothbaum and Jackson (1990) found differences between Catholics and Protestants for the MAQ factor *Bothersome*, with Protestants scoring more highly on this factor than Catholics. However, they did not find any differences on MDQ scores between American Catholics and Protestants. Chandra and Chaturvedi (1992) also found no differences between predominantly Christian and Hindu groups for the MAQ. However, Bramwell and Zeb (2006) found that British Christians and Muslims were more likely to deny any effects of menstruation, whilst the Hindu women found menstruation to be more debilitating and bothersome. Additionally Good and Smith (1980) and Paige (1973) both found differences in menstrual cycle symptom reporting between religions that were related to sex-role attributes.

In the results of Study One, British Christian women as a whole were less likely than American Christian women to deny the effects of menstruation, and more likely to find it debilitating. This points to the multi-dimensional nature of culture, indicating that although British Christian women are more likely to deny the effects of menstruation when compared to one cultural group (i.e. Hindus, Bramwell & Zeb, 2006), they may be less likely to deny it in comparison to a different cultural group (i.e. American Christian, Study One).

One of the main interests of this study was to look for interactive effects between types of culture. Some of the previous research had suggested that religions in different countries might encapsulate different attitudes and beliefs, due to the effects of the national culture that they were operating within (Roccas & Schwartz, 1997; Wikan, 1998). No significant interactive effects were found for these cultural groups. Whilst it is possible that the two national cultures were too similar to have differential effects on the religious groups operating within them, differences in attitudes and symptom reporting were found between the national cultural groups. It is also possible that two of these significant differences between nationalities in menstrual cycle symptom reporting might have been confounded by levels of religiosity. In any case, none of these factors were found to be significant when entered into multivariate linear regression models.

If one compares the mean factor scores obtained for these cultural groups with those obtained in some of the relevant literature, it can be seen that there are similarities in the values of the reported statistics. Tables 45 and 46 illustrate this. Studies using either a British or American sample have been included in the tables, and where possible religion of the sample has also been incorporated. The table shows that there seems to be slightly more congruence between studies for the MAQ scores than for the MDQ scores.

When considering Table 45 for the MAQ and Table 46 for the MDQ, the results from this study seem fairly similar to those gathered in previous

research. This is helpful because it puts the results from this research into a similar arena as other results and shows that the groups sampled for this study may be part of a larger "American" or "British" culture. Whilst this means that firmer, more generalisable conclusions about the representativeness of the national cultures may be appropriate, caution must still be used in interpreting the results.

A key finding of these results is the absence of significant differences between religious groups. This led the researchers to postulate that there might be a third variable which would interact with cultural group membership. The most obvious possibilities for a variable which might produce an interaction effect were the high anxiety levels or the differences between groups in number of children. This resulted in further *post hoc* hypothesis testing for interactions between groups for both of these factors. The results of these analyses are considered later in the discussion.

Table 45. Means and standard deviations for MAQ scores for this study and other comparable research

	British Protestant Mean \pm SD	British Catholic Mean \pm SD	American Protestant Mean \pm SD	American Catholic Mean \pm SD	Brooks-Gunn & Ruble (1980) American Mean \pm SD	Bramwell, Biswas & Anderson (2002) British Mean	Bramwell & Zeb (2006) British Christian Mean \pm SD
Menstruation as a Debilitating Event (MAQF1)	46.24 \pm 10.74	47.87 \pm 11.26	42.95 \pm 10.80	44.13 \pm 10.28	43.32 \pm 11.76	46.72	50.55 \pm 15.24
Menstruation as a Bothersome Event (MAQF2)	30.35 \pm 6.42	32.60 \pm 6.09	31.12 \pm 6.22	30.62 \pm 6.53	27.90 \pm 6.54	24.31	33.21 \pm 5.13
Menstruation as a Natural Event (MAQF3)	21.95 \pm 3.33	20.76 \pm 3.84	22.47 \pm 3.40	22.31 \pm 3.80	22.55 \pm 5.20	18.40	22.75 \pm 4.86
Anticipation and the Prediction of the Onset of Menstruation (MAQF4)	25.73 \pm 6.13	26.60 \pm 6.42	25.53 \pm 4.92	25.27 \pm 5.89	24.90 \pm 5.55	22.92	26.11 \pm 6.71
The Denial of Any Effect of Menstruation (MAQF5)	15.41 \pm 5.60	15.43 \pm 5.54	17.53 \pm 6.01	18.20 \pm 7.41	19.02 \pm 7.35	16.23	17.92 \pm 7.13

Table 46. Means and standard deviations for MDQ scores for this study and other comparable research

	British Protestant Mean \pm SD	British Catholic Mean \pm SD	American Protestant Mean \pm SD	American Catholic Mean \pm SD	Brooks, Ruble & Clark (1977) American Premenstrual Mean	Bramwell & Zeb (2006) British Mean \pm SD
Pain (MDQF1)	12.56 \pm 3.74	12.53 \pm 3.26	12.53 \pm 3.91	12.76 \pm 3.96	15.72	12.24 \pm 4.37
Water Retention (MDQF2)	9.36 \pm 2.96	9.87 \pm 2.88	8.91 \pm 2.68	9.01 \pm 2.69	9.68	9.17 \pm 3.17
Autonomic Reactions (MDQF3)	5.63 \pm 2.00	5.83 \pm 2.08	5.46 \pm 2.01	5.13 \pm 1.58	8.60	5.67 \pm 2.01
Negative Affect (MDQF4)	17.53 \pm 5.82	18.44 \pm 5.44	16.12 \pm 5.24	15.89 \pm 5.29	14.24	15.33 \pm 6.38
Impaired Concentration (MDQF5)	13.10 \pm 4.96	13.74 \pm 4.50	10.69 \pm 4.02	10.56 \pm 3.25	12.24	11.79 \pm 4.48
Behaviour Change (MDQF6)	8.34 \pm 3.16	8.80 \pm 3.11	8.42 \pm 3.44	8.04 \pm 2.79	10.35	8.32 \pm 3.49
Arousal (MDQF7)	7.34 \pm 2.52	7.44 \pm 2.26	7.59 \pm 2.56	7.42 \pm 2.80	6.45	6.49 \pm 2.28
Control (MDQF8)	6.88 \pm 1.94	6.66 \pm 1.14	6.53 \pm 1.36	6.56 \pm 1.34	7.26	6.64 \pm 1.34

1.7.8 Exploratory analyses: Anxiety as a third variable

This section discusses the results from analyses using anxiety status as an independent variable with nationality and religion. Comparisons of these results with previous literature are made. Because using anxiety caseness as a third independent variable was not a pre-designated hypothesis, there were not any prior expectations for what results would be found. Other researchers have reported that MDQ symptoms are associated with anxiety (Elliot & Harkins, 1992; Lane & Francis, 2003; Paige, 1973; Strine et al., 2005; Watts et al., 1980). The results of this study support the finding that anxiety caseness is associated with higher levels of MDQ symptom reporting. Additionally, those women who had high anxiety levels were more likely to find menstruation debilitating and bothersome. As reported in the literature review, there is a large amount of literature discussing the relationship between anxiety and menstrual cycle symptom reporting. This will be discussed in the multiple linear regression analysis results section.

Because of these previous findings, it was expected that anxiety caseness would have a significant effect on MDQ and MAQ factor scores, however there were no pre-existing assumptions made about any patterns between national or religious groups. The results showed that when anxiety was added as a third independent variable, interactions between nationality and anxiety and religion and anxiety emerged on the symptom scales of the MDQ. Whereas when using two independent variables (nationality and religion), the results showed no main effects for religion and several main effects for nationality (British women scored more highly on the MDQ symptoms factors), when anxiety is added as a third variable a more complex relationship appears. The experience of anxiety seems to interact with the experience and expression of MDQ symptoms, with anxious American women and anxious Protestant women reporting higher levels of symptomatology than non-anxious American women or non-anxious Protestant women. British women and Catholic women did not show this trend with the addition of anxiety caseness, except in the cases of Negative Affect (British), and Behaviour Change (Catholic) factors, where the trend was less pronounced than in the American and Protestant samples.

These results are important because they suggest that there may be differences between religious groups; however, the differences are possibly related to the experience of anxiety. Because neither of the religious groups was significantly more anxious than the other, the results indicate that anxiety caseness is differently associated with menstrual cycle symptom reporting for each of the groups. This may suggest that anxiety caseness is related to menstrual cycle somatic symptom reporting for women in some religious groups differently than in other religious groups. As reported earlier in section 1.3.14, similar result has been found by Good and Smith (1985). They found that anxiety (as measured by an adapted form of the Taylor Manifest Anxiety Scale) was correlated with Menstrual Distress (as measured by the MDQ) for Catholics and Jews but not for Protestants. However, in Study One it was anxious and non-anxious members of the Protestant group which showed significant differences in MDQ reporting. The implications of these results will be returned to later in the discussion.

1.7.9 Exploratory analyses: Child status as a third variable

This section examines Child Status as a third independent variable, along with nationality and religion. The results from this study are compared with previous literature.

Again, using child status as a third independent variable was not a pre-meditated hypothesis, and therefore there were no expectations for the outcome of the results. The results of this study show that the inclusion of child status into the AVOVA did not substantially change the results for menstrual attitudes or symptoms (except behaviour change, which was significantly higher for women without children). Interestingly, British women were also found to report more highly on the Behaviour Change factor, and were also more likely to not have children. It is possible that these two variables were confounded. In any case, both variables were included in a multivariate linear regression model, the results of which are discussed later in the thesis.

Previous studies have found differing results with respect to the role of parity in menstrual cycle symptom reporting. Moos (1968) found that women with more children reported higher MDQ scores (although this was confounded by the fact that these women also tended to be older). Other studies have found the opposite, for example Woods et al. (1982) found that it was nulliparous women who reported more severe menstrual cramps. Again, however, the finding that nulliparous women are more likely to report menstrual cramps is confounded by the tendency for nulliparous women to be younger than parous women. Indeed, previous literature has suggested that older women are more likely to experience the psychological changes associated with PMS (irritability, depression, etc.), whilst younger women are more likely to experience dysmenorrhoea (Walker, 1997). Thus, age tends to be associated with parity, and determining which has most important effects on menstrual symptoms is challenging. This study did not seek to separate out age from parity, because no significant differences in age were found between groups.

There were significant interactions between nationality and parity for the menstrual attitudes debilitating and bothersome. British women with children had higher scores than the women in other groups for both of these attitudes. One explanation is that this is due to differences in life stressors associated with motherhood in those countries, as career women with childcare responsibilities have been found to report higher levels of distress premenstrually (Coughlin, 1990). Additionally, these results could be related to differences in socioeconomic characteristics in those societies.

Another explanation for these differences in menstrual attitudes may be that women with children adhere to a more traditional female role, and therefore American women are more likely to adhere to a traditional female role than British women. Paige (1973) found that acceptance of a female role may influence menstrual symptom reporting in women of different cultural groups. Specifically, her results showed that menstrual symptom reporting was more influenced by female role acceptance in US Catholic women than in US Protestant or Jewish women. The results from Study One did not support

Paige's result that there are differences in female role acceptance between religions, as there were no differences in debilitating or bothersome attitudes across religions, but across nationalities instead. This study's results suggest that adherence to a female role may influence symptom reporting, not across religious cultural groups, but across national cultural groups with American women more likely to be influenced by that role than British women.

1.7.10 Multivariate Linear Regression Analyses: MAQ and MDQ factors as outcome variables

This section discusses the results for the multivariate linear regression analyses. These analyses are then compared to the relevant literature. Similar to the univariate results, anxiety was significantly related to all off the MDQ symptom factors, with those scoring higher on the anxiety scale of the HADS also scoring higher on symptom reports of the MDQ. None of the other variables (nationality, religion, child status, religiosity, the interaction between nationality and anxiety, and the interaction between religion and anxiety) showed a significant effect in the model.

As previously discussed in this chapter, anxiety and menstrual cycle symptom reporting have repeatedly been shown to be associated. However, some researchers have observed that women with high levels of anxiety do not show worsening of menstrual cycle symptoms premenstrually and/or menstrually, and instead report a high level of symptoms throughout the cycle (van den Akker & Steptoe, 1985, 1994; Livesey et al., 1987; Rose & Abplanalp, 1983; Rubinow & Roy-Burne, 1984; Sampson, 1984). This has been suggested to be indicative of a general reporting trait (i.e. women who are high in anxiety report high levels of symptomatology in general, van den Akker, Sharifian, et al., 1995; Condon, 1993; Rubinow & Roy-Burne, 1984). This has also been suggested of women who are high in neuroticism (van den Akker, Eves, Stein, et al., 1995), and as has been previously mentioned, neuroticism and anxiety have been found to be related (Brandes & Beinvenu, 2006; Gershuny & Sher, 1998). It has also been hypothesized that

neuroticism may act as a vulnerability factor for symptom reporting in anxious individuals (van den Akker, Eves, Stein, et al., 1995).

Anxiety sensitivity has been described as the 'fear of anxiety symptoms' (Sigmon, Rohan, Boulard, Dorhofer, & Whitcomb, 2000), and this tendency has been found to be correlated with reports of anxiety (Sigmon, Dorhofer, Rohan, & Boulard, 2000). These researchers have suggested that a tendency towards anxiety sensitivity may increase women's awareness of menstrual changes due to an increased amount of self-focus. Women who are high in anxiety sensitivity may be more likely misinterpret the meaning of normal bodily sensations. They are also often found to misjudge the severity of these symptoms (Sigmon, Dorhofer, et al., 2000). Interestingly, these researchers also found no effect for cycle phase on symptom reporting, and instead found that anxiety sensitivity influenced these reports. The potential consequences of this reporting bias are further discussed in the implications section of the discussion.

1.7.11 Hypothesis 2: Menstrual attitudes and distress would be correlated

This section discusses the hypothesis that menstrual attitudes and distress would be correlated. The results from this study are compared with previous research.

Patterns for the sample as a whole showed that negative attitudes correlated with increased negative symptom reporting. Relationships between menstrual attitudes and symptoms have been found by various researchers (Bramwell, Biswas, & Anderson, 2002; Brooks, Ruble, & Clark, 1977; Ruble & Brooks Gunn, 1979; Vila & Beeck, 1980). Brooks-Gunn & Ruble (1980) have also reported associations between negative attitudes and symptoms. They found that debilitating attitudes were associated with more negative symptomatology, and that natural attitudes were not. This is similar to the results found in this study, with British women more likely to report that menstruation was Debilitating and to report higher levels of water retention, autonomic reactions, negative affect and impaired concentration; further

emphasising that there is an association between negative attitudes and negative symptom reporting.

Zeb (2003) found that relationships between menstrual attitudes and menstrual symptoms exhibited different patterns of association depending on cultural group. Similarly, Rothbaum and Jackson (1990) found that attitudes and symptoms correlated for American Catholics, but not for American Protestants. Again, adherence to a traditional female role may play a part, as Paige (1973) found that Catholic women who held traditional female role ideologies were more likely to experience menstrual distress than Catholics who did not hold traditional female role ideologies. Neither Rothbaum and Jackson (1990) nor Paige (1973) found consistent patterns for Protestants, although Paige makes the point that the Protestant women in her sample came from a more heterogeneous religious training background than did the Catholics. This was not true, however, of the American Protestant group in Study One. An examination of the standard deviations of the MAQ and MDQ shows that they were not higher for the American Protestant group than any other national/religious group.

1.7.12 Implications

This section explores the implications of the results, first discussing the relationship between mood and menstruation. The concept of somatisation is then introduced and is related to menstrual symptom reporting through stereotyping and cultural idioms of distress.

The main outcome of these analyses has been to show that anxiety alone was able to significantly predict menstrual symptom reporting independently of the other variables. The relationship between mood and menstruation has been explored in previous research (see references in sections 1.3.4 and 1.7.2). Indeed, the MDQ measures mood, through factors such as Negative Affect and Behaviour Change. Negative affect has been linked to somatic symptom reporting in previous research (Goldberg & Bridges, 1988; Katon, Sullivan, & Walker, 2001; Persson & Sjoberg, 1987). These studies contribute to two veins of literature about negative affect. There is one vein

of research which shows the link between anxiety/depression and somatisation (Goldberg & Bridges, 1988; Katon et al., 2001; Persson & Sjoberg, 1987), and another thread of research showing a link between anxiety/depression and menstrual cycle symptoms (again, see references in sections 1.3.4 and 1.7.2). Additionally some researchers have discussed how these two subjects come together (van den Akker, Sharifian et al., 1995; Corney & Stanton, 1991), although few have formally analysed these variables simultaneously using measures of negative affect, somatisation, and the menstrual cycle. Given that other researchers in the menstrual cycle literature have previously made the point that none of the symptoms of PMS can be considered to be exclusive to the menstruation (Mayo, 1999), the conclusion can be drawn that these symptoms overlap with general somatic symptoms. It is perhaps not surprising, therefore, that women who report a high degree of symptoms premenstrually and menstrually also tend to report a large degree and high level of symptoms intermenstrually as well (van den Akker & Steptoe, 1985, 1994; Livesey et al., 1987; Rose & Abplanalp, 1983; Rubinow & Roy-Burne, 1984; Sampson, 1984). This is considered to be a general reporting trait, and it has been found more often in women who are anxious than in other women (van den Akker, Sharifian, et al., 1995; Condon, 1993; Rubinow & Roy-Burne, 1984).

Somatisation is a term that has been defined as "somatic clinical presentations of affective, anxiety or other psychiatric disorders" (p. 420, Kirmayer & Young, 1998), essentially a physical representation of a non-physical process. One study has examined the relationship between somatisation and menstrual cycle symptoms (Kuczmierczyk et al., 1995), linking somatisation to high levels of depression in women who have prospectively confirmed PMS. However, Kuczmierczyk et al.'s (1995) study also showed significant associations between anxiety and somatisation for women who have prospectively confirmed PMS but low levels of depression, and for women who do not have prospectively confirmed PMS. Study One also suggests that the relationship between negative affect and menstrual symptom reporting is complex, but points to the role of anxiety in somatisation behaviour.

One of the unanswered questions in the somatisation literature is whether anxiety or depression is more associated with somatisation behaviour. Sayar, Kirmayer, and Taillefer (2003) found that depression was related to somatisation, however, when anxiety and hypochondriacal worry were added to the ANOVAs, the effect of depression disappeared. Although depression has been the focus of much of the somatisation literature, findings seem to suggest that anxiety may be as likely to be associated the reporting of somatic symptoms (Sayar et al., 2003). This would agree with findings in the menstrual cycle literature, where anxious women are more likely to report somatic menstrual cycle symptoms.

It has been suggested by Parlee (1974; 1994) that women's responses to retrospective menstrual cycle questionnaires may reflect cultural stereotypes instead of their actual experience of menstruation. Various aspects of a person's cultural background, such as the individual's family, local surroundings, global media and popular culture teach people how discomfort and distress should be appropriately expressed within that setting (Kirmayer, Groleau, Looper, & Dao, 2004). This causes individuals to engage 'idioms of distress' in order to describe their experiences (p. 24, Kirmayer, 2001). These idioms of distress can be thought of as culturally patterned ways of communicating distress, and involve not just concerns about the body, but also problems that are social and interactional (Kirmayer, 2001). Kirmayer and Young (1998) write about somatisation and cultural idioms of distress:

"An individual's report of bodily symptoms can be understood as encoding cultural models of sickness or idioms of distress. These cultural models supply individuals with a 'vocabulary' of symptoms; more than this, they also provide explanations for these symptoms and the associated suffering. As a culturally available idiom, somatic symptoms express discomfort and distress in ways that are intelligible within the individual's social milieu but may have different meanings to outsiders" (p. 424).

The idiom of distress hypothesis suggests that somatising and mental health problems can be mitigated if others in the culture understand it as emotional distress (Keys & Ryff, 2003). Thus, if women can use cultural idioms of distress associated with somatic menstrual symptom reporting to normalise their experiences of anxiety, then they may be able to avoid the social stigma that accompanies presenting with these symptoms. Corney and Stanton (1991) echo these ideas, having stated that PMS may be a more socially acceptable label for negative feelings.

The use of idioms of distress may help to explain the results of this study, and go hand-in-hand with theories proposed by other researchers who have found a general reporting trait for high anxiety women. The lack of specific symptomatology for the menstrual cycle and the idea of cultural stereotyping of women's menstrual experience may consequently lead women who have a tendency to symptom report to choose menstrual cycle complaints as their idiom of distress.

Research in somatisation and psychosomatic disorders has suggested that those individuals who are prone to these types of illnesses have an inhibited development of the ability to experience or express emotions and/or to engage in fantasy. These abilities have been postulated to aid in coping and adapting to distress (Acklin & Alexander, 1988). Alexithymia is a word coined by Sifneos (1973), which means 'no words for feelings'. It is similar to a term coined by the French theorists Marty and DeM'Uzan (1963) that describes a concrete, restricted and stereotypic cognitive style, which had been noticed in psychosomatic patients. Alexithymia has also previously been reported to be associated with both depression and anxiety (Hendryx, Haviland, & Shaw, 1991; van de Putte, Engelber, Kuis, Kimpen, & Uiterwaal, 2007).

