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## Polycystic ovary syndrome (PCOS) in urban India

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POLYCYSTIC OVARY SYNDROME (PCOS)  
IN URBAN INDIA

by

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Bachelor of Arts  
University of Nevada, Las Vegas  
2008

A thesis submitted in partial fulfilment of  
the requirements for the

**Master of Arts in Anthropology  
Department of Anthropology  
College of Liberal Arts**

**Graduate College  
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**THE GRADUATE COLLEGE**

We recommend the thesis prepared under our supervision by

**Heidi Ann Manlove**

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**Polycystic Ovary Syndrome (PCOS) in Urban India**

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**May 2011**

ABSTRACT  
**Polycystic Ovary Syndrome (PCOS)  
in Urban India**  
by

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This thesis research focuses on urban women in India diagnosed with polycystic ovary syndrome (PCOS). PCOS is a complex metabolic, endocrine and reproductive disorder affecting approximately 5-10% of the female population in developed countries. The prevalence of PCOS is on the rise in developing nations like India, which are undergoing rapid nutritional transitions due to westernized diets and lifestyle. However, less appreciated in the literature are the developmental psychosocial impacts for women diagnosed with PCOS, especially in developing countries. Thus, the goal of my thesis research was to contribute to the small but growing literature by investigating psychosocial dimensions of women with PCOS in the developing urban areas of Delhi, India.

Using a mixed method case-control study design, I investigated gender identity, psychological general health and well being (PGWB), and body image. A total of 65 (33 PCOS, 32 control) urban Indian woman from Delhi NCR (National Capital Region) were recruited from a North Delhi gynecology clinic, and by word of mouth. All 65 women completed the survey, 5 of them (3 PCOS, 2 control) completed the semi-structured interview, and 4 of those 5 allowed me to complete participant observation with them.

No statistical differences between PCOS and control groups were observed for the quantitative measures of the survey once body mass index, waist circumference and other covarying demographic variables were controlled for. However, the qualitative results suggest a more complex illustration of possible psychosocial differences between PCOS and control participants, especially in regard to body image.

Despite intriguing qualitative results, more nuanced and in-depth quantitative and qualitative work is needed to verify whether urban Indian women with PCOS contend with discrete biopsychosocial trajectories of health and well-being. Future research is warranted on cross-cultural conceptualization of PCOS as well as the relevance of marital status, geographic location, socioeconomic status, diet, lifestyle and attitudes about health to the psychosocial experience of PCOS.

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## TABLE OF CONTENTS

ABSTRACT .....	iii
ACKNOWLEDGEMENTS .....	v
LIST OF TABLES .....	ix
CHAPTER 1 INTRODUCTION .....	1
What is Polycystic Ovary Syndrome (PCOS)?.....	2
Middle and Upper Class Women in Urban Indian Culture.....	5
CHAPTER 2 LITERATURE REVIEW .....	9
Developmental Origin Hypotheses of PCOS.....	9
Gender Identity and Sex-Typed Behavior .....	10
Pilot Research.....	12
Gender Research in India .....	14
Body Image.....	15
PCOS and Body Image.....	16
Body Image in India .....	19
Psychological Health and General Well-being (PGWB).....	21
PCOS and PGWB Research in India.....	24
CHAPTER 3 RESEARCH DESIGN, OBJECTIVES, AND HYPOTHESES .....	27
Research Design.....	27
Objectives .....	27
Hypotheses.....	28
CHAPTER 4 METHODS .....	31
Participants.....	31
Quantitative Methods.....	32
Qualitative Methods.....	34
Semi-Structured Interviews .....	34
Participant Observation .....	35
CHAPTER 5 RESULTS .....	37
Quantitative Results .....	37
Qualitative Results .....	51
Vignette I: Nandini .....	53
Vignette II: Preeti .....	54
Vignette III: Pooja .....	56
Vignette IV: Aankhi .....	57
Vignette V: Alec.....	58
Vignette Summary.....	60
Semi-structured Interviews .....	61
PCOS Interviews .....	61