Alexithymia has been considered in one study in the menstrual cycle literature. Kuczmierczyk et al. (1995) found that women with PMS had higher levels of both depression and alexithymia. Whilst the results of this study do implicate alexithymia as having a role in menstrual distress, the study found a significant association between depression and alexithymia, but not anxiety

and alexithymia for women in the PMS group. However, this may be explained by methodological differences in how PMS was categorised. Kuczmierczyk et al.'s (1995) study placed women in PMS and non-PMS groups. The PMS grouping was based on recruiting women who had contacted a clinic for help with premenstrual complaints, who then filled out a prospective assessment of symptoms for a three month period, needing to display a 30% increase in symptom in the week before menses. This group is likely to be different from groups recruited from the general population, and therefore these results may not be applicable. Additionally their menstrual symptoms were not scored and related to measures of alexithymia. Therefore the group of 'anxious over-reporters' may not have been captured in the same way. Nonetheless, support was found in this study for their hypothesis that alexithymia would, "play a modulating role in the somatic expression of emotions in women with PMS" (p. 30, Kuczmierczyk et al., 1995).

van den Akker, Sharifian et al. (1995) have suggested the importance of a search for the aetiology of women's misjudging the cause of their negative feelings. Alexithymia, a condition characterised by difficulty identifying feelings, difficulty distinguishing feelings from bodily sensations, and difficulty communicating emotions to others (Le et al., 2002), and also as eliciting a stereotypical cognitive style (Marty & DeM'Uzan, 1963), may prove to have a role to play in explaining why some women with anxiety or a tendency toward negative affect are more likely to report menstrual cycle symptoms.

Another smaller point regarding the results of Study 1 were the interaction effects found between cultural group and anxiety in the ANOVA analyses. Although these interactions were found to not reach significance in the multivariate linear regression models, the graphed depictions of the interactions show an interesting trend. When anxiety caseness was added to the analysis of variance test as a third independent variable, a more complex relationship between culture and menstrual distress symptoms was visible, and it may be possible that with more power, these interaction effects would be seen (Study One was powered for hypothesis one, and not for the

exploratory analysis including anxiety as a third variable). This may indicate that different nationalities and religions may not differ significantly in their attitudes of menstruation, but instead vary in the experience and expression of their symptoms of menstruation, and that the role of anxiety in this relationship is different depending on cultural group. Membership of a national (British or American) or religious (Catholic or Protestant) group alone may not be enough to influence whether or not a woman reports menstrual distress. The graphs suggest that there may be a possibility of an interaction between culture and anxiety which is associated with menstrual cycle symptom reporting, and that both of these factors combine to form women's menstrual experience. This might indicate that anxious women in some cultures are more prone to reporting somatic menstrual cycle symptoms than non-anxious women from the same culture or anxious and non-anxious women of other cultures, (though it should be acknowledged that a one-way causative path interpretation may not be appropriate, and that it is possible that women in some cultures are more likely to become anxious due to the experience of menstrual cycle symptoms). Although these results may be considered a trend and were not conclusive in Study One, they do suggest that researchers should be cautious in cultural group choice, being sure to separate out levels of culture where possible to look for differential effects of types of culture on attitudes and behaviour.

1.7.13 Methodological issues, strengths, limitations, and alternative explanations

This study has explored menstruation in a cross-cultural context, using two cultural indices to try to explain differences in attitudes and symptoms reporting across cultures. Methodological issues are explored within the framework of strengths and limitations.

Strengths

This study had several strengths; most notably that culture was explored using a multi-dimensional approach. This design asset allowed a more complete picture of culture's influence on menstrual attitudes and symptoms to be explored. Although interactions between cultures were not found for

these samples, further cross-cultural research in the menstrual cycle should continue to approach cross-cultural research from this standpoint.

Another key strength of the study was that it did not use a clinical sample, which consists of women who present with a problem to a health professional. Clinical samples are often used in this type of research; however, sampling women who are already presenting to a health professional with a current health problem may bias the results by including mostly unwell women (Walker, 1997). The use of a non-clinical sample avoids this potential bias and arguably gives a more accurate picture of menstrual attitudes and distress in the populations studied.

Limitations

This study is limited by the same theoretical limitations that all biopsychosocial theory-driven research is limited by. As presented in the Literature Review, the foundations of biomedical model theory in menstrual symptom reporting does not have a sound basis in biological fact, as the biological processes (i.e. hormone and/or neurotransmitter levels and patterns) proposed as causative for symptom reporting have not been shown to differ significantly amongst women.

The Biopsychosocial models – including the Psychosocial and Social Psychological Models - are all based on the assumptions of the Biomedical Model, and therefore are subject to the same flaws in theory. Although some researchers outside of the biomedical models have striven to answer questions integral to better understanding the foundations of menstrual cycle symptom reporting, such as whether or not women are variable of temperament, whether this is more or less so at the time of menstruation, and whether or not this is of clinical importance, there is no clear consensus from the biopsychosocial camp as to the answers to these questions. Therefore, this research is also limited by having pursued a theoretical standpoint which has not succeeded in clearly defining the phenomenon that it seeks to explore.

In trying to move past the limitations of previous menstrual cycle theory set by Walker (1995), this research has acknowledged that there have been problems in the past with researcher subjectivity in menstrual cycle research, which may be in part responsible for the assumptions made about biological processes in the biomedical model. In addition, the assumption of linearity has been discussed in relation to this study's results, and it has been acknowledged that the menstrual cycle can be either the dependent or independent variable in this research.

A potential weakness of this study was that the women who participated in the study knew that the focus of the research was menstruation. Previous research has suggested that this may also bias the results by leading to stereotyped answers (Chernovetz et al., 1979; Pazy et al., 1989). It was not possible to obscure the intent of the study, however, due to the inclusion of the MAQ, which asks questions about attitudes towards menstruation.

Similarly, another potential weakness was that the questionnaires asked retrospective questions, which some researchers have suggested may introduce bias in the form of stereotyped answers (van den Akker, Sharifian, et al., 1995; Boyle & Grant, 1992; Dan & Monagle, 1994; Haywood et al., 2002; Marvan & Cortes-Iniestra, 2001; Pazy et al., 1989; Shaver & Woods, 1985; Woods et al., 1982). Knowing the focus of the study and answering questions retrospectively may influence the results women give because they are reporting menstrual expectations instead of menstrual experiences.

However, as mentioned in Section 1.3.3, Richardson (1990) has argued that both retrospective and prospective reports should be similarly affected by stereotyping (this was also suggested by Jakic et al., 2008). He goes on to state that retrospective and prospective data are collected in different ways, and that this might confound the results. From the experience of collecting the pilot data, the women who were asked to fill in prospective diaries were not reliable in remembering to fill the questionnaire out on a daily basis. This meant that a prospective methodology would have resulted in retrospective reporting unknown to the researcher.

The results of the previously mentioned studies suggest that no clear pattern has been shown regarding over or underreporting of menstrual symptoms based on retrospective or prospective measures. As such, these issues warrant further study, and potential implications of one methodology over the other should be included in all menstrual psychology research. In any case, it has been estimated by Logue and Moos (1986) that differences in retrospective and prospective reporting are likely to be around 0.4 on a 6 point scale.

Another factor which may have affected results was including a questionnaire which focussed on anxiety and depression symptoms (HADS) along with questionnaires about menstrual distress. This may have encouraged the women to respond more negatively on the HADS if they had been focussing on negative symptoms that occur around the time of menstruation. It could be that the participants saw the HADS as an extension of the menstruation questionnaires, and therefore responded to it as though it was part of their menstruation cycle symptoms.

One of the other limitations of the study is that the HADS anxiety scale is a state measure of anxiety levels. This means that it measures anxiety based on how the participant felt at a particular time in the recent past (Spielberger et al., 1970). It may have proven more useful to have included a trait measure of anxiety, which is thought to be a more general and long-standing measure of anxiety. It is possible that this might reflect a more general trend of a person to be anxious, as opposed to feeling anxiety in certain situations. However, other researchers in the field of menstrual cycle research have chosen to look at state anxiety as opposed to, or in addition to trait anxiety, and a couple of these researchers have found state anxiety to correlate more highly with the experience of PMS symptomatology (Christensen & Oei, 1989; Mira et al., 1985).

Another potential limitation of the study is that some of the women were lactating, using hormonal contraception, had given birth in the last six months, considered themselves to be menopausal, or were using HRT.

These women may have been experiencing different hormonal patterns than the other women, or may have had different attitudes toward their periods due to the recent changes in their reproductive functioning. However, *all* women must have had a period in the last three months, in order to better recall their menstrual experiences. The total number of women who were lactating was three, a small number, and there were no differences in lactating status between groups. This means that it should not have affected the results in terms of between-group differences. Similarly, the total number of women who had given birth recently was four. Although American women were more likely to have given birth recently than British women, a total number of 4 births was not considered to be too influential to the overall results. For the category of menopause, eleven women considered themselves to be going through menopause. However, this is considered to be self-report, and all of these women had a recent period as per the inclusion criteria. In any case there was not a significant difference between groups in number of women who reported themselves to be menopausal, and this is therefore unlikely to have influenced between group differences. Only two women reported using HRT at the time of filling out the questionnaire, and both of these were British Protestants. Again, because of the small number, this was not felt to be likely to influence the results.

A larger number of women reported using hormonal contraception (104). This represented a third of the sample. However, again there were no differences between groups in number of women using hormonal contraception, and this was therefore unlikely to influence between-group differences in attitudes and symptom reporting.

This research has endeavoured to apply a new method for cross-cultural research in menstrual cycle symptom literature. In doing so it has improved upon some of the previous limitations in the literature. However, it is impossible to exclude all methodological imperfections, and as such the main limitations were the retrospective questionnaires used and the obvious subject matter of the research.

Alternative explanations and other trends in menstrual cycle research

There may be alternative explanations for the results of this study, which were not measured and are outside the scope of this research. For example, other research has looked at the possible association of various risk factors with menstrual symptom reporting. These include behavioural, social, biological, demographic, and lifestyle factors.

Logue and Moos (1986) write that factors such as a woman's cycle characteristics and history of affective illness might be associated with perimenstrual symptom reporting. Woods et al. (1982) report differences in menstrual cycle symptom reporting based on marital status, with married women reporting more pain and separated and divorced women reporting more premenstrual tension (although these may be related to parity). Klein and Litt (1981) found that socio-economic status was positively associated with menstrual cycle symptom reporting, whilst Widholm and Kantero (1971) found no relationship for young girls, and a negative relationship for their mothers. (It is acknowledged, however, that socio-economic status is difficult to compare between studies because of differences in measurement and definition. Additionally, it is linked to other factors such as personality and nutritional aspects). Educational level and higher level of perceived stress have also been found to be related to menstrual cycle symptom reporting (Gollenberg et al., 2010; Sadler et al., 2010; Woods et al., 1982). Physical inactivity, smoking, caffeine, alcohol and diet have all been linked to differences in menstrual cycle symptom reporting (see Gold et al., 2007; Steiner, 2000; Thys-Jacob, Starkey, Bernstein, & Tian, 1998). Other recent themes in menstrual cycle literature may also shed light on the findings of this research: lifestyle factors related to PMS (Gold et al. 2007; Sadler et al. 2010; Stoddard, Dent, Shames, & Bernstein, 2007), quality of life related to PMS (Dean, Borenstein, Knight, & Yonkers, 2006), cost of PMS (Borenstein, Chiun-Fang, Dean, Wong, & Wade, 2005; Borenstein, Dean, Leifke, Korner, & Yonkers, 2007), biomedical research and PMS (Kurshan & Epperson, 2006; Clayton, Keller, Leslie, & Evans, 2006; Inoue et al., 2007), treatment for PMS (Clayton, 2008; Gerhardsen, 2008; Stoddard et al., 2007), and defining and diagnosing PMS and PMDD (Halbreich et al. 2007). This is not

an exhaustive list on subjects in which menstrual cycle research has delved, as the number is now sprawling. Those mentioned above do not require a detailed description, as they are off-topic.

1.7.14 Implications for future research

This study has suggested the importance of taking account of different dimensions of culture. It has also shown that it is possible to do so by using a study design which allows participants to be part of more than one culture. Future research should continue to examine culture from a multi-dimensional standpoint, and take into account that some types of culture are likely to affect the experience and expression of particular aspects of our biological and social world.

The Study One results also point to a need to further investigate the relationship between culture and the expression of menstrual symptoms. The results from this study suggested a tendency for anxious women in certain cultural groups to somatise more than others. The role that culture plays in somatisation behaviour has been previously examined in other research (Kirmayer & Young, 1998; Sayar et al., 2003); however, the results of this study show that it may be necessary to examine this relationship within the context of anxiety and the menstrual cycle.

This research also suggests that the association between anxiety and menstrual cycle symptom reporting might be different for various cultural groups, and might lead to different types of responses for these groups. Research which examines variables that might predispose anxious women to menstrual cycle and general symptom reporting should be further investigated along cultural lines. Additionally, research that considers that the experience of menstrual cycle symptoms may cause women of particular cultures to experience anxiety should also be considered. Some useful themes to include in these types of research would be neuroticism, sex-role attributes, and salience of menstrual cycle symptoms in various cultures.

Research that takes into account the factors mentioned above using regression techniques would be useful. This type of research could look at demographic factors (including the cultural indices used in this research), along with lifestyle factors to search for possible patterns across groups. Modelling could then be used to try to predict factors that influence menstrual symptom reporting in these groups.

1.7.15 Conclusions

The results from this study show that there are few relationships between these national and religious cultures and menstrual attitudes and distress. Significant differences between nationalities were found for a few MAQ/MDQ factors; however, a couple of these may be confounded by differences in religiosity between the national groups. There were no significant differences for mean factor scores between religions, however, this does not mean that differences do not exist in MAQ and MDQ factors across nationalities and religions. Other researchers have found differences in MAQ and MDQ factor scores between cultures where this study didn't; and this may be because the cultural differences in this study were more subtle than the cultural differences used in previous research. Additionally, it could be the case that other researchers did not look for confounding factors such as religiosity, and therefore the reported differences between cultural groups may actually be masking a difference in religiosity or sex role ideology.

This research has suggested the importance of taking into account the multidimensional nature of culture. It has proposed that when trying to ascertain how differences in culture might affect an individual's experience or expression of an illness construct, using one cultural category may not be enough to yield complete answers about how individuals in cultures vary. This is because culture is multidimensional and people are at the same time members of several different cultural groups, any or all of which may have its own influence on the theory being studied. This is suggested in the results of the interactions between culture and anxiety, which although not significant at multivariate regression level, showed a graphable trend in the ANOVA analyses.

This research has also demonstrated the importance of blending psychological and social factors together as part of a biopsychosocial model in order to better inform menstrual cycle research. Furthermore, this merging of affect and culture may have important consequences for menstrual cycle symptom reporting. Namely, that the experience of anxiety seems to be associated with an increased propensity towards higher levels of symptom reporting. Due to stereotyping of women's menstrual experience and the need to find culturally acceptable idioms of distress, this may influence women to report more highly on self-report scales of menstrual distress.

Study 2

2.1 Study Two introduction

This study builds on the results and conclusions of Study One. As was reported in Study One, research has previously shown cross-cultural differences in menstrual attitudes and symptoms. However, Study One emphasised that culture may be understood in many different ways, and women may be simultaneously members of several different cultural groups. Study One endeavoured to separate out different types of culture to try to determine whether differences could be found between different cultural groups. Although univariate analyses showed significant differences between nationalities for menstrual cycle attitude and symptom reporting, some of these may have been explainable by differences in religiosity. Additionally, interactions were found between cultural groups and anxiety; however, these failed to retain significance when other variables were accounted for in multivariate linear regression analyses. The only factor that was found to be reliably associated with menstrual cycle symptom reporting after taking into account the effects of the other variables was anxiety. Due to previous research showing a generalised reporting effect for anxious women on symptom scales, and accompanying theories regarding the role of stereotyped answers on menstrual cycle questionnaires, the idea of menstrual cycle symptom reporting as an idiom of distress was posed.

The conclusions from the results of Study One reinforced the need to ask the question: Why do women attribute their negative feelings to menstruation? In this section, the concept of alexithymia is introduced as a potential explanatory factor in determining the mechanism behind levels of anxious somatisation in menstruation. Additionally this study seeks to try to replicate the results from Study 1, which indicated that an interaction between religious cultural group and anxiety may be possible. This section endeavours to review the relevant alexithymia literature, concentrating on the definition of alexithymia, differences in alexithymia cross-culturally, how anxiety and depression relate to alexithymia, and the potential role for alexithymia in the menstrual cycle research.

2.2 Study Two literature review

2.2.1 Alexithymia as a concept

Alexithymia is defined as having the following two components: "(a) difficulty identifying one's feelings and distinguishing them from bodily sensations and (b) difficulty communicating one's emotions to others" (p. 341, Le et al., 2002). Along a similar vein, Sayar et al. (2003) refer to alexithymia as "externally oriented thinking" (p. 109). Alexithymia has been associated with higher levels of somatisation (Cohen, Auld, & Brooker, 1994), and it is believed that this increased tendency to somatise may be due in part to an alexithymic difficulty in processing and expressing mood (Grabe, Spitzer, & Freyberger, 2004; Sayar et al., 2003).

Research has shown alexithymia to be associated with certain sociodemographic variables, such as male gender, poor education, and low socioeconomic status (Joukamaa, Sohlman, & Lohtinen, 1995; Kokkonen et al., 2001). These factors were revealed to be significantly related even after anxiety and depression were controlled for. Kokkonen et al. (2001) found the prevalence of alexithymia to be five per cent among females in a cohort of Finnish participants from the general population. Hendryx et al. (1991) found a slightly higher alexithymia prevalence of eight per cent in a student population. This suggests that the prevalence of alexithymia is relatively small in the population. It may be more useful to think of alexithymic tendency as normally distributed throughout the population, as suggested by Taylor (1994), meaning that all individuals would differ in the level of alexithymia that they experience. All individuals would fall somewhere on the alexithymia scale, even though they may be below the commonly used cut-off points on scales used to designate individuals as alexithymic.

2.2.2 Alexithymia cross-culturally

Culture has been shown in previous studies to have an effect on alexithymia levels (Dion, 1996; Fukunishi, Yoshida, & Wogan, 1992). Taylor and Bagby (2000) state that in a variety of countries, both somatisation and reported medical problems increase with higher levels of alexithymia. Le et al. (2002)

write "because culture can influence the experience and expression of emotions and because alexithymia is primarily characterised by emotion identification and communication ... culture would also play a role in alexithymia" (p. 341). They theorised that the method by which culture influenced alexithymic tendencies was through parental socialisation of the child into their environment. Likewise, Berenbaum and James (1994) found that having grown up in homes where children were not able to openly express their emotions was the best predictor of alexithymia. Consequently, if some cultures are more prone to this type of child socialisation, then alexithymic tendencies should be increased in those cultures.

2.2.3 Alexithymia and anxiety/depression

It has been observed that individuals with depression or anxiety score highly on the Toronto Alexithymia Scale ((TAS), Bagby, Parker, & Taylor, 1994; Bagby, Taylor, & Parker, 1994), which has been shown to measure alexithymia in both clinical and non-clinical populations (Hendryx et al., 1991; van de Putte et al., 2007). Because many survey studies show a large degree of overlap between depression and alexithymia, it has been suggested that they may actually be measuring the same construct (Hintikka, Honkalampi, Lehtonen, & Viinamaki, 2001). Hintikka et al.'s (2001) research showed that for participants who were both depressed and alexithymic, loadings of the Toronto Alexithymia Scale and the BDI (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961), were highly overlapping. Furthermore, Le et al. (2002) found that negative affect is positively associated with alexithymia in European American, Asian American, and Malaysian cultural groups, and positive affect was negatively correlated to alexithymia.

However, Hendryx et al. (1991) found that only the dimensions of the TAS which related to identifying and communicating emotions were related to anxiety and depression. Furthermore, their results suggested that alexithymia is state-dependent, and that anxiety-inducing situations can provoke alexithymia-like reactions. Often in research, alexithymia is measured by using an overall score, which encapsulates all areas of the construct: difficulty communicating and identifying feelings. They suggest

that because certain dimensions of alexithymia can be state-dependent, it may be more accurate to study them independently.

2.2.4 Alexithymia, somatisation, mood and menstruation

As previously stated, somatisation and depression have been found to be associated with each other. This is also true of alexithymia and somatisation, which has been shown to have a moderate positive correlation (Bagby, Taylor, & Atkinson, 1988; Bagby, Taylor, & Ryan, 1986). However, to date only one study has endeavoured to pull together alexithymia, mood, somatisation and menstruation. Kuczmierczyk et al. (1995) found that women who had self-diagnosed PMS and high levels of depression scored higher on somatisation measures and on alexithymia measures. Women who had PMS and low levels of depression and women in the non-PMS group did not score as high on somatisation and alexithymia measures. This research suggests a possible role for somatisation, mood and alexithymia in the aetiology of PMS symptoms, and therefore invites further exploration to see if these variables give a more comprehensive model of menstrual attitudes and symptomatology.

2.2.5 Conclusions

Taken together, the results of previous research suggest that alexithymia may be a mechanism by which individuals in certain cultures learn to somatise their feelings. Anxiety, and to a lesser extent depression, are associated with somatisation (Sayar et al., 2003), and these variables have all been shown to be associated with alexithymia. Thus, it may be that women in some types of culture that also have a current mood disorder will somatise based on an increased alexithymic tendency, and therefore report worse menstrual symptomatology. This study will venture to explore this possibility.

2.3 Study Two aims, objectives and hypotheses

Aim: The aim of this study is to explore the role of alexithymia in menstrual cycle symptom reporting. Additionally, this study seeks to replicate Study One, which is further explained in the hypotheses below. The cultural groups to be used for the purposes of this research are British Protestant women and British Catholic women.

Objective 1: The first objective of this study is to assess the demographic characteristics of the group.

Objective 2: The second objective of this study is to replicate the findings of Study One relating to the interaction between anxiety and religion in menstrual symptom reporting.

Objective 3: The third objective of this study is to measure differences between groups in levels of alexithymia and anxiety and to assess the contribution of alexithymia to menstrual cycle symptom reporting.

Hypotheses

This section aims to test the following five hypotheses:

Hypothesis 1: As in the Study One, there will be no difference in anxiety levels between the two religious cultural groups.

Hypothesis 2: As suggested in Study One, there will be an interaction between religion and anxiety. It is expected that Protestant women who are classified as anxious will report significantly higher MDQ scores than Protestant women who are not anxious on several MDQ factors, including Pain, Autonomic Reactions, Impaired Concentration, Behaviour Change and Control. It is predicted that the differences in MDQ scores between anxious and non-anxious Catholics will be less pronounced and also non-significant.

Hypothesis 3: Protestants will have higher alexithymia scores than Catholics, as measured by the Toronto Alexithymia Scale.

Hypothesis 4: Alexithymic individuals will report higher levels of menstrual cycle symptoms than non-alexithymic individuals.

Hypothesis 5: There will be an interaction between high anxiety levels and high alexithymia levels, producing higher reported menstrual symptom scores on the Menstrual Distress Questionnaire.

2.1 Study Two methods

This study used a cross-sectional between-groups study design.

The second study was also a questionnaire-based study. The first section of the methods will focus on the measures used in the study, and the second section will then outline the participants, procedure and design of the study. Finally the sample size calculations, data analysis strategy, and ethical approval are discussed.

2.1.1 Measures

All questionnaires and participant hand-outs for the Study Two can be found in Appendix 3.

The Menstrual Distress Questionnaire (MDQ)

The Menstrual Distress Questionnaire used in this study is the same as the one used in Study One. For a review of psychometric properties of the scale, see Study One, Section 1.5.2. Internal reliability (Cronbach's alpha) for this scale was high in this sample (.95).

The Hospital Anxiety and Depression Scale (HADS)

The Hospital Anxiety and Depression Scale (HADS - Zigmond & Snaith, 1983) used in this study is the same as in Study One. For a review of psychometric properties of the scale, see Study One, Section 1.5.2. Cronbach's alpha scores showed internal consistency to be moderate for these factors in this sample (Anxiety scale = .80, Depression scale = .75).

Demographics questionnaire

The demographics page used in this study is the same as the one used in Study One. For details refer to Study One, Section 1.5.2.

The Toronto Alexithymia Scale (TAS)

The Toronto Alexithymia Scale (TAS-20) (Bagby, Parker et al., 1994; Bagby, Taylor et al., 1994) is used to measure alexithymia levels in both clinical and non-clinical samples (Bagby, Parker et al., 1994). It measures the degree to

which individuals are alexithymic by determining the amount that a person agrees with statements related to alexithymia by using a five-point Likert scale. There are 20 items on the TAS-20, which relate to three different categories, 1) Difficulty Identifying Feelings, 2) Difficulty Describing Feelings, and 3) Externally-Oriented Thinking. Scores of 62 or less indicate a non-alexithymic individual, and scores of 74 or more indicate an alexithymic individual. A score between 63 and 73 indicates possible alexithymia (Taylor et al., 1988). Previous research has shown adequate internal consistency (Cronbach's alpha = 0.81; Bagby, Parker et al., 1994), test-retest reliability (.82 at 1 week, and .75 at 2 weeks; Taylor et al., 1985). The internal reliability (Cronbach's alpha) score for this scale in this sample was adequate (.80). The measure has also been shown to be replicable across different cultures (Le et al., 2002).

2.1.2 Participants

Inclusion criteria consisted of women from the UK who had been brought up in either Protestant or Catholic families and had menstruated within the last three months. There was no upper-bound cut-off age used to exclude respondents, however, females under the age of 16 were not allowed to participate. Women were recruited from a university situated in an industrial city in the Northwest of England. Women were recruited solely from the United Kingdom for this study. This was because Study One showed few differences between nationalities for main effects (and those that were found were possibly confounded by differences in levels of religiosity between nationalities) or for interaction effects between nationality and religion or nationality and anxiety level. Therefore, effort was put into finding Catholics and Protestants from within the UK in order to better explore and attempt to replicate the relationship between religion, anxiety and MDQ reporting.

2.1.3 Procedure

Female students were recruited online by placing an advertisement on the University's web-announcement system. This system operates such that when logging into their computers, all students on the university network receive a message asking them to participate in the study. Women were

invited to participate by clicking on a link which led them to an information page about the research and could decide to continue with the survey at that point. The survey was handled by a company called Mercurial mSurvey, which allowed questionnaires and information sheets to be posted online and provided a link to be sent out for the survey. The questionnaires were completed between May and July of 2007, and the company has since closed down (August 2007). In accordance with University of Liverpool ethics and data protection procedures, all completed questionnaires were printed off into hardcopy, and the electronic versions were deleted. The hardcopies are securely stored in a locked filing cabinet with any participant identifying information stored separately.

As an incentive the women were asked if they would like to participate in a lucky draw. Women were offered £100 in the form of a gift certificate from a pre-designated choice of stores. At the end of the recruitment process, a winner was randomly chosen.

Again, to encourage a high response rate, the study:

1. Used a self-completed online questionnaire.
2. Provided an information sheet explaining the aims and objectives of the study and the uses of the data collected.
3. Provided assurances about the anonymity of all data collected.
4. Kept the questionnaires as short as possible to reduce the burden on respondents.
5. Offered incentive in the form of £100 gift voucher to one respondent in a lucky draw.

It is not possible to calculate a response rate, since the invitation for the questionnaires was sent out electronically to all students, and the survey link

could have been forwarded to friends and relatives by those who received the link.

2.1.4 Sample size calculation

As previously mentioned, there were two aims for this study: 1) To replicate the findings of Study 1 relating to an interaction between anxiety and religion in menstrual symptom reporting, and 2) to explore alexithymia's role in menstrual cycle symptom reporting. The key hypotheses relate to the impact of alexithymia on menstrual symptom reporting, and there is no similar previous study which could be drawn on in order to conduct a power analysis. *Post hoc* sample size calculations relating to alexithymia can be found in the results section.

In order to replicate the findings from Study One, a power analysis using NQuery advisor was completed. The analysis showed that replication of the interaction between anxiety status and religious cultural group for the MDQ factor Autonomic Reactions (MDQF3) would require an N per group of 45 to give 80 per cent power (at $\alpha=0.05$) to detect the interaction effect. The effect size for the interaction between religious cultural group and anxiety caseness for the factor Autonomic Reactions was $ES=0.092$. Autonomic Reactions was used to give a conservative estimate of the number needed to find an interaction between anxiety caseness and religion. It was decided that after the responses from 40-45 participants was gathered, a *post hoc* sample size analysis would be performed to determine whether or not it would be beneficial to collect more data.

2.1.5 Data analysis

Data were analysed using the statistical software SPSS versions 14 and 15.

2.1.6 Ethics approval

The research proposal was subjected to ethics review following procedures in place in the University of Liverpool Research Ethics Committee. Ethics approval was subsequently granted based on making the following two

changes to the questionnaires and information pages: (a copy of the email granting ethics approval can be found in Appendix 4).

The wording on the demographics questionnaire should be changed from

- “How many children do you have?” to “Do you have any children? If so, how many?”
- The information page should make it clearer that no one under the age of 16 is allowed to participate.

2.1 Study Two results

The results section is split into six segments:

1. Description of the respondents
2. ANOVA results for Hypothesis 2: Replication of Study One
 - a. Main Effects – Anxiety and Religion
 - i. Results from Study Two
 - ii. Replication of Study One
 - b. Interactions – Anxiety * Religion
 - i. Results from Study Two
 - ii. Replication of Study One
3. Student's t-test results for Hypothesis 3: Protestants will have higher alexithymia scores than Catholics
 - a. Religious groups
 - b. Anxiety caseness groups
4. Student's t-test results for Hypothesis 4: Alexithymic individuals will report higher levels of menstrual cycle symptoms
5. Pearson Product-Moment Correlation results for Exploratory Analysis
 - a. Correlation between anxiety and alexithymia
 - b. Correlation between depression and alexithymia
6. Hierarchical Linear Regression for Exploratory Analysis for Hypothesis 5: Modelling MDQ factors with anxiety, alexithymia, and the interactive term anxiety*alexithymia as independent variables

2.1.1 Description of the respondents: Socio-demographic profile of the sample

In total, this study consisted of 191 female participants. The number of these women which were Protestant was 115 (60.2%) and 76 were Catholic (39.8%). When split into groups based on anxiety caseness, 114 of these 191 women fell into the anxiety caseness category (59.7%) and 77 did not (40.3%). The participant categories were further broken down into religious/anxiety caseness groups. Forty-two of the 191 women were Protestants without anxiety caseness (22.0%), 73 of the women were Protestants with anxiety caseness (38.2%), 35 of the women were Catholics

without anxiety caseness (18.3%), and 41 of the women were Catholics with anxiety caseness (21.5%).

General demographics

Age

The data for the age of the sample was positively skewed, with the mean value for the whole sample (in age \pm SD) of 22.91 ± 6.08 years, a median value of 21 and a mode of 20. The youngest participant was 18 and the oldest was 50. The median age for the Protestant group was 21, and the age spread was 18-50. The Catholics had a median age of 20.50, and the age spread was 18-47. For the anxiety caseness group, there was a median age of 21, and the lowest age was 18, with the highest age being 50. Finally, the non-anxiety caseness group also had a median age of 21, and an age spread of 19-48. A Kruskal-Wallis one-way ANOVA was performed with age as the dependent variable and the four groups (Catholic Anxiety Caseness, Catholic Anxiety Non-caseness, Protestant Anxiety Caseness, and Protestant Anxiety Non-caseness) as independent variables. There were no significant differences found for age between religious/anxiety groups (chi square=2.34, df=3, NS).

Parity

Parity was examined for the group as a whole. Similar to the previous study, women were asked both whether or not they have children and also how many children they have. Due to more than 20 per cent of the cells having an expected count of less than five, a chi-square test was not able to be used, and a Fisher's Exact Test was used. This test showed that there was not a significant difference between any of the four religion/anxiety groups for child status (having children versus not having children) ($p=1.00$, Fisher's Exact Test).

Again, number of children was examined to determine whether there was a significant difference between groups. A Kruskal-Wallis one-way ANOVA was performed on the four groups, as the distribution was positively skewed. The analysis (which included women who had responded that they had no

children) revealed that there was not a significant difference in number of children between the four groups (chi square=0.10, df=3, NS).

Weekly work hours

The participants were asked how many hours a week they worked, categorised into full-time, part-time, or none. Fisher's Exact Test was used to determine whether or not there was a significant difference between groups in number of hours worked. There was not a significant difference between religion/anxiety groups for hours worked ($p=0.14$, Fisher's Exact Test).

2.1.2 Reproductive status

Breast feeding/lactation

Women were asked whether or not they were currently lactating, as lactation can cause periods to cease. None of the participants were lactating at the time of filling out the questionnaires.

Hormonal contraception

Participants were asked whether or not they were currently using hormonal contraception. Women who were using certain types of contraceptives that suppress menstruation were not included due to not having experienced a recent period (within the previous three months). Participants using hormonal contraception were only included if they were having regular periods. Altogether, slightly under half of the women were using hormonal contraception ($n=93$). There were no significant differences in the number of women using hormonal contraception between any of the religion/anxiety groups (chi square=1.21, df=3, NS).

Recent birth

Inclusion criteria indicated that women who had given birth recently (within the last six months) would only be included if they had experienced a recent period. However, none of the women in this sample had recently given birth.

Menopause

Some of the women considered themselves to be menopausal, but reported having had a recent period. Women who considered themselves to be going through menopause were included if they had recently menstruated. Three women in this study considered themselves to be going through/have gone through menopause. Fisher's Exact Test revealed that there was not a significant difference in number of women who considered themselves to be going through menopause between the four groups ($p=0.70$, Fisher's Exact Test).

Hormone replacement therapy

Women who reported themselves as using hormone replacement therapy were to be included in the sample due to the fact that they were still experiencing periods. However, none of the women sampled were using HRT.

Currently menstruating

Women were asked whether or not they were currently in the bleeding phase of their periods whilst filling out the questionnaires. Thirty-five out of the 191 women (18.3%) were having their menses when they filled out the questionnaires. There was not a significant difference between women in any of the four groups for currently menstruating (chi square=4.13, $df=3$, NS).

Cycle day

The day of the cycle that the woman would likely have been on was calculated using the reported first day of her last period, along with the date that she filled the questionnaires out. The mean day was 18.13 ± 12.26 , the median was 17 and the mode was 16. The range of values was 1-86. As the data were positively skewed, a Kruskal-Wallis one-way ANOVA was used to test for significant differences between groups in cycle day. The Kruskal-Wallis test showed that there was a significant difference between groups for day of cycle (chi-square=8.77, $df=3$, $p<0.05$). Subsequently, Mann-Whitney *U* tests were performed to identify which groups showed a significant difference. A Mann-Whitney *U* test revealed no differences between religious

groups ($U=3551.5$, NS), however there was a difference in day of cycle for the anxious and non-anxious groups ($U=3227.5$, $p<0.05$), with the non-anxious group having a median score of 19 days and the anxious groups having a median score of 15 days.

Length of cycle

Women were asked how long their cycle typically lasts. The mean number of days was 29.35 ± 9.99 , the median number of days was the same value as the mode, at 28. The maximum value was 135 and the minimum value was 30. A Kruskal-Wallis one-way ANOVA was performed to identify any differences between the four groups in number of days in the menstrual cycle. This test showed a significant difference between groups (chi square=9.22, $df=3$, $p<0.05$). Subsequently, a Mann-Whitney U test was used to identify any differences between religious or anxious groups. This test showed that there was a significant difference between religious groups in length of cycle ($U=3374.0$, $p<0.05$), but not between anxious groups ($U=3707.5$, NS). Median values for both religious groups was 28, however, the range of score for the Protestants (20-135) was much higher than that of the Catholics (21-56).

2.1.3 Anxiety and depression levels

Hypothesis One stated that religious groups would not differ in anxiety status. The Hospital Anxiety and Depression Scale was again used to investigate levels of anxiety and depression in the sample. Eleven per cent of women participants scored above seven on the depression subscale of the HADS (as mentioned in Study One, this is the cut-off point recommended for correctly classifying a mood disorder by Hall et al., 1999), indicating the possible presence of a depressive mood disorder. Sixty per cent of women participants scored highly enough, seven or above (again, recommended by Hall et al., 1999), on the anxiety subscale on the HADS to suggest a possible anxious mood disorder.

Chi-square tests showed no differences in depression status (caseness vs. non-caseness) between religious groups (chi square=0.41, $df=1$, NS). There

were also no differences in anxiety status (caseness versus non-caseness) between religious groups (chi square=1.73, df=1, NS). Previous research (see Sartorius, Ustun, Lecrubier, & Wittchen, 1996) has demonstrated a high rate of comorbidity between anxiety and depression, so it was not surprising to find that those who fell into the anxiety caseness group also tended to fall into the depression caseness group (chi square=9.30, df=1, $p<0.01$).

Independent samples t-tests were performed on the overall depression factor score and the overall anxiety score using religion (Protestant and Catholic) as independent variables. These showed no significant differences in overall factor score between groups. (Depression: $t=-1.06$, df=189, NS), Anxiety: $t=-1.39$, df=189, NS).

Anxiety and depression medication

Ten of the 191 women (5.2%) were taking anxiety or depression medication, There was not a significant difference in number of women taking anxiety and depression medication for any of the four groups ($p=0.18$, Fisher's Exact Test).

2.1.4 General health

Women were also asked whether or not they had other current health problems and what type of health problem they had. Twenty-five of the 191 women (13.10%) reported having other health problems at the time of filling out the questionnaires. There was not a significant difference in incidence of women reporting health problems between the four groups (chi square=1.19, df=3, NS). The most common response was asthma, with 4.7 per cent of the answers. Eczema and diabetes each had two responses, and no other answer had more than one response.

2.1.5 Religious converts

In total, only six of the 191 women (3.1%) had converted to a different religion than their parents had belonged to. Using Fisher's Exact Test, the participants showed no significant differences between any of the four groups

for number of converts from parent's religion to their current religion ($p=0.53$, Fisher's Exact Test).

2.5.6 ANOVA results for hypothesis 2: Replication of Study One

In order to replicate the results of Study One, a series of 2x2 analyses of variance tests were used to test for the effects of religion (Catholic versus Protestant) and anxiety (anxiety caseness versus non-caseness) on MDQ factor scores. The results are presented below in terms of religion main effects and anxiety main effects, focussing on new versus replicated results. Next interactions between religion and anxiety (focussing on new versus replicated interactions) are presented. Table 47 shows the means, standard deviations and ANOVA results for of the MDQ factors for the main effects religion, and anxiety. Table 48 shows the means, standard deviations and ANOVA interaction results for the MDQ factors with religion and anxiety as independent variables.

Religion

Study Two Result

In this study, one main effect was found for the MDQ factor Pain ($F(3,187)=6.22$, $p<0.05$), with Protestants scoring significantly higher than Catholics.

Replication of Study One

In Study One there were no main effects found for religious group on any of the MDQ factor scores.

HADS anxiety caseness

Study Two Result

There were significant main effects found for anxiety caseness on all of the MDQ factors, with those in the anxiety caseness category scoring significantly higher than those not in the anxiety caseness category. Please see Table 47 for individual results.

Replication of Study One

This replicates the results found in Study One, excepting that Study Two found significant results for Water Retention (MDQF2) and Arousal (MDQF7), which were not found in the Study One.

Interactions between religion and anxiety caseness

Study Two Result

There were no significant interactions between religion and anxiety caseness.

Replication of Study One

The results from Study One showed an interaction between religion and anxiety caseness, such that Protestants with high levels of anxiety scored higher on the MDQ than Protestants with low levels of anxiety. Study One also found that Catholics did not show differences in MDQ scoring based on anxiety status. Neither of these findings was replicated in this sample.

Figures 14 - 18 show the graphed mean scores for each of the four groups (Catholic Anxiety Caseness, Catholic Anxiety Non-Caseness, Protestant Anxiety Caseness, Protestant Anxiety Non-Caseness). These have been included for further examination in the discussion section.