Control Interviews .....	69
Qualitative Results Summary .....	72
CHAPTER 6 DISCUSSION.....	75
Summary of Key Results .....	75
Group Differences in BMI and WC.....	75
Overweight Preoccupation.....	77
Weight Class .....	80
Results and Hypotheses .....	81
Limitations .....	86
Implications for Delhi Culture .....	89
Evolutionary Approach to Westernized Ideals of Beauty.....	91
CHAPTER 7 CONCLUSION .....	96
APPENDIX 1 ADULT GENDER IDENTITY QUESTIONS .....	103
APPENDIX 2 CURRENT ADULT SECTION INTERVIEW .....	104
APPENDIX 3 ADOLESCENT RECALL INTERVIEW .....	108
APPENDIX 4 IRB APPROVAL.....	110
BIBLIOGRAPHY.....	111
VITA.....	128

## LIST OF TABLES

Table 1	Demographic Characteristics .....	39
Table 2	Childhood Questionnaire .....	41
Table 3	The Psychological General Well-being Index (PGWB).....	42
Table 4	MBSRQ-AS .....	43
Table 5	Correlation Analysis of BMI, WC, Owpreocc and Wtclass .....	44
Table 6	Test of Covariation and ANCOVA .....	45
Table 7	Adult Gender Identity Questionnaire.....	47
Table 8	BMI, WC, and Adult Gender Identity .....	48
Table 9	PCOSQ.....	50
Table 10	Key Participant Information and MBSRQ-AS .....	67

## CHAPTER 1

### INTRODUCTION

The focus of this research is the role that early life hormonal, physiological, psychosocial and cultural influences may have on the psychological general health and well-being (PGWB), gender identity and body image of urban Indian women living in Delhi and who are diagnosed with polycystic ovary syndrome (PCOS). PCOS is a complex metabolic, endocrine and reproductive disorder affecting approximately 5-10% of the female population in developed countries (Abbott et al. 2005, Xita and Tsatsoulis 2006). This prevalence is derived from a modest amount of Western biomedical research largely conducted in the U.S. and Europe (Li et al. 2007). However, recent findings from developing countries like China and India indicate similar prevalence rates of PCOS (Allahbadia and Merchant 2008, Li et al. 2007, Sundararaman et al. 2008).

The estimation of high PCOS prevalence rates appear in countries where diagnoses of obesity and type 2 diabetes are also common (Allahbadia and Merchant 2008). Even though women with PCOS vary in degrees of thinness to fatness, 30-75% of PCOS cases contend with being overweight or obese (Pasquali et al. 2006). These parallel trends between metabolic health perturbations and PCOS have impacted much of the developed world as well as urban areas of developing nations such as India and China (Allahbadia and Merchant 2008). Within the past two decades, these developing nations began relying on Westernized diets and lifestyle. It is predicted that they may see up to a six fold increase in obesity prevalence in the next ten years especially for India who already has the highest rates of diabetes in the world (WHO 2009).

A sense of urgency is needed in addressing contemporary metabolic and reproductive health in India (Allahbadia and Merchant 2008), including the associated psychosocial and biopsychosocial health of the people facing these increasing global health issues, such as PCOS (Sundararaman et al. 2008). The term ‘psychosocial’ refers to the interplay of both social and psychological processes involved in behavior (Lovallo 2005). Mental, emotional, and behavioral processes can interact in the biological and psychological development and expression of health and disease (Lovallo 2005). A person’s experiences, feelings, and moods regarding their health or disease status can influence and exacerbate health and disease by their own behavioral actions or thoughts. For example, as observed in double-blind placebo studies, taking placebo pills can make an ailing person feel better physically and psychologically, even though they are not taking medication (Lovallo 2005). Although research has not yet elucidated the exact psychosocial and physical pathway to explain this phenomenon, it can be concluded that the mind and body can be closely connected in health and disease. The interplay of physical or biological, and psychosocial processes in health and disease has been termed ‘biopsychosocial’ (Lovallo 2005). The psychosocial, and biopsychosocial processes involved in the health and disease of women with PCOS is a major focus of this thesis.

What is Polycystic Ovary Syndrome (PCOS)?

Understanding the complexities of a PCOS diagnosis is relevant to understanding the multiple biopsychosocial and cultural implications for female metabolic and reproductive health. The etiology of PCOS has yet to be clearly explained. The manifestation and expression of PCOS symptoms such as polycystic ovaries, high levels

of androgen hormones and irregular periods are variable from person to person. Also, the controversy concerning a PCOS diagnosis and treatment contributes to the overall current complexities of the syndrome. I.F. Stein and M.L. Leventhal were the first researchers to distinguish the reproductive phenomena of what was to become known as PCOS (1935). A co-relational effect of the presence of irregular menses and polycystic ovaries was the core of Stein and Leventhal's original study (1935). A polycystic ovary is defined as having 12 or more follicles (or cysts) within the 2-9 mm range under ultrasound (Balen et al. 2009).

Since 1935, a myriad of other symptoms have also been correlated with PCOS such as acne, male pattern balding (alopecia), hirsutism (excessive hair growth), infertility, obesity, or at least truncal fat patterning, skin tags, and high androgen hormone levels (Fauser et al. 2004). Most of the symptoms associated with PCOS appear to be linked with either high androgen or insulin hormone levels (Abbott et al. 1998, Abbott et al. 2002, Diamanti-Kandarakis et al. 2006, Xita & Tsatsoulis 2006). Collectively, these symptoms became known as "Stein-Leventhal Syndrome" until the 1960s and 70s when the induction of ultrasound allowed doctors to easily diagnose polycystic ovaries. The syndrome then began to be referred to as 'polycystic ovary syndrome' or 'PCOS' and polycystic ovaries were viewed as the cardinal trait for this syndrome (Balen 2009, Rosenfield 1997).

However, despite the seemingly obvious name, not all women with polycystic ovaries have PCOS and not all women with PCOS have polycystic ovaries (Balen 2009). This symptomatic idiosyncrasy is an example of the broad spectrum of symptoms that are characteristic of the term 'polycystic ovary syndrome'. This spectrum also entails

symptoms that vary from mild to more severe, and some women may only have a few symptoms, while others have more. This complexity has made it very difficult for clinicians to find a clear cut way to diagnosis a patient with PCOS and to account for exact prevalence rates (Balen 2009).

Problematic PCOS diagnoses are evident through the recent controversial discussion among clinical PCOS researchers and clinicians (Azziz 2006, Balen 2009, Franks 2006, Geithövel and Rabe 2007). These controversies are over the most recent 'global' and most used diagnostic 'consensus' (Balen 2009), the Rotterdam ESHRE/ASRM-Sponsored PCOS Consensus (Fauser et al. 2004). Following these criteria, a woman can be diagnosed with PCOS if she has two of the following three symptoms: (1) hyperandrogenism (elevated levels of total or unbound hormone blood levels of testosterone), or clinical signs of hirsutism (excessive male patterned hair growth), (2) intermittent or absent menstruation, and (3) polycystic ovaries visualized by ultrasound (Fauser et al. 2004).

Presently, high androgen levels (hyperandrogenemia) have largely become the clinical focus of PCOS (Azziz et al. 2006, Homburg 2009). High blood level concentrations of androgenic hormones, specifically, testosterone, androstenedione, DHEA and DHEAS, as well as luteinizing hormone and insulin have received the most attention concerning the endocrine basis of the syndrome (Balen 2009). All of these hormones play a role exacerbating excess ovarian androgen secretion (Balen 2009). The combination of a hyperinsulin, hyperandrogen, and an obese phenotype can increase the levels of androgens and obesity in PCOS patients (Pasquali et al. 2006). Effects of elevated androgen levels may be enhanced due to a tendency of PCOS patients to have

lower sex hormone binding globulin (SHBG) levels (Xita and Tsatsoulis 2006). This overload of unbound androgenic hormones can cause detrimental, de-feminizing physical conditions such as menstrual irregularities, anovulation, hirsutism (excessive hair growth), and alopecia (male pattern balding) (Fauser et al. 2004, Xita and Tsatsoulis 2006).

While medical and clinical research has made modest strides toward understanding the biological complexities of the manifestation and physical expression of PCOS, far less is understood concerning how this condition may impact the psychosocial behaviors and self-perception of women diagnosed with PCOS. The majority of clinical PCOS literature follows the “standard biomedical model” (Lovallo 2005:12). This model of disease treatment focuses on proximate mechanisms and a strictly biological manifestation and treatment of the syndrome (Lovallo 2005).