Figure 14. Graphed mean scores for religion and anxiety caseness groups for the MDQ factor Pain

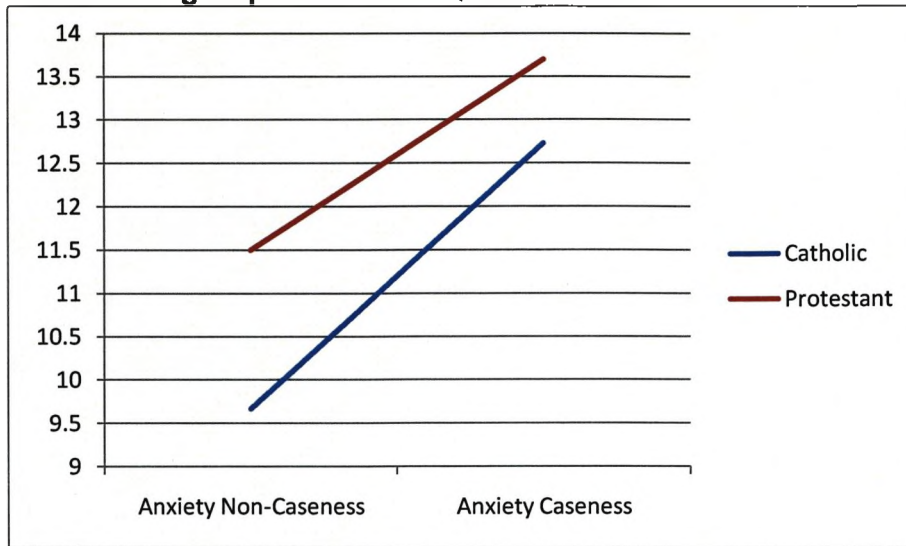


Figure 15. Graphed mean scores for religion and anxiety caseness groups for the MDQ factor Autonomic Reactions

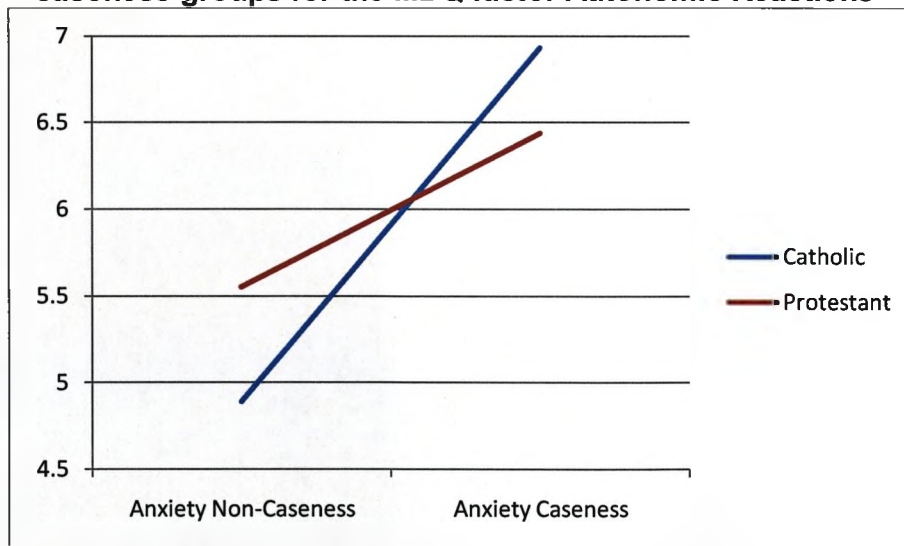


Figure 16. Graphed mean scores for religion and anxiety caseness groups for the MDQ factor Impaired Concentration

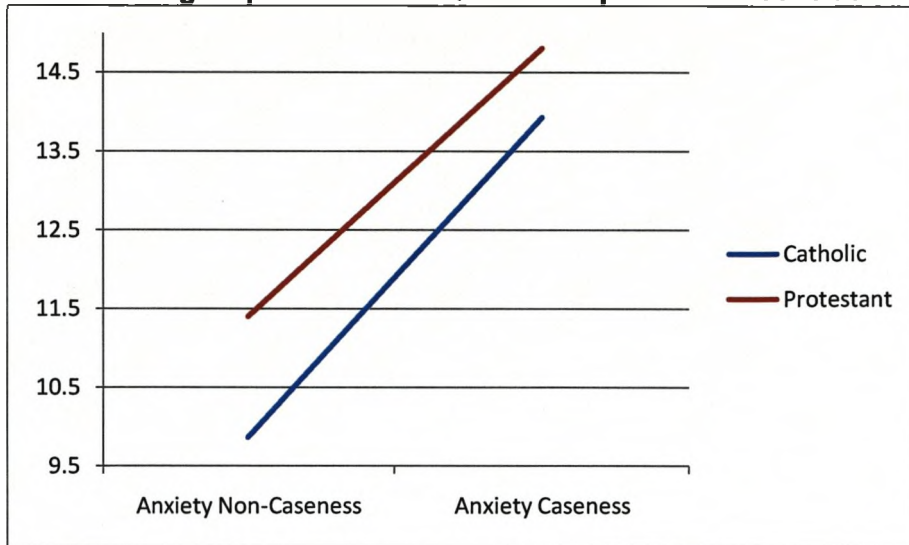


Figure 17. Graphed mean scores for religion and anxiety caseness groups for the MDQ factor Behaviour Change

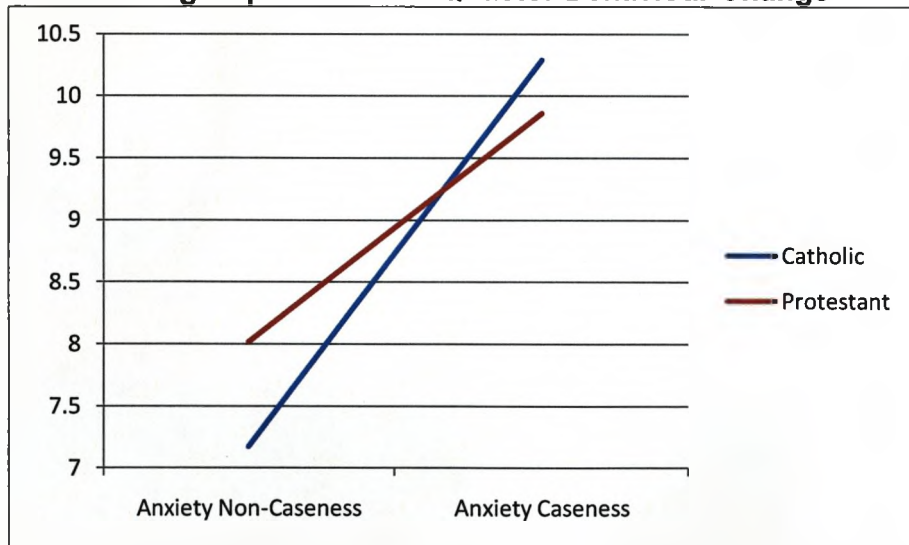


Figure 18. Graphed mean scores for religion and anxiety caseness groups for the MDQ factor Control

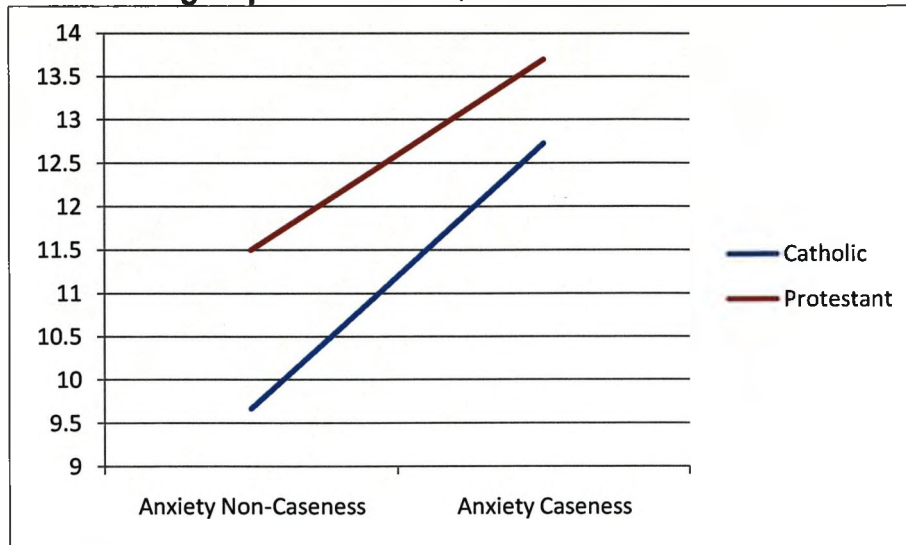


Table 47. Means, standard deviations, and ANOVA test results for main effects for the MDQ factors with religion and anxiety caseness as independent variables

	Protestant Mean \pm SD	Catholic Mean \pm SD	Anxiety Caseness Mean \pm SD	Anxiety Non- caseness Mean \pm SD	Main Effect - Religion	Main Effect - Anxiety
Pain (MDQF1)	12.90 \pm 3.89	11.32 \pm 4.02	13.35 \pm 3.85	10.66 \pm 3.69	F(3,187)= 6.22, p<0.05	F(3,187)= 21.89, p<0.01
Water Retention (MDQF2)	9.37 \pm 2.89	8.72 \pm 3.01	9.88 \pm 2.84	7.99 \pm 2.75	F(3,187)= 1.32, NS	F(3,187)= 19.30, p<0.01
Autonomic Reactions (MDQF3)	6.11 \pm 2.56	5.99 \pm 2.60	6.61 \pm 2.90	5.25 \pm 1.70	F(3,187)= 0.05, NS	F(3,187)= 15.39, p<0.01
Negative Affect (MDQF4)	18.44 \pm 6.14	17.57 \pm 6.64	20.37 \pm 6.19	14.73 \pm 4.93	F(3,187)= 0.30, NS	F(3,187)= 44.50, p<0.01
Impaired Concentration (MDQF5)	13.57 \pm 4.75	12.05 \pm 4.38	14.49 \pm 4.84	10.70 \pm 3.25	F(3,187)= 3.61, NS	F(3,187)= 34.13, p<0.01
Behaviour Change (MDQF6)	9.19 \pm 3.32	8.86 \pm 3.47	10.02 \pm 3.44	7.64 \pm 2.72	F(3,187)= 0.20, NS	F(3,187)= 26.98, p<0.01
Arousal (MDQF7)	7.14 \pm 2.33	7.18 \pm 2.31	7.65 \pm 2.50	6.43 \pm 1.80	F(3,187)= 0.19, NS	F(3,187)= 13.66, p<0.01
Control (MDQF8)	7.02 \pm 1.74	7.12 \pm 2.13	7.46 \pm 2.07	6.47 \pm 1.44	F(3,187)= 0.50, NS	F(3,187)= 13.18, p<0.01

Table 48. Means, standard deviations and ANOVA results for the MDQ factor interactions with religion and anxiety caseness as independent variables

	Catholic Anxiety Non-caseness Mean \pm SD	Catholic Anxiety Caseness Mean \pm SD	Protestant Anxiety Non-caseness Mean \pm SD	Protestant Anxiety Caseness Mean \pm SD	Religion * Anxiety Caseness ANOVA Test Result
Pain (MDQF1)	9.66 \pm 2.85	12.73 \pm 4.35	11.50 \pm 4.12	13.70 \pm 3.53	F(3,187)= 0.60, NS
Water Retention (MDQF2)	7.69 \pm 2.50	9.61 \pm 3.16	8.24 \pm 2.95	10.03 \pm 2.66	F(3,187)= 0.03, NS
Autonomic Reactions (MDQF3)	4.89 \pm 1.30	6.93 \pm 3.05	5.55 \pm 1.94	6.44 \pm 2.82	F(3,187)= 2.37, NS
Negative Affect (MDQF4)	14.03 \pm 4.66	20.59 \pm 6.63	15.31 \pm 5.13	20.25 \pm 5.97	F(3,187)= 0.88, NS
Impaired Concentration (MDQF5)	9.86 \pm 2.16	13.93 \pm 4.91	11.40 \pm 3.83	14.81 \pm 4.80	F(3,187)= 0.27, NS
Behaviour Change (MDQF6)	7.17 \pm 1.98	10.29 \pm 3.83	8.02 \pm 3.19	9.86 \pm 3.23	F(3,187)= 1.80, NS
Arousal (MDQF7)	6.46 \pm 1.79	7.80 \pm 2.53	6.40 \pm 1.84	7.56 \pm 2.50	F(3,187)= 0.08, NS
Control (MDQF8)	6.57 \pm 1.79	7.59 \pm 2.30	6.38 \pm 1.08	7.38 \pm 1.93	F(3,187)= 0.00, NS

2.5.7 *Post hoc* sample size calculations: Replication of study one

A *post hoc* sample size calculation was performed in order to determine whether or not it would be beneficial to collect more data in order to replicate the results from Study One. As can be seen from Figures 14 – 18, the directions of the graphed mean scores are different to that of Study One, with Catholic participants in Study Two showing similar patterns of menstrual cycle reporting to Protestants. The NQuery *post hoc* sample size calculation for a 2x2 ANOVA confirmed that the interaction results from Study One were not replicable in Study Two, showing that an n of 19,623 would be necessary to find a significant interaction for the MDQ factor Impaired Concentration ($ES=0.000$). Impaired Concentration was one of the factors that had shown a significant interaction trend in Study One, and which showed the smallest effect size in Study Two. The factor from Study Two showing the largest effect size was Control ($ES=0.001$), which would still have needed 3,499 participants to show a significant interaction result. The decision was made not to collect more data to try to replicate the findings from Study One.

2.5.8 Student's t-test results for hypothesis 3: Protestants will have higher alexithymia scores than Catholics

A Student's t-test was used to calculate mean differences in alexithymia levels between religious groups. It had been hypothesised that Protestant women would be more alexithymic than Catholic women, due to graphed interactions from Study One suggesting that Protestant women may be more likely to somatise. Results of the test showed that there was not a significant difference in alexithymia levels between Catholic and Protestant participants ($t=-1.0$, $df=189$, NS).

As an exploratory analysis, Student's t-test was again used to calculate mean differences in alexithymia levels between anxiety caseness groups. Women in the anxiety caseness group were found to have significantly higher levels of alexithymia than women in the anxiety non-caseness group ($t=-4.47$, $df=189$, $p<0.01$).

2.5.9 *Post hoc* sample size calculation: Significant differences in alexithymia levels between religions

A *post hoc* sample size calculation was performed in order to determine whether or not it would be beneficial to collect more data in order to be able to detect significant differences in alexithymia levels between the Catholic and Protestant samples. The StatsDirect sample size calculation for independent samples t-test showed that an n of 778 per group (ES=0.14) would be necessary to detect differences in alexithymia levels between these religious group samples (Power 80%, alpha 5%). The decision was made not to collect more data to detect differences in alexithymia between these religious groups.

2.5.10 Student's t-test results for hypothesis 4: Alexithymic individuals will report higher levels of menstrual cycle symptoms

Student's t-test was used to test whether or not alexithymic individuals had a higher mean score for the MDQ factors than non-alexithymic individuals. As suggested by Taylor et al. (1988), scores of 62 or less indicate a non-alexithymic individual and scores of 74 or more indicate an alexithymic individual. Scores between 63 and 73 indicate possible alexithymia, and for the purposes of this study were classified as non-alexithymic. Results of the t-test show that alexithymic individuals scored higher than non-alexithymic individuals on six of the eight factors of the MDQ (Pain: $t=-3.21$, $df=189$, $p<0.01$, Water Retention: $t=-3.00$, $df=189$, $p<0.01$, Negative Affect: $t=-2.56$, $df=189$, $p<0.05$, Impaired Concentration: $t=-2.20$, $df=19.84$, $p<0.05$, Behaviour Change: $t=-3.53$, $df=189$, $p<0.01$, Control: $t=-2.58$, $df=19.5$, $p<0.05$).

2.5.11 *Post hoc* sample size calculations: Significant differences in MDQ reporting between alexithymic and non-alexithymic groups

A *post hoc* sample size calculation was performed in order to determine what sample size would be necessary to detect differences between alexithymic and non-alexithymic individuals in MDQ factor symptom reporting for those factors which did not reach significance (Autonomic Reactions (MDQF3) and Arousal (MDQF7)). The StatsDirect sample size calculation for an

independent samples t-test showed that an n of 50 per group (ES=0.57) would be necessary to detect differences between groups for the MDQ factor Autonomic Reactions. An n of 198 per group (ES=0.28) would be necessary to detect differences between groups for the MDQ factor Arousal (Power 80%, alpha 5%). The results from this study showed that around 10% of this population scored high enough of the TAS to be considered to be alexithymic. Because there were already 19 in this sample who were alexithymic, this would have meant recruiting at least 310 more participants to fulfil the number per group for the MDQ factor Autonomic Reactions, and 1790 more participants to fulfil the number per group for the MDQ factor Arousal. The decision was made not to collect more data for these analyses.

2.5.12 Pearson product-moment correlation results for exploratory analysis: Correlation between anxiety and alexithymia, and correlation between depression and alexithymia

A Pearson product-moment correlation was calculated using the continuous variable Total HADS Anxiety Factor Score and the continuous variable Total Toronto Alexithymia Scale Score. Anxiety and alexithymia were found to have a moderate positive linear correlation ($r=0.37$, $p<0.01$).

A Pearson product-moment correlation was also calculated for the continuous variable Total HADS Depression Factor Score and the continuous variable Total Toronto Alexithymia Scale Score. Depression and alexithymia were found to have a moderate positive correlation ($r=0.38$, $p<0.01$).

2.5.13 Hierarchical linear regression for exploratory analysis: Modelling MDQ factors with anxiety, alexithymia and the interactive term anxiety * alexithymia as independent variables

As it has already been established that both anxiety and alexithymia have a significant effect on menstrual cycle symptom reporting, and that anxiety and alexithymia are moderately correlated, a series of hierarchical regression analyses were performed on the MDQ factor totals. There were three steps included in the analyses, with anxiety alone as step one, anxiety and

alexithymia as step two, and anxiety, alexithymia, and the interactive term anxiety * alexithymia as step three (see Table 50). This analysis was performed with two questions in mind: 1) Does alexithymia explain variance in MDQ factor scores independent of the variance explained by anxiety? 2) Does a multiplicative interactive term (anxiety * alexithymia) explain variance in MDQ factor scores independent of that explained by anxiety and alexithymia alone? As alexithymia is thought to represent a continuum (Taylor, 1994), a hierarchical regression analysis was chosen as the most appropriate statistical analysis (see Bramwell, 1996).

Since both anxiety and alexithymia have previously been shown to have a univariate association with the outcome variables, no further univariate analyses have been undertaken; however univariate analyses for the interactive term anxiety * alexithymia needed to be performed. The results of the univariate analyses will be followed by the results of the multivariate analyses.

Univariate analyses

It was hypothesised that there would be a significant interaction between anxiety and alexithymia for the MDQ menstrual cycle factors, such that high anxiety levels and high alexithymia levels would produce higher reported menstrual symptom scores on the Menstrual Distress Questionnaire. Simple linear regression analyses found the interaction between anxiety and alexithymia to be significantly related to all of the MDQ factors. The interaction was shown to explain 22 per cent of the variance for the Pain (MDQF1) factor, 18 per cent of the variance in the Water Retention factor (MDQF2), 15 per cent of the variance in the Autonomic Reactions factor (MDQF3), 31 per cent of the variance in the Negative Affect factor (MDQF4), 29 per cent of the variance in the Impaired Concentration factor (MDQF5), 27 per cent of the variance in the Behaviour Change factor (MDQF6), eight per cent of the variance in the Arousal factor (MDQF7), and 16 per cent of the variance in the Control (MDQF8) factor at a significant level. Table 49 shows a summary of these results.

Table 49. Simple linear regression analysis results for the MDQ factors with the interactive term anxiety * alexithymia as an independent variable

	R	R Square	Standardised Beta Coefficient	t	Significance Level
Pain	0.47	0.22	0.47	7.37	p<0.01
Water Retention	0.42	0.18	0.42	6.32	p<0.01
Autonomic Reactions	0.38	0.15	0.38	5.67	p<0.01
Negative Affect	0.56	0.31	0.56	9.24	p<0.01
Impaired Concentration	0.54	0.29	0.54	8.76	p<0.01
Behaviour Change	0.52	0.27	0.53	8.29	p<0.01
Arousal	0.27	0.08	0.27	3.92	p<0.01
Control	0.40	0.16	0.40	6.02	p<0.01

Multivariate analyses

A hierarchical multivariate regression analysis was performed on the MDQ factor totals, with anxiety, alexithymia and the interactive term anxiety * alexithymia as independent variables. The independent variables were entered into the model building up from one variable (anxiety) to three variables (anxiety, alexithymia, the interactive term anxiety * alexithymia). Table 50 illustrates the models used in the regression analysis.

Table 50. Steps included in the hierarchical regression analysis with the MDQ factors as outcome variables

	Independent Variables included
Step 1	Anxiety Total Score
Step 2	Step 1 Anxiety Total Score Step 2 Alexithymia Total Score
Step 3	Step 1 Anxiety Total Score Step 2 Alexithymia Total Score Step 3 Anxiety*Alexithymia Interaction

Anxiety was significantly related to all of the MDQ factors, explaining between 6 and 31 percent of the variance. For nearly all MDQ factors, alexithymia contributed to explaining the overall variance in the factors independently of the amount explained by anxiety alone, resulting in a difference in R squared change in contribution to the model and a significant beta value.

The interactive term anxiety * alexithymia did not contribute significantly to the model in any of the cases except for Control (MDQF8). It will be noted that the interactive term is necessarily strongly correlated with both of the variables which make it up, and therefore, as commonly happens in this type of analysis, the addition of the interactive term to the model means that the beta values for anxiety and alexithymia often dropped to non-significant in Step Three, as the variance they share with the dependent variable is also shared with the interactive term. Tables 51 - 58 show the results for the multivariate analyses for each of the MDQ factors.