Just as important, but less understood, especially in developing nations, are the biopsychosocial impacts on the overall health of women with PCOS. This ‘biopsychosocial model’ defies the traditional biomedical ‘standard model’ by avoiding the mind-body dichotomy in health and disease (Lovallo 2005:14-15). While considering the biological mechanisms involved in PCOS, why not consider the significance of psychological, cultural and behavioral mechanisms that may be intimately tied with the development and manifestation of the PCOS phenotype?

#### Middle and Upper Class Women in Urban Indian Culture

Recent articles expressing the urgency to understand PCOS in Asian cultures warrant a cross-cultural investigation of the manifestation and expression of PCOS (Allahbadia



and Merchant 2008, Li et al. 2007). Although cases of PCOS may exist in rural areas of India, the focus of current research is based on urban areas of India, such as Delhi, where impacts of Westernization and globalization have heavily influenced urban Indians undergoing a rapid nutrition transition toward an obesogenic diet and lifestyle.

Along with the influences of Western lifestyle, recent shifts in cultural ideologies of what is expected of young urban women have changed. For women of reproductive age, an emphasis on being a “new Indian woman” requires an important balance of negotiating Western trends and new ideals with traditional customs and behaviors (Lau 2007, Thapan 2001, Reddy 2006). A woman who is able to balance the new and old cultural expectations is thought to have “respectable femininity” (Radhakrishnan 2009).

An example of these negotiations is the integration of new customs of education and careers for women, while balancing traditional roles of being in the center of household duties, bearing and raising children (Mitra and Knottnerus 2008, Radhakrishnan 2009). Another example of negotiating a balance of new and traditional ways is the relationship urban Indians have with eating food. The recent preoccupation with thinness for middle to upper class young adult women, where dieting has become common (Chugh and Puri 2001), has been criticized as “the food-as-poison discourse that originates in the U.S.” (Desai 2010). Balancing this new “discourse” with traditional ideals of food, as a positive influence for the balance of mind and body (Kakar and Kakar 2007), is challenging. Where eating was once central to an Indian’s psychological and physical “existence”, it is now complicated with mixed emotions of desire to eat, but a desire to be thin (Desai 2010).

Balancing new and traditional customs can add pressure to young women of reproductive age in regard to fertility status. Getting married and having children is a priority to Indians (Mehta and Kapadia 2008), and motherhood is a defining factor in a woman's status with the family and in social circles (Widge 2005). Women often deal with the brunt of a couple's infertility, even if it may be due to impotence on the man's part (Widge 2005). The emphasis of a mother and her love for her children as a central focus in families also aid in understanding the cultural pressures and importance of motherhood for all women in India (Chaudhary and Bhargava 2006).

Given the emphasis on motherhood and its equation with womanhood in India, if women with PCOS are infertile, a stigma of not being able to fulfill a woman's role as a mother may have negative consequences for her psychological and physical health. Recent research involving Indian women's mental and reproductive health, sexuality, marriage and motherhood has been helpful in understanding these impacts on the PGWB for Indian women (Vindhya 2007). Knowledge of the expectations of a "new Indian woman" can contribute to understanding the psychosocial issues involved with a PCOS diagnosis in urban India. Since many of the symptoms of PCOS, such as obesity and infertility, go against the "new Indian woman" ideal, understanding how this impacts these women's psychosocial experiences is warranted.

Synthesizing the moderate amount of literature on PCOS and even a smaller amount on middle to upper class urban Indian women in Delhi, more research is needed to fully understand the impacts of a PCOS diagnosis to urban Indian women's physical and psychological health. My thesis, then, focuses on the impacts of hormonal, physiological, psychosocial and cultural influences on gender identity, PGWB, and body image of

women diagnosed with PCOS. By using a bio-cultural anthropological approach that includes a combination of quantitative surveys, qualitative interviews and participant observation, this research also contributes to the dearth of psychosocial literature on PCOS, and more specifically, of urban Indian women living in Delhi and diagnosed with PCOS.

## CHAPTER 2

### LITERATURE REVIEW

#### Developmental Origin Hypotheses of PCOS

In regard to possible PCOS etiology, genetic studies have focused on androgenic factors such as investigating polymorphisms and CAG repeats in androgen receptors (Kim et al. 2008) and identifying possible SHBG and CYP19 genes associated with androgen excess in utero (Xita et al. 2008). Despite advances in identifying possible genetically-based etiologies, other possible mechanisms through which PCOS phenotypes may be “programmed” developmentally, have surfaced in the literature.

During pregnancy, these mechanisms may be either maternally or fetally induced, or both. For example, in a study investigating insulin and androgen levels in pregnant mothers with PCOS, in gestation weeks 10-16 the PCOS group trended toward higher maternal blood serum androgen levels than controls. In that same study during gestation weeks 22-28, the women with PCOS had significant serum androgen and insulin levels compared to controls (Sir-Petermann et al. 2002). It is unclear if the mother’s hormonal and metabolic profile is indicative of the fetus’ condition and who (mother or fetus) may be responsible for the mother’s metabolic and hormone condition. However, the principal debilitating factor of hyperinsulinemia is fetal aromatase inhibition, exhibited in human placental cytotrophoblasts (Nestler 1990), resulting in decreased conversion of androgens to estrogens. In other words, elevated androgens may pass into the female fetal environment, producing androgen levels comparable to those of a developing male (Sir-Petermann et al. 2002, Xita and Tsatsoulis 2006).

Understanding human developmental androgen exposure and its effects on sex-typed behavior is challenging due to limited research on the fetal-placental hormone and nutrient environment. Also, because of time and financial constraints to conducting longitudinal human studies, animal research has been the most efficient way to study such an exposure and its outcomes. Research with rhesus macaques has focused on androgen administration to pregnant rhesus mothers; effects on the female offspring include an increase in male-like behaviors such as rough-and-tumble play and female-to-female mounting (Goy 1978, Goy et al. 1988). Timing the exposure to the critical periods of development in early and late gestation is the key to the level of de-feminizing effects of androgens on brain sexual differentiation (Abbott et al. 2005, Bosinski et al. 1997, Goy 1978, Goy et al. 1988). Abbott et al.'s (1998) rhesus monkey work also revealed effects on daughters of pregnant mothers who were given exogenous androgens throughout the pregnancy. When these prenatally androgenized daughters reached adulthood, they exhibited phenotypes resembling those of the PCOS diagnosis and typical symptoms including menstrual irregularities, polycystic ovaries and insulin resistance (Abbott et al. 2005, Abbott et al. 1998).

#### Gender Identity and Sex-Typed Behavior

Although animal research has been at the forefront of understanding early androgen exposure, studies on humans have also investigated how androgens such as testosterone exert both organizational (early and permanent) and activational (later and transitory) effects on sex-typed behaviors like verbal fluency (Schattmann and Sherwin 2007), rough-and-tumble play and sexual partner preference (Hines 2006, Hines and Kaufman

1994). Other sex-typed outcomes including choices in child play, gender identity, and gender roles (Bosinski et al. 1997, Cohen-Bendahan et al. 2005, Hines 2006, Nelson 2005) have also been elucidated. Examples of extreme androgen exposure cases involve girls diagnosed with congenital adrenal hyperplasia (CAH), characterized by elevated perinatal androgen levels due to alterations in sex steroid metabolism. Social psychology research has revealed that CAH girls can exhibit more masculine child play patterns (Hines 2006, Hines et. al 2004). These results have been identified through studies of direct observation of child play patterns and interviews from parents (Hines et al. 2004). In a retrospective study, adult CAH women self-reported participating in more male-typical play patterns as children; moreover, as adults, these same women reported less exclusively heterosexual orientation, and less satisfaction identifying as a female (Hines et al. 2004) .

Researchers have begun to address whether the elevated androgens of PCOS women are linked with sex-related differences in behavior. In one of the earliest behavioral studies, women with PCOS showed greater interest in careers over family, a lesser concern for style issues and appearance, as well as increased prevalence in being considered a 'tomboy' (Gorzynski and Katz 1977). Recently, researchers have identified connections between the hyperandrogen levels of PCOS women and cognitive functioning (Barnard et al. 2007, Schattmann and Sherwin 2007). However, these behavioral connections are not quite clear. For example, the associations between performance on cognitive tasks and androgen levels for PCOS women challenged expectations of sexually dimorphic performance on certain tasks. Specifically, PCOS

women did not excel at tasks such as mental rotation which may be expected with high androgen levels (Barnard et al. 2007, Schattmann and Sherwin 2007).