Table 51. Multivariate analysis results for the MDQ factor Pain

	R	R Square	R Square Change	Standardised Beta Coefficient	t	Significance Level
Model 1 Anxiety	0.46	0.20	0.21	0.46	7.02	p<0.01
Model 2 Anxiety Alexithymia	0.48	0.23	0.02	0.40 0.15	5.79 2.15	p<0.01 p<0.05
Model 3 Anxiety Alexithymia Anxiety*Alexithymia	0.48	0.23	0.00	0.29 0.11 0.14	0.81 0.75 0.33	NS NS NS

Table 52. Multivariate analysis results for the MDQ factor Water Retention

	R	R Square	R Square Change	Standardised Beta Coefficient	t	Significance Level
Model 1 Anxiety	0.40	0.16	0.16	0.40	6.03	p<0.01
Model 2 Anxiety Alexithymia	0.42	0.18	0.02	0.35 0.14	4.92 1.97	p<0.01 p=0.05
Model 3 Anxiety Alexithymia Anxiety*Alexithymia	0.42	0.18	0.00	0.32 0.13 0.04	0.88 0.87 0.09	NS NS NS

Table 53. Multivariate analysis results for the MDQ factor Autonomic Reactions

	R	R Square	R Square Change	Standardised Beta Coefficient	t	Significance Level
Model 1 Anxiety	0.38	0.14	0.14	0.38	5.58	p<0.01
Model 2 Anxiety Alexithymia	0.38	0.15	0.00	0.35 0.07	4.85 0.91	p<0.01 NS
Model 3 Anxiety Alexithymia Anxiety*Alexithymia	0.38	0.15	0.00	0.09 -0.03 0.32	0.24 -0.20 0.73	NS NS NS

Table 54. Multivariate analysis results for the MDQ factor Negative Affect

	R	R Square	R Square Change	Standardised Beta Coefficient	t	Significance Level
Model 1 Anxiety	0.55	0.31	0.31	0.55	9.10	p<0.01
Model 2 Anxiety Alexithymia	0.57	0.32	0.02	0.50 0.14	7.73 2.19	p<0.01 p<0.05
Model 3 Anxiety Alexithymia Anxiety*Alexithymia	0.57	0.32	0.00	0.57 0.17 -0.09	1.74 1.26 -0.22	NS NS NS

Table 55. Multivariate analysis results for the MDQ factor Impaired Concentration

	R	R Square	R Square Change	Standardised Beta Coefficient	t	Significance Level
Model 1 Anxiety	0.53	0.28	0.28	0.53	8.59	p<0.01
Model 2 Anxiety Alexithymia	0.54	0.29	0.01	0.49 0.12	7.37 1.75	p<0.01 NS
Model 3 Anxiety Alexithymia Anxiety*Alexithymia	0.54	0.29	0.00	0.29 0.05 0.23	0.87 0.33 0.59	NS NS NS

Table 56. Multivariate analysis results for the MDQ factor Behaviour Change

	R	R Square	R Square Change	Standardised Beta Coefficient	t	Significance Level
Model 1 Anxiety	0.49	0.24	0.24	0.49	7.69	p<0.01
Model 2 Anxiety Alexithymia	0.52	0.27	0.03	0.42 0.19	6.21 2.90	p<0.01 p<0.01
Model 3 Anxiety Alexithymia Anxiety*Alexithymia	0.52	0.27	0.00	0.31 0.15 0.13	0.90 1.11 0.33	NS NS NS

Table 57. Multivariate analysis results for the MDQ factor Arousal

	R	R Square	R Square Change	Standardised Beta Coefficient	t	Significance Level
Model 1 Anxiety	0.25	0.06	0.06	0.25	3.50	p<0.01
Model 2 Anxiety Alexithymia	0.29	0.09	0.03	0.18 0.17	2.45 2.28	p<0.05 p<0.05
Model 3 Anxiety Alexithymia Anxiety*Alexithymia	0.30	0.09	0.00	0.34 0.23 -0.19	0.89 1.47 -0.42	NS NS NS

Table 58. Multivariate analysis results for the MDQ factor Control

	R	R Square	R Square Change	Standardised Beta Coefficient	t	Significance Level
Model 1 Anxiety	0.34	0.12	0.12	0.34	5.01	p<0.01
Model 2 Anxiety Alexithymia	0.39	0.15	0.03	0.27 0.20	3.73 2.72	p<0.01 p<0.01
Model 3 Anxiety Alexithymia Anxiety*Alexithymia	0.42	0.18	0.03	-0.60 -0.12 1.04	-1.65 -0.81 2.45	NS NS p<0.05

2.6 Study Two discussion

The discussion for Study Two is presented in terms of key results, followed by a discussion of the demographic characteristics of the sample. The main findings are then discussed in the context of the demographic variables of the sample, with reference to the previous literature. Finally, methodological issues, strengths and limitations are discussed.

The implications of these findings and the thesis as a whole are discussed in the Overall Conclusions section, along with implications for future research and for clinical practice.

2.6.1 Summary of key results

The aims of this study were to test the hypotheses that the incidence of alexithymia would be different between cultural groups, and that alexithymia would be associated with menstrual cycle symptom reporting. Study Two also aimed to replicate the findings from Study One in a different sample of women. There were three main results that came from this study. Firstly, significant differences were found in menstrual cycle symptom reporting between alexithymic and non-alexithymic groups, such that alexithymic individuals were more likely to report higher levels of menstrual symptomatology. Secondly, for most of the MDQ factors, alexithymia was able to explain a significant portion of the variance in menstrual cycle symptom independently of anxiety. Finally, this study showed that the Study One graphed interaction trends between religion and anxiety found in Study One were not replicated in this sample.

2.6.2 Demographic and sampling background

There were very few demographic differences between the Catholic and Protestant, anxious and non-anxious groups. In general, the overall sample was quite homogeneous, possibly due to nearly all of the women being of a similar age and undertaking courses at university. Despite this, significant differences between the groups were found in duration and day of the menstrual cycle.

This section presents the significant differences in cycle day and duration of cycle between the groups sampled for Study Two, along with the inclusion/exclusion criteria for the study. The differences in demographic results between the groups sampled in Study Two were not as central to the main focus of this study as the differences in demographic results between the Study One and Two samples, and are therefore only reflected upon briefly. The final topic presented in this section therefore addresses the differences between the Study One and Two samples, focussing on differences in life stage, changes in societal values, differences in regional culture, and differences in anxiety/depression levels.

There was a significant difference in Study Two between anxiety groups for the day of cycle that the woman was currently experiencing when she filled out the questionnaire. The median value for the day that the anxious women were currently experiencing was day 15, and for the non-anxious women the median value was 19. This means that the anxious women as a whole may have been earlier in the cycle than the non-anxious women. It is, however, important to take into account that it is a median value that is being used to approximate cycle day. Due to the nature of how this value is calculated, it may not be appropriate to assume that most of the women in either group were currently experiencing the cycle day represented by the median value. Therefore, commenting on whether or not one group may have been more likely to have been ovulating or premenstrual when filling out the questionnaires may not be appropriate in the context of this study. The aims, objectives and hypotheses of this research have not been concerned with identifying patterns in symptom and attitude responses based on cycle day, and further exploration around this topic is beyond the scope of this thesis.

There was a significant difference found between religious groups in length of menstrual cycle. The median values for both groups were found to be 28 days. However, there were differences in the way in which the data was distributed, with the Protestants reporting between 20 – 135 days and the Catholics reporting between 21 – 56 days. The distribution of the Protestant groups showed a cluster of participants with cycle lengths ranging between

25 – 55 days, and with a few outlying data points up to a value of 135. The Catholics, on the other hand, showed a cluster of participants with cycle lengths ranging between 20 – 38 days, with several outlying data points up to a value of 56. As the main clusters of data are roughly similar, there is not likely to be an important difference in length of cycle between the two groups. The differences in the outliers in the distributions most likely account for the differences between groups evidenced through the significant p value.

The inclusion/exclusion criteria were the same for this study as for Study One. However, the sampling characteristics of the participants were somewhat different. Both Study One and Study Two recruited participants from a northern industrial city in the United Kingdom. However, Study Two recruited mainly students to participate. Potential implications of the differing sampling characteristics are discussed below.

2.6.3 Demographic differences and sampling characteristics between the Study One and Two samples

This section presents an overview of the characteristics that were found to be different between the Study One and Study Two samples. Many of these differences appear attributable to the age disparity between the samples of women, and can be categorised into differences in life stage, differences in societal values, and differences in regional culture. All of these differences potentially have implications for the discrepancies in results between the two studies, and for the alexithymia results for Study Two. The differences between groups in life stage and culture are addressed below, and will be returned to in discussing the results from Study Two. It is important, however, to emphasise that the implications of the differences between the groups in life stage and cultural group are not mutually exclusive, and that they may have overlapping effects on the outcomes of the studies.

Differences in life stage

The women sampled in the two studies would have generally been in different life stages. The Study Two sample was almost entirely from a student population, and was therefore younger than the previous group by

nearly a decade (Study 1: mean age \pm SD = 31.92 \pm 8.60, Study 2: mean age \pm SD = 22.91 \pm 6.08). This difference in age coincides with the tendency for the women in Study Two to either have part-time work or to not have a job (Study 1 part-time/without job: 21%, Study 2 part-time/without job: 94%), whereas in Study One, so few women did not have a job that the category was excluded from analysis. Again, because of differences in life stage, the women in Study Two did not tend to have children (Study 1 without children: 54%, Study 2 without children: 90%). Additionally, the women in Study Two were all sampled from a university, whilst the women in Study One may not have been as likely to have attended university. Educational level has been shown to be negatively associated with menstrual cycle symptom reporting (Sadler et al., 2010). The Study Two groups can probably best be conceptualised as a student population, whilst the Study One group included more young mothers.

Demographic differences relating to age, children and work hours have been shown in previous literature to have a significant effect on menstrual cycle symptom reporting (Deuster et al., 1999; Gold et al., 2007; Moos, 1968; Sternfeld et al., 2002; Woods et al., 1982). Most often increased age, having children and working longer hours have been associated with higher levels of menstrual symptom reporting, and the Study One sample of women encapsulated all of these traits. These ideas have been introduced here, but will be returned to in later sections of the discussion.

Differences in culture: A changing society

Culture is not static, and is instead an ever-evolving phenomenon. This is part of what makes culture difficult to study, since the values and characteristics that it instils in individuals change, albeit slowly, over generations. As Inglehart (1997) writes, culture is resistant to change, but an individual's worldview is also shaped by their own subjective experience and through transmission to peers through social learning processes. Rapid shifts in cultural attitudes can happen in an otherwise relatively stable cultural climate, especially if the culture was already on the borderline between alternatives (Bikhchandani, Hirshleifer, & Welch, 1992).

There are continuing cultural trends towards the secularisation and liberalisation of culture. Increased secularisation of society is shown through the shunning of traditional religious rules of social conduct, and also in the dwindling church membership numbers (Grundy & Jamieson, 2002), both of which are particularly applicable for a student population. These changes in secularisation correlate with changes in liberalisation trends. One of the ways that the liberalisation trends can be seen is through the increase in rates of employment of women and the decrease of traditional male occupations (e.g. the manufacturing industry) (Grundy & Jamieson, 2002).

Despite that well-being aspects of culture have been shown to be slow to change (Rice & Steele, 2004), it seems as though other aspects of culture may change more rapidly. If individuals are likely to retain the cultural values and attitudes that they grew up with (Inglehart, 1997), those women who grew up in the 1980s and 1990s (the Study Two women), may have been exposed to increased levels of secularisation and liberalisation in the British culture to which the Study One sample were not exposed. It may be that culture began to instil slightly different values in these younger women, and that this was enough to cause the differences across the studies. These ideas have been introduced here, but will be expanded on later in the discussion.

Differences in culture: Regional

There may also have been more subtle differences between the two samples. For example, whilst it was a prerequisite in Study Two that the participants have been raised in the UK, many of the university students will have come from various parts of the country. It is not uncommon for students to attend university in a city in which they did not grow up. With the sample from Study One, the women may have been more likely to have been raised in the northern industrial city sampled, as they tended to be settled with families and working. If so, then many of the British Catholic women from Study One would have come from an Irish Catholic background. One of the considerations for the previous study was whether or not the attitude and symptom reports being sampled were true for women of the UK as a whole,

or whether they were particular to the culture of the northern industrial city where the women were raised. As a British cultural group, the Study Two participants may be more representative of the entire country, whilst at the same time, as a Protestant or Catholic cultural group they may be more heterogeneous than the previous sample.

Differences in anxiety and depression

The overall percentages for anxiety were again high in the Study Two sample. Sixty per cent of the sample scored high enough on the HADS to indicate anxiety caseness. This is higher than the percentage found in the previous study, which was 44 per cent. Clark and Zeldow (1988) found that freshman medical students in their study were significantly stressed. As students, the participants in this study seem to have also been significantly stressed, and this may help to explain the high levels of anxiety.

For Study Two, the percentage of participants who scored high enough on the HADS to indicate depression caseness was 11 per cent. Again, this is slightly higher than the 7.4 per cent who were found to be depressed in the previous study, which may be due to the higher levels of anxiety found in the sample.

In this study, five per cent of the participants were using anxiety and depression medication. This percentage is similar to the percentage of British participants found to be using this type of medication in Study One (4.05%). It is possible that the slightly higher percentage taking antidepressants in this sample is due to the higher percentage of participants reporting feeling anxious. It is also possible that younger women feel less stigma related to taking antidepressants, or at least to admitting that they are taking antidepressants, and that this is the reason for the slightly higher percentage of women reporting that they take the medication.

This section has discussed the demographic differences found between religious and anxious groups in Study Two, and between the Study Two sample as a whole and the Study One sample. The differences found

between the Study Two groups in cycle day and length of cycle were not statistically robust. They were also not central to the objectives and hypotheses of this thesis, and therefore not further considered.

There are several substantial differences between the Study One and Two samples in terms of demographic characteristics. Primarily, the samples differ in age, which may affect the culture in which they grew up, and also the life stage they are currently in. In addition, the samples may differ in region of childhood residence, which could have instilled different regional cultural values. These factors are explored in more detail when discussing and comparing the results of Study Two with those of Study One.

2.6.4 Hypothesis 2: Replication of Study One

Hypothesis two stated that, similar to Study One, there would be an interaction between anxiety and religion, such that anxious Protestant participants would score higher on menstrual symptom factors of the MDQ than non-anxious Protestant participants. It was also predicted that Catholics would not show a marked difference in symptom reporting across anxiety groups. This hypothesis was not found to be true for this sample, and the interaction results between religion and anxiety from Study One were not replicated. This section will first discuss the significant main effect results, moving on to the results showing the lack of an interaction effect.

The main effect results for religion and HADS anxiety caseness were largely similar to those found in Study One. Religion had one significant main effect in Study Two (Pain), with Protestants scoring higher (mean score = 12.90) than Catholics (mean score = 11.32) on this factor. In Study One religion showed no significant main effects, and the mean values between religions were very similar for the factor Pain (Catholic: 12.65, Protestant: 12.55). The difference in mean score here seems to be with the younger Catholic women from Study Two, who reported lower levels of pain. This supports the suggestion that there is something different about the Catholics sampled in the second study, and it is hypothesised that this difference may be due to life stage, changes in societal values, or differences in regional culture.

HADS anxiety caseness showed significant main effects for all of the MDQ factors in Study Two, with anxious women scoring higher on the factors than non-anxious women. However in Study One, the differences between anxious and non-anxious groups for Water Retention (MDQF2) and Arousal (MDQF7) did not reach significance. For both of these Study One factors, a trend can be seen, with those having higher levels of anxiety scoring higher on these factors than those with lower levels of anxiety (Water Retention: anxiety caseness – 9.57, anxiety non-caseness – 9.06; Arousal: anxiety caseness – 7.73, anxiety non-caseness – 7.21). The findings for anxiety as a main effect are consistent with those found by Lane and Francis (2003) and van den Akker and Steptoe (1985), who demonstrated that higher levels of anxiety are associated with higher levels of symptom reporting on the MDQ.

The results showed that the graphed interactions, which suggested a possible trend in Study One between anxiety and religion were not found in Study Two. As can be seen from comparing Figures 6 – 10 and 14 - 18, in most cases it was the Catholic participants who scored differently on the MDQ factors. The non-anxious Catholics tended to score lower and the anxious Catholics tended to score higher on the MDQ factors in Study Two than in Study One. The Protestant mean factor scores stayed largely the same, tending to have slightly less extreme values in Study Two. Potential explanations for these results are discussed below, concentrating on sample size, differences in life stage, change in societal values and differences in regional culture.

Sample size

The sample size calculation indicated that 45 participants were needed per group in order to detect a religion/anxiety caseness group interaction. These requirements were not met (as explained in 2.5.7), and three of the groups had slightly less than 45 participants. It is important to acknowledge, however, that the differences seen between the interaction graphs in Study One and the interaction graphs in Study Two show that there was not a

similar pattern of results in the two studies. It is unlikely that the addition of several more participants in three of the groups would have changed the outcome of the interaction directions, and therefore sample size is unlikely to have been the deciding factor in disproving hypothesis two for this sample. This is emphasised by the results of the *post hoc* sample size calculation, which indicated that 19,000 women would have to be sampled in order to detect an interaction between the groups.

It is therefore more likely that there is something different about the samples collected in Study One and in Study Two. One difference is that Study One's sample consisted of both American Catholics and Protestants and British Catholics and Protestants, whereas Study Two surveyed only British. However, if one looks at the mean values for just the British Catholics and Protestants from Study One, it is apparent that it is not the addition of the Americans in Study One which changes the results. There must be some other difference between the samples.

Differences in life stage, social and regional culture

As previously mentioned, younger women, especially students, are less likely to hold a full-time job and to have children. Both of these factors are known to increase stress levels (Deuster et al., 1999; Moos, 1968; Sternfeld et al., 2002; Woods et al., 1982). Additionally, higher stress levels have been shown to be associated with increased menstrual symptom reporting (Sadler et al., 2010; Gollenberg et al., 2010). The biggest difference in the interaction results between the two studies was that in Study Two Catholics mostly showed the same pattern as Protestants, and to a larger extent. This means that anxious Catholic women rated themselves as having much worse menstrual symptoms than non-anxious Catholic women. This trend can be seen in the religion and anxiety interactions from Study One; however it did not reach significance. The Protestant mean values and trends look largely the same between studies. This means that if differences in life stage were to be responsible for the differences in results between the Study One and Two samples, then these factors would influence menstrual symptom reporting in Catholic women to a greater extent than Protestant women.

The pattern of the interactions from Studies 1 and 2 also suggest that for a younger, child-free, job-free group of Catholics, anxiety may be associated with a significant increase in menstrual cycle symptom reporting, whilst the absence of anxiety may be related to a decrease in menstrual cycle symptom reporting. However, for older Catholic women who tend to have children and jobs, the presence or absence of anxiety does not seem to be associated with menstrual cycle symptom reporting to the same degree.

The differences between the samples in menstrual cycle symptom reporting might also be attributable to changes in society which affect the ways in which women think about their bodies/menstruation and/or to changes in religious culture. For example, women in their thirties will most likely have experienced their first period in the 1980s, whilst women in their twenties will most likely have experienced their first period in the 1990s. As previously mentioned, Western culture is becoming increasingly more liberal and secular (Grundy & Jamieson, 2002), and this may have implications for both menstrual attitude and symptom reporting, and for the types of anxiety triggers that cultures can cultivate in its members. The subject of menstruation is less taboo than it was for previous generations, and this may serve to increase the rate of transmission of experiences and ideas about it between peers. This may lead women who in the past would have received their formative ideas about menstruation from family interactions (and therefore the family culture) to be exposed to a variety of alternative attitudes and experiences from different sources.

In the UK, Protestantism is the dominant religious culture (British Social Attitudes Survey, 2005). If there is an increased rate of transmission of ideas about menstruation for younger women through peer relationships and media, it may be that the views and experiences of the less dominant group would come to reflect those of the more dominant group. This is supported by the work of Piontkowski, Florack, Hoelker, and Obdrzalek (2000), who report that especially where identification with one's own cultural group is low, acculturation to the dominant cultural group is likely. They go on to state that this would result in the integration of the dominant culture's attitudes and

beliefs. This in-group/out-group phenomenon may go some way to explaining why the younger Catholic women's patterns of anxiety and menstrual cycle symptom reporting have come to resemble the Protestant women's patterns when combined with the idea that younger women may be more likely to discuss menstruation than their older counterparts.

As previously mentioned, the British Catholic women in Study One were mostly from an industrial city in the Northwest of England, whereas the Study Two Catholics would likely have come from all over the UK. Another explanation for the differences in menstrual cycle symptom reporting between the samples is that it may have occurred because the Catholic group in Study Two consisted of a more heterogeneous group which came from many regions around the UK. This might mean that the Catholic women sampled in Study One were from a sub-culture of Catholics within the UK. This sub-culture would be comprised of Catholics who are descended from Irish heritage, and these results suggest that their patterns of menstrual symptom reporting could be different from those of other Catholic women living in the UK. This further emphasises the point that culture is multidimensional, and that it can be difficult to be exact in any study about which layer of culture is being measured, or affecting the studied variables.

The Protestant sample showed very similar answers between Studies One and Two. The standard deviations for the mean scores for the Protestant group are not conspicuously larger than for the Catholics, meaning that even if the group's composition is more heterogeneous, the results are not.

This section has discussed some potential explanations for why the results from Study One were not replicated in the sample used for Study Two. One of the biggest differences seen between the results of the two studies was that the Catholic women in Study Two reported differently from the British Catholic women in Study One. The Study Two Catholic group's results closely matched those of the Protestant group, with those with high levels of anxiety scoring much higher on the MDQ factors scores than those with low levels of anxiety. Interestingly, if one examines the mean scores from Study

One, the British Catholics do not reflect the Study Two mean scores. It was proposed that reasons for the differences in reporting between Studies One and Two could include variation in life stages, in societal change, or in cultural region.

2.6.5 Hypothesis 3: Mean differences in alexithymia levels

It was hypothesised that Protestant participants would have higher levels of alexithymia than Catholic participants. Results from Study One showed a trend that Protestant women in the anxiety caseness category were more likely to score higher on somatic symptom factors of the MDQ than those without anxiety. Alexithymia has been shown to be related to somatic symptom reporting (Bagby et al., 1986; Bagby et al., 1988; Kuczmierczyk et al., 1995; Taylor & Bagby, 2000), which added to the rationale behind the proposition that alexithymia might be a culturally-induced mechanism causing women in certain cultures to somatise when anxious more than women in other cultures. The results obtained from this study showed that there were no differences between religious groups in alexithymia levels in Study Two.

However, for this study sample differences in somatisation of menstrual symptoms were also not found between religious groups. Accordingly, given the previous research findings indicating an association between somatisation and alexithymia, it is perhaps not surprising that differences in alexithymia levels were not found. Had there been differences in patterns of somatisation of menstrual symptoms in Study Two between the religious groups, perhaps differences in alexithymia levels between religious groups would also have been found.

Unsurprisingly, differences were able to be detected between anxiety caseness groups. As was mentioned in the Study Two literature review, previous research has found a significant association between anxiety and alexithymia (Hendryx et al., 1991; van de Putte, et al., 2007; Sayar et al., 2003). This study supports these results, showing that women in the most anxious group were also most likely to score higher on the TAS.

Again, the lack of significant results between religious groups in this analysis may be somewhat explainable by the demographic composition of the sample. These results are explored further in terms of life stage and regional culture.

Differences in life stage and regional culture

Overall, not many of the women were found to have scored highly enough to be considered in the alexithymic category, as indicated by the cut-off points suggested by Taylor et al. (1988). Nineteen of the 191 women (9.94%) scored highly enough on the TAS to indicate that they had alexithymia. Forty-three of the women (22.5%) fell into the intermediate category, leaving 129 (67.5%) in the non-alexithymic group. The small numbers of individuals scoring highly enough on the TAS to indicate alexithymia found in this sample may not be an unusual result in general population studies. As mentioned in Section 2.2, a study by Hendryx et al. (1991) using a student sample (mean age = 24) showed that 8.2 per cent of the sample in his study was alexithymic. That study also showed that 18.2 per cent of their sample fell into the intermediate category, leaving 73.6 per cent in the non-alexithymic group. Although Hendryx et al.'s (1991) study was carried out in the US; these percentages are quite comparable to those found in this Study Two sample.

However, Taylor (1994) has suggested that alexithymia is normally distributed throughout the population, and that conceptualising it in this way might be more appropriate. In this way all people fit somewhere on the spectrum of alexithymia. It has also been suggested in other research using the TAS that the scores can either be used dimensionally or nominally (Kooiman, 1998; Kooiman et al., 2000; van de Putte et al., 2007; Taylor, Bagby, & Luminet, 2000). Taylor et al. (2000) have clarified that although alexithymia is a dimensional construct, cut off points have been established for the purposes of comparison of alexithymia rates with other studies. For this analysis (t-test with Catholic and Protestant as independent variables) and for the regression analyses, alexithymia has been treated as a

dimensional variable. The implications of using a nominal versus dimensional version of measurement for the TAS is further discussed in Section 2.6.8.

As mentioned in Section 2.2, alexithymia is known to be associated with certain sociodemographic variables (Joukamaa et al., 1995; Kokkonen et al., 2001). The participants in Study Two would tend to be outside of the groups that are considered the most likely to be alexithymic, which might partly explain the low levels of alexithymia in the group. The sociodemographic variables usually associated with higher levels of alexithymia are male gender, poor education and low socioeconomic status (Joukamaa et al., 1995; Kokkonen et al., 2001). The participants in this study were female, undertaking higher education, and arguably from a higher than average socioeconomic level – all of which are the opposite of the demographic variables which tend to be associated with alexithymia.

However, sampling university students has been done in previous alexithymia research (Bagby et al., 1986; Hendryx et al., 1991), and was recommended by those researchers due to the tendency for students to be anxious and mildly-to-moderately depressed prior to end of the year exams (Clark & Zeldow, 1988; Vitaliano, Maiuro, Russon, & Mitchel, 1989). In addition, Bagby et al. (1986) found that state anxiety and alexithymia were moderately correlated. However, it may be that because alexithymia is thought to inhibit expression and imaginative thought, universities do not have many alexithymic individuals. Alexithymic individuals could be less likely to attend university due to the nature of the academic demands made on students, which may include requirements of above average ability to express oneself and an aptitude for imaginative thought. In addition, the lack of ability to identify and describe one's feelings may have a negative impact on an individual's well-being to the extent that academic performance and social relationships are affected, precluding these individuals from successfully obtaining a place at university.

Previous research has found that differences in alexithymia levels do exist between cultures (Le et al., 2002), and much research has been done

showing differences in somatisation between cultures (Kirmayer, 1989; Kirmayer & Young, 1998; Ryder et al., 2002; Simon, Gater, Kisely, & Piccinelli, 1996). As previously mentioned, the Study One and Study Two samples may have represented different cultural sub-groups within the UK. It may be that the Study One Catholic participants represented a more homogeneous Irish Catholic sub-culture that was less likely to somatise and be alexithymic than the Protestant sample. However, in Study Two, as the Catholic sample was more heterogeneous in religious culture and potentially more culturally similar to the dominant Protestant religious cultural group, this cultural tendency was not found.

It is possible that differences between religious cultures within a westernised country are very slight and an effect for alexithymia therefore difficult to detect. If differences in alexithymia do exist between these religious groups, they are subtle. Corresponding with the subtlety of differences between these cultural groups, the *post hoc* sample size calculation indicated 778 participants per group would be needed to detect a difference between the Catholic and Protestant sample in alexithymia. Although the effect size is small, it is therefore possible that if more data was collected, including data from more alexithymic individuals, differences between these groups would surface.

This section has reviewed the results for differences in alexithymia across religious cultural groups. The lack of significant differences across groups may be somewhat accounted for by demographic factors associated with the Study Two sample, whether variation in life stage or regional culture.

A central question here is whether alexithymia is something people are born with, or if it is something that people develop at various stages through life. This study set out with the assumption that alexithymia was something that was learned through enculturation. However if, as has been suggested by Hendryx et al. (1991), alexithymia is a state-dependent phenomenon which can be increased in anxiety-inducing situations, it may be possible that alexithymia is something which individuals experience at various life stages.

Perhaps Taylor's (1994) suggestion that alexithymia is normally distributed throughout the population is a more useful way of conceptualising it, with all people fitting somewhere on the spectrum of alexithymia. Using this as a model, it is still possible to think of alexithymia as being state-dependent, showing both inter- and intra-person and culture variability. Longitudinal studies, sampling several social classes, would be helpful to further explore these ideas.

2.6.6 Hypothesis 4: Alexithymia is related to menstrual cycle symptom reporting

It was hypothesised that alexithymic individuals would show higher levels of symptom reporting on the MDQ than non-alexithymic individuals. In Study One anxiety was shown to produce higher levels of menstrual cycle symptom reporting, and because of the links between anxiety, alexithymia and somatisation (Bagby et al., 1986; Bagby et al., 1988; Cohen et al., 1994; Goldberg & Bridges, 1988; Hendryx et al., 1991; Katon et al., 2001; Kuczmierczyk et al., 1995; Persson & Sjoberg, 1987; van de Putte et al., 2007; Sayar et al., 2003; Taylor & Bagby, 2000), alexithymia was hypothesised to also produce higher levels of menstrual symptom reporting.

Study Two showed that for six of the eight MDQ factors, alexithymic individuals rated their symptoms as more severe than non-alexithymic individuals. Pain, Water Retention, Negative Affect, Impaired Concentration, Behaviour Change, and Control were all reported as significantly higher by those who were alexithymic. Both Autonomic Reactions and Arousal were not significantly different between alexithymic and non-alexithymic groups, although the trend was for these to be worse in alexithymics for both factors. *Post hoc* sample size calculations showed that 50 per group would be able to detect differences between groups in Autonomic Reactions, and 198 per group would detect differences in arousal.

A MetaLib Expert Search (online library database search), using the terms alexithymia and menstrual, alexithymia and menstruation, did not find any previous research showing an association between alexithymia and

menstrual cycle symptom reporting. This means that these results are new information in the menstrual cycle literature and in the alexithymia literature. The only previous literature found to be exploring alexithymia in relation to menstruation was the study done by Kuczmierczyk et al. (1995). The methodology of that study was different from that of this study, however, as the women in that study had completed 3 months prospective assessments and were judged to have PMS if there was a 30% worsening of symptoms in the premenstrual phase. These women were recruited from a clinical setting and were not experiencing 'normal' menses, which means that the results of their study may not be applicable to women in a general population. Additionally, the researchers did not compare the women's self-reported menstrual cycle symptoms with alexithymia scores, and instead only used them for the purpose of categorisation. In any case, the Kuczmierczyk et al. (1995) study did not endeavour to show an association between menstrual symptom reporting and alexithymia. Thus the findings of Study Two are novel and improve our understanding of the variables which affect menstrual distress.

2.6.7 Exploratory analysis: Discussion of the correlation between anxiety and alexithymia and correlation between depression and alexithymia

Anxiety and alexithymia have previously been found to be correlated (Hendryx et al., 1991; van de Putte et al., 2007; Sayar et al., 2003), and the results from this study support that finding. The correlation coefficient ($r=0.37$) showed that for this sample of women there was a moderate significant correlation between the two variables. This was not surprising because of the previous literature's findings.

Depression and alexithymia were also found to have a similar correlation coefficient ($r=0.38$). As mentioned in Section 2.2, one of the on-going discussions in the alexithymia literature is whether anxiety or depression is more related to alexithymia. This research would suggest that anxiety and depression are similarly related to alexithymia.

2.6.8 Hierarchical Linear Regression: Anxiety and alexithymia as independent predictors of menstrual cycle symptom reporting

A series of hierarchical linear regression analyses were performed in order to explore two questions: 1) Does alexithymia explain variance in MDQ factor scores independent of the variance explained by anxiety? 2) Does a multiplicative interactive term (anxiety * alexithymia) explain variance in MDQ factor scores independent of that explained by anxiety and alexithymia alone? The results are discussed in terms of steps one, two and three of the hierarchical regression analysis.

Step one: Anxiety alone

The first step of the hierarchical regression analyses showed that anxiety independently was able to explain between 12 to 31 percent of the variance in seven of the eight MDQ factors (Arousal was the exception, with six percent). This result is in accordance with previous results showing that those in the HADS anxiety caseness group score significantly higher on the MDQ factors than those in the HADS anxiety non-caseness group.

Step two: Anxiety and alexithymia

The addition of alexithymia to the model in step two resulted in an increase in the amount of variance explained for seven of the eight factors, showing an increase of one to three percent. The beta values showed that the contribution was significant in five of the eight factors, although it also was nearly significant for the MDQ factor Water Retention ($p=0.05$), indicating a trend. These are important results, showing that despite the correlation between anxiety and alexithymia, alexithymia adds independently to explaining the variance in menstrual cycle symptom reporting. In other words, alexithymia's explanation of the variance goes beyond that which is already accounted for by anxiety.

Due to the nature of the statistical analyses used, there was a slight discrepancy between those MDQ factors which showed a difference in reporting between alexithymic and non-alexithymic groups in the Student's t-test analyses (see Section 2.5.10), and those factors to which alexithymia

made a significant contribution in the hierarchical regression analyses. These differences are most likely due to the poor distribution of alexithymia. When individuals were categorised into two categories (alexithymic and non-alexithymic) based on the cut-off points suggested by Taylor et al. (1988), few individuals were found to have scored highly enough on the TAS to be included in the alexithymic group. Having used a categorical variable with a small number in one of the groups may have produced slightly different results for the Student's t-test. This was not the case for the hierarchical regression analyses, which did not dichotomise the alexithymia variable and instead used TAS score as a continuous variable. In any case, these differences between statistical test results were small, and the overall picture of these results indicate that alexithymics and non-alexithymics show significant differences in menstrual symptom reporting, and that alexithymia predicts menstrual symptom reporting independently of that which is accounted for by anxiety alone.

Step three: Anxiety, alexithymia and the interaction between anxiety and alexithymia

These analyses tested the hypothesis that anxiety and alexithymia would interact such that a multiplicative effect would occur between the two, producing significantly higher menstrual symptom reporting in those with both high levels of alexithymia and high levels of anxiety. This hypothesis was not shown to be true in this sample, and the interaction between anxiety and alexithymia did not add to the model over and above the contribution of the two variables independently.

This was an interesting finding due to the expectation that alexithymia would act on the other variables to produce differences in menstrual cycle symptom reporting. Instead, the results of the hierarchical regression analyses show that alexithymia exerts an independent effect on menstrual cycle symptom reporting.

This section has discussed the findings from the hierarchical regression analysis. The analysis found that alexithymia explains variance in menstrual

cycle symptom reporting independently of anxiety; however the interaction between anxiety and alexithymia does not add to the variance explained by the model. This shows that alexithymia is having a direct, not interactive effect on menstrual cycle symptom reporting. The finding that alexithymia predicts menstrual cycle reporting independently of anxiety is new to the literature, both in terms of what it adds to understanding menstruation, but also in what it adds to understanding the anxiety and depression literature. These ideas will be returned to in the overall discussion.

2.6.9 Methodological issues, strengths and limitations

This study has explored the relationship of alexithymia to both anxiety and menstrual cycle symptoms in a sample of British university students. The study has also undertaken to replicate the results found from Study One. The same methodology was necessary in both Study One and Study Two in order to replicate Study One's results. This means that this study exhibits the methodological strengths and weaknesses demonstrated in Study One (see Section 1.7.13).

There were several additional methodological issues specific to this study, however. Firstly, the sample used in this study was very different to that used in Study One. This may have had several consequences for the outcome of the results for this study. It was felt that using a very different sample to replicate the results from Study One would be a useful addition to the Study One findings. The results that emerged disappointed, as they did not replicate the Study One findings. The findings of Study Two do reinforce the need to be careful in selecting cultural groups, as differences in life stage, changes in societal values, and/or differences in regional culture may also influence the results obtained in cross-cultural research.

Another methodological issue in the second study is the distribution of alexithymia in the sample since there was not a good distribution of both alexithymic and non-alexithymic individuals. Only a few individuals (n=19) were found to be alexithymic when grouped into alexithymic and non-alexithymic categories. This may have made interactions between

alexithymia and anxiety difficult to detect since a very large effect would have been needed to detect a significant interaction. Research using a larger number of alexithymic participants may reveal significant interactions between alexithymia and anxiety. However it is also important to note that significant effects for alexithymia were found both when alexithymia was treated as a continuous variable and as a categorical variable. In the regression analysis alexithymia was treated as a continuous variable, which means that there is still an effect for alexithymia on menstrual cycle symptom reporting, even in the absence of highly alexithymic individuals.

Finally, the second study used the internet as a medium to distribute the questionnaires. This has been criticised in previous literature, as some people do not have access to the internet (Bakker, Demerouti, & Schaufeli, 2002). However, because this study focussed on university students, all of whom have access to the internet through the institution, this was not thought to be a problem in this research. For this population the internet was a time- and cost-efficient way to distribute the questionnaires. In addition, King and Miles (1995) report that for personality and attitude surveys, the medium by which they are delivered does not affect the responses given by the participants.

2.6.10 Conclusions

The overall results from this study show that alexithymic women are more likely to report higher levels of menstrual cycle symptoms. It also showed that anxious women in British Protestant and British Catholic religions report higher menstrual cycle than non-anxious women in these cultures. This is similar to the results from Study One, which showed that anxious individuals reported significantly higher symptomatology.

The results of Study Two also differ from the results from Study One, which suggested that it might be only Protestant women who had increased menstrual cycle symptom reporting when anxious. This study, however showed similar patterns for both anxious Protestants and anxious Catholics. The discussion section has explored the differences between the results of

Study One and the results of Study Two in terms of the demographic differences between the two study samples. The demographic differences suggest that Catholic women in Study Two may have reported differently to British Catholic women in Study One based on differences in life stage, changes in society, and/or differences in regional sub-group culture. These factors may not be independent of each other and most likely combine to form the exhibited differences between the two groups in menstrual symptom reporting.

Finally, these results also suggest that alexithymia predicts MDQ scores independently of anxiety. This result is new in the menstrual cycle literature, and may hold interesting implications for future research.

This discussion has considered the results specific to the analyses performed in Study Two, along with the methodological issues, strengths and limitations of this study. Implications of the findings of this study for the previous literature and future research and clinical practice will be further explored in the Overall Conclusions, having also been integrated with the findings from Study One.

Overall Conclusions

The conclusions aim to pull together the results of Study One and Study Two in order to discuss the overall implications of the research as a whole. This includes the implications for the cross-cultural menstruation literature, the menstruation and psychological distress literature, and the alexithymia literature. Implications for future research and for clinical practice are also discussed.

3.1 Summary of overall key results

This research aimed to explore differences and similarities between cultures in menstrual attitudes and distress. One of the main purposes of this study was to take into account a multi-dimensional model of culture, a model which has previously not been acknowledged in the menstrual cycle literature. The results of these studies showed that differences in cultural group membership were not as important as factors in menstrual cycle symptom reporting as anxiety. Study One did hint at the possibility of a trend towards an interactive relationship between culture, anxiety and menstrual cycle somatic symptom reporting, with anxious Protestant and anxious American women reporting higher levels of symptomatology on the MDQ. However, the results were not substantiated for religious groups in Study Two, suggesting that for menstrual somatic symptom reporting the experiences of anxiety and alexithymia may be more important than national or religious cultural cohorts. Importantly, alexithymia was found to be associated with menstrual symptom reporting independently of the effects of anxiety.

3.2 Overall implications

The results from Studies 1 and 2 would suggest interplay of both the Psychosomatic and Social Psychological models in menstrual cycle symptom reporting. The Psychosomatic model suggests that there is something about a woman's psychology or personality that interacts with the biological mechanism of menstruation to produce reports of menstrual-related complaints. The results of these studies would suggest that this factor is likely to be anxiety. It is possible that anxiety or anxiety sensitivity produces

a tendency for the woman to catastrophise about her symptoms, misjudging the severity of these symptoms, and therefore selectively remembering symptoms and attributing them to the menstrual cycle. Additionally, as anxiety and alexithymia are correlated, and the experience of anxiety can cause alexithymic-type responses in women, this may reinforce the tendency for women to resort to cultural stereotypes to explain their negative feelings. This part of the process would also be similar to the Social Psychological model, which asserts that it is something in the woman's cultural background which influences the way in which arousal is labelled.

The significant differences between nationalities in menstrual cycle attitudes and symptoms may have been confounded by religiosity. In any case, nationality was not a significant factor in multivariate analyses, and religiosity was only shown to explain a significant amount of the variance for the MAQ factor *Bothersome*. The lack of significant effects for cultural group may have been due to similarities in the cultural groups chosen. The results indicate that anxiety, depression, and alexithymia levels were similar for the cultural groups, and the lack of effects between them in menstrual attitudes and symptom reporting may indicate that they share similar cultural stereotypes. This would lead anxious and alexithymic individuals in the sampled cultural groups to use similar idioms of distress to explain their negative feelings.

This leaves open the question of what it is that these women are anxious about. There are many potential answers here, and quite probably the causative factors are unique to each woman. For the women sampled in Study One, religiosity was found to be related to the attitude that menstruation is *Bothersome*. However, this leaves open several questions as well. What exactly is bothersome about menstruation? Is it, as Paige (1973) and Brooks-Gunn (1985) have suggested, related to duration and intensity of menstrual flow? Additionally, is it possible that the anxiety is tied up in female role ideology, which was also found to be correlated with religiosity by Paige (1973)?

Answers to these types of questions are difficult to find due to the multi-dimensional nature of culture. As mentioned in the literature review, each individual woman has a unique set of cultural influences: national, religious, ethnic, regional, age cohort, and others. This research suggested the possibility of differences in menstrual attitudes and symptoms based on combinations of these, and certainly there are others not investigated here.

Furthermore, the origins and pathways of cultural belief are difficult to distinguish. Whilst some cultural characteristics seem to be handed down through the generations (Lutz, 1983; Lutz & White, 1986), others appear to have a lateral transmission through peer groups (Inglehart, 1997). These two modes of transmission are not mutually exclusive. The differing British Catholic results in Studies One and Two suggest that depending on changes in society, the mode of transmission for a particular characteristic may change from being predominantly generational to predominantly peer group, and vice versa. This may have implications for the degree to which individuals exhibit the characteristic of their family culture, or whether they display the characteristic of the dominant cultural group(s). This is an important factor to take account of in cross-cultural menstrual cycle research because it has implications for the interpretation of the results of all cross-cultural research in this field.

Additionally, the results from Study Two, which suggested that younger, student Catholics report similar menstrual symptom patterns to Protestants may have implications for an in-group/out-group effect in the UK. The results suggest that young Catholics may be adopting the symptom reporting patterns of the dominant Protestant religious cultural group. It could be that this trend is increasing in strength as society becomes more liberal and secular or that the trend is more pronounced for younger women, who have a stronger desire to conform (Constanzo & Shaw, 1966). Again, this may have implications for describing cultural group results in cross-cultural menstrual cycle studies, and should be taken into consideration by researchers when interpreting their results. However, Study Two suggests that age may have a homogenising effect on menstrual attitudes and symptom reporting, causing

women from various cultural groups to adopt the dominant cultural group's labelling patterns and idioms of distress and consequently their attitudes and symptoms (Piontkowski et al., 2000).

In addition, the interplay between anxiety, somatisation and alexithymia has shown promising trends in this research. The extent to which these factors contribute to menstrual cycle reporting for other groups would be a useful contribution to the menstrual cycle literature.

The implications of alexithymia in the variability of menstrual cycle symptom reporting are a topic which has not previously been researched. Despite the moderate correlation between anxiety and alexithymia, alexithymia was found to predict menstrual cycle symptom reporting. Alexithymia has traditionally been associated with idiopathic disease (van de Putte et al., 2007), and this research suggests that menstrual cycle symptom reporting may also be included in this category. Idiopathic disease is defined as "a disease or condition, the cause of which is not known or that arises spontaneously" (p. 325, Martin, 1998). As previously mentioned, the biological basis for menstrual cycle symptoms has not been identified, despite scientific effort to do so. It may be that menstrual cycle symptoms represent an idiopathic disease construct, which explains its association with alexithymia.

Although the Psychosomatic Model and Social Psychological Model seem to lend support to the findings from this research, it may also be useful to consider the results from the standpoint of Kinderman's (2005) criticism of the biopsychosocial model and subsequent proposal of a psychological model. Two things must then be acknowledged: life circumstances/events and the interplay of the variables. Whilst it is acknowledged that Kinderman's model was used to describe mental disorder (and it is not being suggested here that menstrual symptom reporting in the general population is a mental disorder), there are a couple of crucial points that can be taken from this concept. Firstly, Kinderman has suggested that the social environment, life circumstances, and biological factors affect the psychology

of an individual. This is what is meant by the interplay of variables. If one accepts the Kinderman's psychological model and applies it to the findings of this research, then the hormonal or neurotransmitter aspects of the menstrual cycle, along with the social culture to which the woman belongs (promoting negative stereotypes of menstruation), and the life circumstances the woman has had or is having (stress, diet and lifestyle, children, previous history of abuse) will combine to act on the psychological. It is assumed that in this study the psychological aspects may include personality predispositions to neuroticism and that the reaction to these factors may be higher levels of anxiety associated with menstrual cycle symptomatology. Life circumstances/events were not considered as part of this research, but would certainly add a useful dimension to explaining menstrual cycle reporting.

3.2.1 Implications for future research

This research also supports the benefit of using a biopsychosocial model (van den Akker et al., 1987; van den Akker & Steptoe, 1994; Anson, 1999; Bramwell & Zeb, 2006; Brooks-Gunn, 1985; Miota et al., 1991; Paige, 1973; Parlee, 1982; Ussher, 1992) in menstrual cycle research, which by definition requires that biological, psychological and social constructs should be considered in research to provide a more complete picture of menstrual cycle symptom and attitude reporting. In agreement with a biopsychosocial model of menstruation, this study suggests that cultural social indices and psychological indices of anxiety and depression may be interlinked, and both should be accounted for in menstrual cycle research.

This study reinforces combining cross-cultural menstruation research with menstruation and psychological distress research, such as Paige (1973) and van den Akker et al. (1985 & 1995) have previously done. This thesis has built on studies such as these, and has further implications for the field by proposing that the culture, menstrual cycle symptom and attitude reporting, anxiety and alexithymia may be linked.

This research has employed a new methodology in the field of cross-cultural menstrual cycle psychology. The results from Studies One and Two suggest that more research is needed which takes into account multidimensional cross-cultural approaches. A multi-dimensional approach is necessary in order to increase the researcher's ability to tease apart various types of cultural difference and to find where differences in attitudes and symptom reporting are positioned. Multi-dimensional models provide more comprehensive pictures of menstruation cross-culturally. This study has recommended that not only is more than one index of culture useful in measuring attitudes and behaviours, but also cultural variables such as age, region, and other sociodemographic factors.

Future research should try to replicate the findings from Study One in a population similar to the Study One sample. Additionally, a study using a sample of a similar age to the Study One sample, but recruiting Catholics from around the UK would be helpful in understanding whether the differences found between the Study One and Two samples were due to regional differences or due to variations in life stage or social changes in culture. Finally, the Study Two results should be repeated in a different student population to find out whether or not these findings are replicable in women of a similar age and demographic composition. Clearly, psychological distress, culture and life style, social culture and regional cohorts are all important factors in determining menstrual cycle symptom reporting. These factors need to be explored in various contexts to achieve a better understanding of how they work together to form the menstrual experience.

The finding that higher levels of religiosity are associated with a less negative attitude that menstruation is bothersome and decreased reporting of impaired concentration, behaviour change and negative affect is also new to the literature. This result may have important implications for the well-being of women who are suffering from problematic menstrual cycle symptoms. More research should be done in this area to tease out the factors which influence this association.

Furthermore, Study Two has suggested that where relationships can be found between culture and anxiety on menstrual cycle symptom reporting, they may vary depending upon region, life stage, and social culture cohort. These effects are therefore also tied in with the ways in which enculturation of the individual determines the expression of the experiences of menstruation and anxiety. The intricacy of the findings from this study further point to the need for a multidimensional approach in cross-cultural menstrual cycle psychology. Clearly, designating individuals to a culture without consideration for other variables (e.g. psychological distress, religious cultural group, age cohort, ethnic cultural group), will significantly limit the ability to extrapolate and compare the results of the research to other groups. A one-dimensional approach gives a less complete picture of menstrual cycle symptom and attitude reporting.

This thesis has also raised questions regarding the nature of alexithymia. Is it something that a person is born with, or is it something that develops over time, changing through life stages and societal modernisation? Longitudinal studies, sampling several socio-economic classes would be beneficial in answering these questions. The responses to these questions hold important implications for both the alexithymia literature and the menstrual cycle literature.

This thesis has introduced alexithymia as a predictor of menstrual cycle symptom reporting. The results of this thesis suggest that the concept of alexithymia may hold important clues into the nature of menstrual symptom reporting, and that this is only the beginning of research combining these two fields. Future research into the impact of alexithymia on cultural groups' menstrual cycle symptom reporting may need to use larger numbers of participants, as the differences between cultures, especially westernised sub-cultures seems to be small. In addition, stratified sampling, which seeks to recruit alexithymic individuals, would be beneficial in providing a clearer picture of the effect of alexithymia on menstrual cycle symptom reporting. Stratified sampling methods might also help to acquire an increased number of alexithymic individuals who are not also anxious in order to assess

whether or not an interaction between alexithymia and anxiety exists for menstrual cycle symptom reporting, and the effect that such an interaction would have on menstrual cycle symptom reporting.

Additionally, research into alexithymia and menstrual cycle symptom reporting could split the Toronto Alexithymia Scale into its component parts to tease out which aspects of alexithymia are most applicable to menstrual cycle symptom reporting.

Finally, the topic of this research was not obscured in these studies and the responses were retrospectively obtained. Given that this has been found to influence reporting on menstrual cycle questionnaires (van den Akker, Sharifian, et al., 1995; Boyle & Grant, 2002; Chernovetz et al., 1979; Dan & Monagle, 1994; Haywood et al., 2002; Marvan & Cortes-Iniestra, 2001; Pazy et al., 1989; Rubinow et al., 1984; Shaver & Woods, 1985; Woods et al., 1982), these studies should be replicated both prospectively and by obscuring the intent of the research.

3.2.2 Implications for practice

The implications for practice are separated into two topics. The first topic is more general and addresses implications for practice when treating clients with affective disorders and those presenting with somatic symptoms. The second topic is more specific to menstruation, and discusses the clinical implications for those treating women presenting with menstrual complaints.

Clinicians are encouraged to take into account how a woman's culture might influence the expression of anxiety as somatic symptoms, or the degree to which this might affect many medically unexplainable symptoms and disorders. Clinicians' abilities to understand patient expression and experiences may be greatly improved with a greater awareness and understanding of the cultural determinants that affect an individual's thoughts and behaviours.

Menstrual symptom complaints have been shown to negatively impact on women's quality of life, even when loose defining criteria are used to diagnose PMS (Dean et al., 2006). Additionally, some research has suggested that at least in Westernized countries, women from various national cultures may be similarly motivated to seek help from health care professionals for menstrual cycle complaints (Hylan, Sundell, & Judge, 1999). Commonly used treatment modalities include pharmacological interventions (selective serotonin reuptake inhibitors (SSRIs)), cognitive behavioural therapy (CBT), psycho-educational approaches, and introducing lifestyle changes.

This research has raised the possibility of treating menstrual cycle symptoms through treating anxiety. SSRIs have been shown to significantly improve symptoms associated with PMS (*Clinical Evidence*, 2003), and this research has described a theoretical framework which explains this finding, as the treatment for one would be expected to treat the other.

Another suggested treatment for PMS is CBT, which has been found to reduce menstrual symptom reporting, but is difficult to study due to problems with designing appropriate controls (*Clinical Evidence*, 2003). Again, this research has provided an explanation for why CBT could be beneficial for both anxiety and menstrual problems. Due to the idiopathic nature of PMS, the use of CBT may be beneficial for more severe PMS sufferers in specialist PMS pain clinics, as used for other conditions such as back pain. The use of CBT as a treatment option avoids the problem of side-effects from powerful pharmaceuticals, and is preferable for this reason.

Psycho-education has been put forth as another form of treatment for menstrual cycle complaints. Several researchers have proposed improvements in coping with menstrual cycle problems following self-help packets (Futterman & Jones, 1997; Huston & Fujitsubo, 2002; Ussher & Perz, 2006). The results of this study suggest that the authors of these packets should be aware of cultural differences between women and the effect that these differences might have on menstrual cycle symptom

reporting. Tailoring information more specifically to the cultures they are handed out in could increase the efficacy of the materials. (Further information on the treatment of PMS is beyond the scope of this study. Please see Halbreich, 2003; Robinson & Swindle, 2000; Hewison & van den Akker, 1996).

3.3 Final Summary

This research made contributions to several fields of literature, including cross-cultural menstrual cycle literature, menstruation and anxiety/depression literature, and the alexithymia literature.

This research found that anxiety was able to predict menstrual cycle symptom reporting even when other cultural and sociodemographic factors had been controlled for. This finding was consistent with other literature suggesting both a general reporting trait in anxious women, and that stereotyping of the female experience of menstruation and the use of menstruation as a cultural idiom of distress may be implicated. Additionally, this research has implicated a factor which had previously not been associated with menstrual symptom reporting and has been found to be a significant predictor of reporting menstrual distress. From these findings it was suggested that alexithymia, anxiety, and somatisation link together to form a complex yet more complete picture of menstrual cycle symptom reporting.

This thesis has also linked levels of religiosity with menstrual cycle attitudes and symptoms, which had been hinted at but not formally tested in the literature. Previous research has shown that religiosity and psychological distress are correlated. This research found that both religiosity and psychological distress are associated with menstrual cycle symptom reporting. This relationship was found to be negative in nature for religiosity and menstrual attitudes and distress, with higher levels of religiosity associated with lower reports of bothersome menstrual attitudes. The relationship between psychological distress and menstrual cycle symptoms was found to be positive in nature.

Finally, although this thesis did not find many significant differences between cultures, the importance of using a multidimensional approach in menstrual cycle literature is still stressed. It is suggested that there is a need for change both in the way cross-cultural menstrual cycle research is conducted, and in the assumptions about the nature of culture which researchers make. This suggests that it is important that other researchers in the field of cross-cultural menstrual cycle research adopt a multidimensional approach to culture. Individuals are comprised of a complex set of cultural values, some of which may come from various cultural heritages within the same person. Often these differences may be subtle; however, this research has shown a method to aid in teasing out these differences between cultures, where they can be found. Research which takes a biopsychosocial approach to understanding the menstrual cycle is needed in order to create a more complete picture.

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Appendix 1

Ms. Angela Tufte
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Dear Madam:

My name is Angela Tufte. I am a postgraduate research student in Clinical Psychology at the University of Liverpool. For my thesis project I am looking at the ways in which cultural and religious beliefs impact upon the health and feelings of women. Through the questionnaires I am hoping to find some common patterns. Because this is a large-scale project, I will need to recruit a lot of women to take part in my study. The questionnaires should take approximately 15 minutes.

There are five questionnaires involved in this study.

1. **The General Questionnaire**, which asks some general questions about yourself. This should take about 2 minutes to complete.
2. **The Menstrual Distress Questionnaire**, which asks you about some symptoms that people sometimes associate with the menstrual cycle. This should take approximately 3 minutes.
3. **The Religiosity Questionnaire**, which asks about your current religious beliefs and those of the family you grew up in. This should take about 2 minutes to complete.
4. **The General Feelings Questionnaire**, which asks you how you have felt emotionally in the last week. This should take about 3 minutes to complete.
5. **The Menstrual Attitudes Questionnaire**, which asks you about how you feel about menstruation. This should take approximately 4 minutes to complete.

I would very much appreciate your participation in this study.

Information that you provide for this study will be used for academic purposes only. At the end of the study the results will be published in a health journal. These results will not be able to identify you in any way. Your information will not be distributed to any third party or used for any commercial enterprise. You have the right to withdraw from the study at any time. Although I will have your name on file, this information will not be kept with the answers to your questionnaires. The data are held completely anonymous and confidential. At the beginning of the study a research number will be assigned in order to keep all of the papers together. This number will not be able to trace anyone back to your name.

As a bonus for taking part in the study, I will be having a prize draw for £100 worth of goods in the form of a gift voucher once all of the forms have been collected. When you are finished filling out the questionnaires, please fill out the prize draw form. This will ask you to check which store you would most like to receive a £100 gift voucher from out of a list of stores that provide gift vouchers, should you win the prize draw. You will need to include your name and phone number. This information will not be stored with your questionnaire and no one will be able to use this information to trace you to your questionnaire answers.

The study is due to be finished by end of September. I would be happy to share the results with you at that time.

If you have any questions or comments, please do not hesitate to contact me on the above address, e-mail address and phone number.

Thank you for taking the time to read this letter and I hope you will consider this study.

Sincerely,

Angela Tufte (Clinical Psychology Postgraduate Research Student)

Consent Form

Menstrual Symptom Reporting Cross-Culturally

I confirm that I have read and understand the information sheet for the above study. I understand that my participation is voluntary and that I am free to refuse or withdraw at any time. I agree to take part in the above study.

Name (print): _____

Signature: _____

Date: _____

_____ Please put a tick here if you would like to receive more information about the study.

If you would like further information about the outcome of the study, please indicate how you would like to receive the information (circle one and provide necessary information). Information about the results of the study will be available in April, 2007.

Email address _____

Postal address _____

Menstrual Attitudes Questionnaire

Number 1 indicates strong disagreement with the statement. Number 7 indicates strong agreement with the statement. Please circle the number that most accurately reflects your attitude to the statement. Your attitude may be at either end of the scale or somewhere in-between, so for example if you agreed with the first statement, but not at all strongly, you might circle number 5. Please read each statement carefully and respond to each in turn, answering as honestly as possible.

Disagree Strongly		Neither Agree/ Disagree			Agree Strongly	
1	2	3	4	5	6	7

Attitude Statement:

- 1) A woman's performance in sports is no worse during menstruation.

1	2	3	4	5	6	7
---	---	---	---	---	---	---

- 2) Menstruation is something I just have to put up with.

1	2	3	4	5	6	7
---	---	---	---	---	---	---

- 3) Menstruation is a re-occurring affirmation of womanhood.

1	2	3	4	5	6	7
---	---	---	---	---	---	---

- 4) I can tell my period is approaching because of breast tenderness, backache, cramps and other physical signs.

1	2	3	4	5	6	7
---	---	---	---	---	---	---

- 5) Most women show a weight gain just before or during menstruation.

1	2	3	4	5	6	7
---	---	---	---	---	---	---

- 6) Women are more tired than usual when they are menstruating.

1	2	3	4	5	6	7
---	---	---	---	---	---	---

- 7) I expect extra consideration from my friends when I am menstruating.

1	2	3	4	5	6	7
---	---	---	---	---	---	---

**Disagree
Strongly**

**Neither
Agree/
Disagree**

**Agree
Strongly**

1 2 3 4 5 6 7

8) In some ways I enjoy my menstrual periods.

1 2 3 4 5 6 7

9) Menstruation allows women to be more aware of their bodies.

1 2 3 4 5 6 7

10) I have learnt to anticipate my menstrual periods by the mood changes, which precede it.

1 2 3 4 5 6 7

11) Others should not be critical of woman who is easily upset before or during her menstrual period.

1 2 3 4 5 6 7

12) The physiological effects of menstruation are normally no greater than other usual fluctuations in physical state.

1 2 3 4 5 6 7

13) Men have a real advantage in not having the monthly interruption of a menstrual period.

1 2 3 4 5 6 7

14) Menstruation provides a way for me to keep in touch with my body.

1 2 3 4 5 6 7

15) My own moods are not influenced in any major way by the phase of my menstrual cycle.

1 2 3 4 5 6 7

16) Cramps are bothersome only if one pays attention to them.

1 2 3 4 5 6 7

**Disagree
Strongly**

**Neither
Agree/
Disagree**

**Agree
Strongly**

1 2 3 4 5 6 7

17) Menstruation can adversely affect my performance in sport.

1 2 3 4 5 6 7

18) I feel as fit during menstruation as I do during any other time of the month.

1 2 3 4 5 6 7

19) I hope it will be possible some day to get a menstrual period over within a few minutes.

1 2 3 4 5 6 7

20) Menstruation is an obvious example of the rhythmicity, which pervades all of life.

1 2 3 4 5 6 7

21) A woman who attributes her irritability to her approaching menstrual period is neurotic.

1 2 3 4 5 6 7

22) I barely notice the minor physiological effects of my menstrual periods.

1 2 3 4 5 6 7

23) I don't allow the fact that I am menstruating to interfere with my usual activities.

1 2 3 4 5 6 7

24) I don't believe my menstrual period affects how well I do on intellectual tasks.

1 2 3 4 5 6 7

25) Avoiding certain activities during menstruation is often very wise.

1 2 3 4 5 6 7

**Disagree
Strongly**

**Neither
Agree/
Disagree**

**Agree
Strongly**

1 2 3 4 5 6 7

26)The only thing menstruation is good for is to let me know I'm not pregnant.

1 2 3 4 5 6 7

27)Women who complain of menstrual distress are just using that as an excuse.

1 2 3 4 5 6 7

28)I am more easily upset during my pre-menstrual or menstrual periods than at any other times of the month.

1 2 3 4 5 6 7

29)I realise that I cannot expect as much of myself during menstruation compared to the rest of the month.

1 2 3 4 5 6 7

30)The recurrent monthly flow of menstruation is an external indication of a woman's general health.

1 2 3 4 5 6 7

31)Pre-menstrual tension/irritability is all in a woman's head.

1 2 3 4 5 6 7

32)Women just have to accept the fact that they may not perform as well when they are menstruating.

1 2 3 4 5 6 7

33)Most women make too much of the minor physiological effects of menstruation.

1 2 3 4 5 6 7

Menstrual Distress Questionnaire

According to the following scale, please rate your general experience of each symptom a week prior to starting your periods during the last three months. Not all symptoms that you possibly will have experienced may be on this questionnaire. This is a list of symptoms that I am currently studying. If you have any other symptoms you wish to mention, please do so in the space provided at the end of the questionnaire.

Not at all Weak Moderate Severe
1 2 3 4

Please circle the most appropriate response.

1) Muscle stiffness	1	2	3	4
2) Backache	1	2	3	4
3) Painful breasts	1	2	3	4
4) Nausea	1	2	3	4
5) Restlessness	1	2	3	4
6) Anxiety	1	2	3	4
7) Confusion	1	2	3	4
8) Take naps	1	2	3	4
9) Orderliness	1	2	3	4
10) Feelings of suffocation	1	2	3	4
11) Poor motor co-ordination	1	2	3	4
12) Poor appetite	1	2	3	4
13) Decreased efficiency	1	2	3	4
14) Bursts of energy	1	2	3	4
15) Numbness	1	2	3	4

	Not at all 1	Weak 2	Moderate 3	Severe 4
16) General aches/ pain	1	2	3	4
17) Weight gain	1	2	3	4
18) Feeling sad	1	2	3	4
19) Loneliness	1	2	3	4
20) Headaches	1	2	3	4
21) Insomnia	1	2	3	4
22) Difficulty concentrating	1	2	3	4
23) Poor work performance	1	2	3	4
24) Affectionate	1	2	3	4
25) Chest pains	1	2	3	4
26) Blind spots	1	2	3	4
27) Fatigue	1	2	3	4
28) Swelling breasts/ abdomen	1	2	3	4
29) Irritability	1	2	3	4
30) Dizziness	1	2	3	4
31) Crying	1	2	3	4
32) Distractibility	1	2	3	4
33) Avoid social situation	1	2	3	4
34) Excitement	1	2	3	4
35) Ringing in the ears	1	2	3	4

	Not at all 1	Weak 2	Moderate 3	Severe 4
36) Feelings of well-being	1	2	3	4
37) Heart pounding	1	2	3	4
38) Cramps	1	2	3	4
39) Skin blemish	1	2	3	4
40) Cold sweats	1	2	3	4
41) Moods swings	1	2	3	4
42) Hot flashes	1	2	3	4
43) Poor judgement	1	2	3	4
44) Stay at home	1	2	3	4
45) Minor accidents	1	2	3	4
46) Tension	1	2	3	4
47) Forgetfulness	1	2	3	4

If you have experienced any other symptoms not listed here, please indicate below.

General Feelings Questionnaire (HADS)

Read each item and place a firm tick in the box opposite the reply which comes closest to how you have been feeling in the past week. Don't take too long over your replies: your immediate reaction to each item will probably be more accurate than a long thought out response.

1. I feel tense or "wound up."
 - Most of the time
 - A lot of the time
 - From time to time, occasionally
 - Not at all

2. I still enjoy the things I used to enjoy.
 - Definitely as much
 - Not quite as much
 - Only a little
 - Hardly at all

3. I get a sort of frightened feeling as if something awful is about to happen.
 - Very definitely and quite badly
 - Yes, but not too badly
 - A little, but it doesn't worry me
 - Not at all

4. I can laugh and see the funny side of things.
 - As much as I always could
 - Not quite so much now
 - Definitely not so much now
 - Not at all

5. Worrying thoughts go through my mind.
 - A great deal of the time
 - A lot of the time
 - From time to time but not too often
 - Only occasionally

6. I feel cheerful.
 - Not at all
 - Not often
 - Sometimes
 - Most of the time

7. I can sit at ease and feel relaxed.
 - Definitely
 - Usually
 - Not often
 - Not at all

8. I feel as if I am slowed down.
- Nearly all of the time
 - Very often
 - Sometimes
 - Not at all
9. I get a sort of frightened feeling like "butterflies" in the stomach.
- Not at all
 - Occasionally
 - Quite often
 - Very often
10. I have lost interest in my appearance.
- Definitely
 - I don't take so much care as I should
 - I may not take quite as much care
 - I take just as much care as ever
11. I feel restless as if I have to be on the move.
- Very much indeed
 - Quite a lot
 - Not very much
 - Not at all
12. I look forward with enjoyment to things.
- As much as I ever did
 - Rather less than I used to
 - Definitely less than I used to
 - Hardly at all
13. I get sudden feelings of panic.
- Very often indeed
 - Quite often
 - Not very often
 - Not at all
14. I can enjoy a good book or radio or TV program.
- Often
 - Sometimes
 - Not often
 - Very seldom

Demographics (UK)

Age: _____

How many children do you have? _____

Do you have a part-time or full-time job outside of the home? (please tick appropriate box):

- Full-time
- Part-time

What kind of work do you do?

If you were not born in the UK, please state where and when you were born and the length of time spent in the UK:

- Born in the UK
- Born outside the UK
- Which country? _____
- Length of time in the UK? _____

Because we're interested in the effect of culture, including religious culture and beliefs, which religious group do you identify with?

Is this the religion that you were brought up with?

- Yes
- No

Are you currently:

- Pregnant
- Breast-feeding
- Lactating
- Using hormonal contraception (oral, implant, injection, intrauterine device, etc.)
- Within 6 months of having delivered a baby
- Going through menopause
- Using hormone replacement therapy
- Using medicines for depression or anxiety

Thank you for your time and participation. If you have any further questions in respect to any of these questions, please feel free to contact me.

Please feel free to include any comments with regard to this study or the questionnaires below:

Demographics (US)

Age: _____

How many children do you have? _____

Do you have a part-time or full-time job outside of the home? (please put an "x" in the appropriate box):

- Full-time
- Part-time

What kind of work do you do?

If you were not born in the US, please state where and when you were born and the length of time spent in the US:

- Born in the US
- Born outside the US
- Which country? _____
- Length of time in the US? _____

Because we're interested in the effect of culture, including religious culture and beliefs, which religious group do you identify with?

Is this the religion that you were brought up with?

- Yes
- No

Are you currently:

- Pregnant
- Breast-feeding
- Lactating
- Using hormonal contraception (oral, implant, injection, intrauterine device, etc.)
- Within 6 months of having delivered a baby
- Going through menopause
- Using hormone replacement therapy
- Using medicines for depression or anxiety

Thank you for your time and participation. If you have any further questions in respect to any of these questions, please feel free to contact me.

Please feel free to include any comments with regard to this study or the questionnaires below:

Religion Questionnaire

Because we're interested in the effect of culture, including religious culture and beliefs, which religious group do you identify with?

- Protestant
- Catholic
- Jewish

How often have you attended your place of worship in the last month either for services or for social events? (Tick the answer that best describes your attendance).

- Daily
- Weekly
- A couple of times
- Once
- I haven't attended my place of worship this month

Is this your usual pattern?

- Yes
- No, I usually attend daily
- No, I usually attend weekly
- No, I usually attend a couple of times a month
- No, I usually attend monthly
- No, I usually attend several times a year
- No, I usually attend only on special occasions (religious holidays, marriages, etc.)
- No, I usually don't attend my place of worship

How often did your parents attend their place of worship as you were growing up?

- Daily
- Weekly
- A couple of times a month
- Monthly
- Several times a year
- Only on special occasions (religious holiday, marriages, etc.)
- Never

How often do you pray or are involved in religious activities in your home?

- Daily
- Weekly
- A couple of times a month
- Monthly
- Several times a year
- Only on special occasions (religious holidays, etc.)
- Never

How often did your parents pray or engage in religious activities in their home?

- Daily
- Weekly
- A couple of times a month
- Monthly
- Several times a year
- Only on special occasions (religious holidays, etc.)
- Never

How important is your religion in your life?

- I don't adhere to the beliefs and teachings of my religion
- Not very important
- Somewhat important
- Very important

How important do you feel religion was in your parents' lives?

- They didn't adhere to the beliefs and teachings of their religion
- Not very important
- Somewhat important
- Very important

How do your current religious beliefs compare with those you were brought up with?

- I am now more religious
- I am about the same
- I am now less religious

According to the following scale, please rate the amount the person or activity influenced you in learning about your religion.

	Not at all 1	A little 2	Somewhat 3	Mostly 4
Parents	1	2	3	4
Religious leader	1	2	3	4
Reading religious texts	1	2	3	4
Other person at place Of worship	1	2	3	4
Other_____	1	2	3	4

Prize Draw Form (UK)

Please select which store you would like a gift voucher from, should you win the prize draw. (Please choose one.)

- Boots
- Marks and Spencer
- Tesco
- Mothercare
- WHSmith
- Argos
- Homebase
- Ikea
- B & Q
- Next

Please provide your name and a daytime phone number.

Name (Print): _____

Daytime phone number: _____

Prize Draw Form (US)

Please select which store/restaurant you would like a gift voucher from, should you win the prize draw. (Please choose one.)

- Target
- Walmart
- Bed Bath & Beyond
- KMart
- Herberger's
- Pier 1
- Home Depot
- Linens 'n Things
- Doolittle's Restaurant
- Marshall Field's
- Olive Garden Restaurant

Please provide your name and a daytime phone number.

Name (Print): _____

Daytime phone number: _____

Appendix 2

D. Clin. Psychol. Programme

Division of Clinical Psychology
The Whelan Building
Quadrangle, Brownlow Hill
Liverpool L69 3GB

T 0151 794 5530/5534
F 0151 794 5537

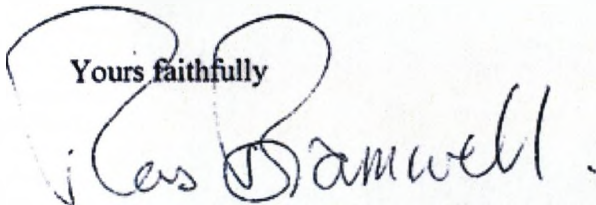
23rd June 2005

To whom it may concern

Ms Angela Tufte is registered as a full-time research student at the University of Liverpool and is being supervised by me. She is undertaking a research project which looks at attitudes towards and experience of menstruation in different groups in the UK and USA. This research has been reviewed by the Research Committee of the Division of Clinical Psychology at the University of Liverpool. The research complies with the standards for ethics in research as published by the British Psychological Society.

Please feel free to contact me if you have any questions or concerns about Ms Tufte and this research project.

Yours faithfully



Dr Ros Bramwell

Prof James McGuire
Programme Director
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Dr Ros Bramwell
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rosb@liv.ac.uk

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Programme Administrator
mgregg@liv.ac.uk

Appendix 3

Ms. Angela Hewett
School of Population, Community
and Behavioural Sciences
Whelan Building
University of Liverpool
Work: 01517944215
e-mail: a.hewett@liv.ac.uk

Dear Madam:

My name is Angela Hewett. I am a University Teacher in the School of Population, Community and Behavioural Sciences at the University of Liverpool. I am currently doing research looking at the ways in which culture impacts upon the health and feelings of women. Through the questionnaires I am hoping to find some common patterns. Because this is a large-scale project, I will need to recruit a lot of women to take part in my study. The questionnaires should take approximately 10 minutes.

There are four questionnaires involved in this study.

1. **The General Questionnaire**, which asks some general questions about yourself. This should take about 2 minutes to complete.
2. **The Menstrual Distress Questionnaire**, which asks you about some symptoms that people sometimes associate with the menstrual cycle. This should take approximately 3 minutes.
3. **The General Feelings Questionnaire**, which asks you how you have felt emotionally in the last week. This should take about 3 minutes to complete.
4. **The Toronto Alexithymia Scale**, which asks you about how you think about your emotions. This should take approximately 2 minutes to complete.

I would very much appreciate your participation in this study.

Information that you provide for this study will be used for academic purposes only. At the end of the study the results will be published in a health journal. These results will not be able to identify you in any way. Your information will not be distributed to any third party or used for any

commercial enterprise. You have the right to withdraw from the study at any time. Although I will have your name on file, this information will not be kept with the answers to your questionnaires. The data are held completely anonymous and confidential. At the beginning of the study a research number will be assigned in order to keep all of the papers together. This number will not be able to trace anyone back to your name. Those under the age of 16 are excluded from participating.

As a bonus for taking part in the study, I will be having a lucky draw for £100 worth of goods in the form of a gift voucher once all of the forms have been collected. When you are finished filling out the questionnaires, you can choose to fill out the lucky draw form. This will ask you to put a tick next to the store you would most like to receive a £100 gift voucher from out of a list of stores that provide gift vouchers, should you win the lucky draw. You will need to include your name and phone number. This information will not be stored with your questionnaire and no one will be able to use this information to trace you to your questionnaire answers.

The study is due to be finished by end of September. I would be happy to share the results with you at that time. If you would like to be sent a one-page summary of the results of the study, please tick the circle on the next page and include your name and address.

If you have any questions or comments, please do not hesitate to contact me on the above address, e-mail address and phone number. Thank you for taking the time to read this letter and I hope you will consider this study.

Sincerely,

Angela Hewett

I would like to receive information about the results of this study.

Name: _____

Address: _____

Consent Form

Menstrual Symptom Reporting Cross-Culturally

I confirm that I have read and understand the information sheet for the above study. I understand that my participation is voluntary and that I am free to refuse or withdraw at any time. I agree to take part in the above study.

Name (print): _____

Signature: _____

Date: _____

Menstrual Distress Questionnaire

According to the following scale, please rate your general experience of each symptom a week prior to starting your periods during the last three months. Not all symptoms that you possibly will have experienced may be on this questionnaire. This is a list of symptoms that I am currently studying. If you have any other symptoms you wish to mention, please do so in the space provided at the end of the questionnaire.

Not at all Weak Moderate Severe
1 2 3 4

Please circle the most appropriate response.

1) Muscle stiffness	1	2	3	4
2) Backache	1	2	3	4
3) Painful breasts	1	2	3	4
4) Nausea	1	2	3	4
5) Restlessness	1	2	3	4
6) Anxiety	1	2	3	4
7) Confusion	1	2	3	4
8) Take naps	1	2	3	4
9) Orderliness	1	2	3	4
10) Feelings of suffocation	1	2	3	4
11) Poor motor co-ordination	1	2	3	4
12) Poor appetite	1	2	3	4
13) Decreased efficiency	1	2	3	4
14) Bursts of energy	1	2	3	4
15) Numbness	1	2	3	4

	Not at all 1	Weak 2	Moderate 3	Severe 4
16) General aches/ pain	1	2	3	4
17) Weight gain	1	2	3	4
18) Feeling sad	1	2	3	4
19) Loneliness	1	2	3	4
20) Headaches	1	2	3	4
21) Insomnia	1	2	3	4
22) Difficulty concentrating	1	2	3	4
23) Poor work performance	1	2	3	4
24) Affectionate	1	2	3	4
25) Chest pains	1	2	3	4
26) Blind spots	1	2	3	4
27) Fatigue	1	2	3	4
28) Swelling breasts/ abdomen	1	2	3	4
29) Irritability	1	2	3	4
30) Dizziness	1	2	3	4
31) Crying	1	2	3	4
32) Distractibility	1	2	3	4
33) Avoid social situation	1	2	3	4
34) Excitement	1	2	3	4
35) Ringing in the ears	1	2	3	4

	Not at all 1	Weak 2	Moderate 3	Severe 4
36) Feelings of well-being	1	2	3	4
37) Heart pounding	1	2	3	4
38) Cramps	1	2	3	4
39) Skin blemish	1	2	3	4
40) Cold sweats	1	2	3	4
41) Moods swings	1	2	3	4
42) Hot flashes	1	2	3	4
43) Poor judgement	1	2	3	4
44) Stay at home	1	2	3	4
45) Minor accidents	1	2	3	4
46) Tension	1	2	3	4
47) Forgetfulness	1	2	3	4

If you have experienced any other symptoms not listed here, please indicate below.

General Feelings Questionnaire (HADS)

Read each item and place a firm tick in the box opposite the reply which comes closest to how you have been feeling in the past week. Don't take too long over your replies: your immediate reaction to each item will probably be more accurate than a long thought out response.

1. I feel tense or "wound up."
 - Most of the time
 - A lot of the time
 - From time to time, occasionally
 - Not at all

2. I still enjoy the things I used to enjoy.
 - Definitely as much
 - Not quite as much
 - Only a little
 - Hardly at all

3. I get a sort of frightened feeling as if something awful is about to happen.
 - Very definitely and quite badly
 - Yes, but not too badly
 - A little, but it doesn't worry me
 - Not at all

4. I can laugh and see the funny side of things.
 - As much as I always could
 - Not quite so much now
 - Definitely not so much now
 - Not at all

5. Worrying thoughts go through my mind.
 - A great deal of the time
 - A lot of the time
 - From time to time but not too often
 - Only occasionally

6. I feel cheerful.
 - Not at all
 - Not often
 - Sometimes
 - Most of the time

7. I can sit at ease and feel relaxed.
 - Definitely
 - Usually
 - Not often
 - Not at all

8. I feel as if I am slowed down.
- Nearly all of the time
 - Very often
 - Sometimes
 - Not at all
9. I get a sort of frightened feeling like "butterflies" in the stomach.
- Not at all
 - Occasionally
 - Quite often
 - Very often
10. I have lost interest in my appearance.
- Definitely
 - I don't take so much care as I should
 - I may not take quite as much care
 - I take just as much care as ever
11. I feel restless as if I have to be on the move.
- Very much indeed
 - Quite a lot
 - Not very much
 - Not at all
12. I look forward with enjoyment to things.
- As much as I ever did
 - Rather less than I used to
 - Definitely less than I used to
 - Hardly at all
13. I get sudden feelings of panic.
- Very often indeed
 - Quite often
 - Not very often
 - Not at all
14. I can enjoy a good book or radio or TV program.
- Often
 - Sometimes
 - Not often
 - Very seldom

General Questionnaire

Age: _____

Do you have any children? _____ If so, how many? _____

Do you have a part-time or full-time job outside the home?

- Yes
- No

If yes, please tick appropriate box:

- Full-time
- Part-time

What kind of work do you do?

If you were not born in the UK, please state where and when you were born and the length of time spent in the UK:

- Born in the UK
- Born outside the UK
- Which country? _____
- Length of time in the UK? _____

Because we're interested in the effect of culture, including religious culture and beliefs, which religious group (Protestant or Catholic) do you identify with?

Is this the religion that you were brought up with?

- Yes
- No

If not, which religion were you brought up with? _____

Are you currently:

- Pregnant
- Breast-feeding/Lactating
- Using hormonal contraception (oral, implant, injection, intrauterine device, etc.)
- Within 6 months of having delivered a baby
- Going through/have gone through menopause
- Using hormone replacement therapy
- Using medicines for depression or anxiety

Do you have any pre-existing health problems?

- Yes
- No

If yes, please explain: _____

The Toronto Alexithymia Scale

Number 1 indicates strong disagreement with the statement. Number 5 indicates strong agreement with the statement. Please circle the number that most accurately reflects your attitude to the statement. Your attitude may be at either end of the scale or somewhere in-between, so for example if you agreed with the first statement, but not at all strongly, you might circle number 3. Please read each statement carefully and respond to each in turn, answering as honestly as possible.

Disagree Strongly		Neither Agree/ Disagree		Agree Strongly
1	2	3	4	5

Statement:

1) I am often confused about what emotion I am feeling.

1 2 3 4 5

2) It is difficult for me to find the right words for my feelings.

1 2 3 4 5

3) I have physical sensations that even doctors don't understand.

1 2 3 4 5

4) I am able to describe my feelings easily.

1 2 3 4 5

5) I prefer to analyse problems rather than just describe them.

1 2 3 4 5

6) When I am upset, I don't know if I am sad, frightened, or angry.

1 2 3 4 5

7) I am often puzzled by sensations in my body.

1 2 3 4 5

8) I prefer to just let things happen rather than to understand why they turned out that way.

1 2 3 4 5

9) I have feelings that I can't quite identify.

1 2 3 4 5

10) Being in touch with emotion is essential.

1 2 3 4 5

11) I find it hard to describe how I feel about people.

1 2 3 4 5

12) People tell me to describe my feelings more.

1 2 3 4 5

13) I don't know what's going on inside me.

1 2 3 4 5

14) I often don't know why I am angry.

1 2 3 4 5

15) I prefer talking to people about their daily activities rather than their feelings.

1 2 3 4 5

16) I prefer to watch "light" entertainment shows rather than psychological dramas.

1 2 3 4 5

17) It is difficult for me to reveal my innermost feelings, even to close friends.

1 2 3 4 5

18) I can feel close to someone, even in moments of silence.

1 2 3 4 5

19) I find examination of my feelings useful in solving personal problems.

1 2 3 4 5

20) Looking for hidden meanings in movies or plays distracts from their enjoyment.

1 2 3 4 5

Lucky Draw Form

Please select which store you would like a £100 gift voucher from, should you win the lucky draw. (Please choose one.)

- Boots
- Marks and Spencer
- Tesco
- Mothercare
- WHSmith
- Argos
- Homebase
- Ikea
- B & Q
- Next

Please provide your name and a daytime phone number.

Name (Print): _____

Daytime phone number: _____

Appendix 4

Ethics Approval – Study Two

From: Cloke, Jane
Sent: 12 January 2007 13:07
To: Bramwell, Ros
Cc: Carter, Ian [ethics]
Subject: RETH000027

RETH000027 Dr R Bramwell
"Menstrual Symptom Reporting Cross-Culturally: The roles of anxiety and alexithymia"
Lead reviewer: Dr R Latto
Date of review 19th December 2006

The application was APPROVED subject to the following conditions:

Mandatory conditions

The General Questionnaire should be altered to ask 'Do you have any children? If so, how many?'

1. The information for participants and the advertisement should make it clear that those under 16 years of age are excluded from participating.
2. On completion of the project, a Final Report form must be completed and sent to the Sub-Committee.
3. On each anniversary of this approval, until the project is completed, an Annual Report form must be completed and sent to the Sub-Committee.
4. All serious adverse events must be reported to the Sub-Committee within 24 hours of their occurrence.

Advisory conditions

5. The information for participants should include appropriate sources of health information (websites etc.) on the topics relevant to the study.

This approval applies for the duration of the research. If it is proposed to extend the duration of the study as specified in the application form, the Sub-Committee should be notified. If it is proposed to make a substantial amendment to the research, you should notify the Sub-Committee.