Also in these studies, however, PCOS women performed more poorly at tasks such as verbal fluency, verbal memory, manual dexterity (Schattmann and Sherwin 2007), as well as perceptual accuracy and perceptual speed in word recognition (Barnard et al. 2007) compared to controls—all tasks in which females tend to outperform males. Possible interpretations for such outcomes include higher levels of free testosterone (Schattmann and Sherwin 2007), other hormonal mechanisms (Barnard et al. 2007), or other psychosocial sequelae (e.g., feeling “atypical”, altered self-esteem leading to differential participation in activities that shape cognition).

Previous research on elevated in-utero androgenic hormones and associated sex-typed behaviors has proved encouraging for understanding the etiology of PCOS and associated organizational effects on behavior (Homburg 2009:1). To better grasp how hormones and sex-typed behaviors influence life history trajectories, examining tangible psychosocial behaviors of women with PCOS through biocultural research using quantitative and qualitative approaches is warranted. This thesis, then, aims at observing and understanding these psychosocial behaviors from the hormonal and developmental biological perspective in context with cultural beliefs, ideals and behaviors of urban Indian women in Delhi.

### Pilot Research

Based on the above background, the paucity of data on PCOS and the development of sex-typed behavior, my colleagues and I conducted a pilot study published in *Annals of Human Biology* (Manlove et al. 2008). The goal of this study was to examine whether

women diagnosed with PCOS would self-report more masculine sex-typed behavior in childhood, adolescence and adulthood. We hypothesized that 1) women with PCOS would self-report more masculine sex-typed behavior compared to controls, and 2) these masculine effects would appear early in life (rather than or in addition to adulthood).

Using a case-control study design we recruited a total of 61 women, 34 women with a self-identified diagnosis of PCOS and 27 controls that self-identified as not having PCOS. All of the women in the PCOS group were recruited from internet support groups, however only two of the controls were recruited as friends of the PCOS women. Due to lack of responses from friends of PCOS participants, as planned in the recruitment strategy, we then recruited controls using word-of-mouth. All of the women completed the same 104 item questionnaire that included questions about retrospective self-reported feelings and behaviors concerning childhood, adolescence, and adulthood.

We concluded that this pilot study provides preliminary evidence of discrete psychosocial developmental patterns among PCOS women compared to non-PCOS women. PCOS women retrospectively reported significant differences in childhood sex-typed behavior and gender conformity. Our most robust differences between the PCOS and control group were from their earliest childhood experiences using “The Recalled Gender Identity/Gender Role Questionnaire” (Zucker et al. 2008). In this study, women with PCOS recalled less typically feminine childhoods compared with controls. These results suggest that sex-typed behavioral effects associated with an etiology of PCOS may arise early, possibly due to developmental androgen programming.

Adolescent sex-typed behaviors measured by “The Adolescent Activity Questionnaire” (Rekers et al. 1989) did not differ according to PCOS status, although



some individual items did. Of the 30 adolescent measures, five behavioral items (rather than 1.5, if by chance) differed between PCOS women and controls. This also suggests impacts either direct (due to androgens) or indirect (e.g., on outcomes like self-esteem or body image distal to androgenic effects) on sex-typed behavior. Among adults, using the “Bem Androgyny Scale” (Bem 1989), PCOS women did not differ in self-reported masculinity or femininity, but adult women did exhibit trends toward a higher prevalence of bisexuality and changes in sexual orientation as well as significantly lower happiness.

### Gender Research in India

Building from the previous animal and human studies on conditions such as CAH, and the results of our pilot study, I wanted to extend the investigation of a developmental gender identity and gender role trajectory for women with PCOS cross-culturally in Delhi, India. Understanding the development of gender identity and femininity in India is challenging due to a lack of literature, especially on urban India. We can make inferences about the development of gender and its ideological process based on generalizations of a patriarchal culture, where there is a preference for sons, and women are dominated by men (Bonvillain 1998, Kakar and Kakar 2007). This is helpful given the evidence of these deeply rooted cultural practices in urban India today (Bonvillain 1998, Kakar and Kakar 2007, Mitra and Knottnerus 2008, Mehta and Kapadia 2008, Widge 2005). However, further research on children and young adults through a life history approach in urban India would prove helpful to identify shifts in gender ideologies and patterns in the development of gender.

## Body Image

Examining body image in this thesis also stemmed from our pilot study. Although we did not investigate body image specifically, we concluded if there is less happiness in adult PCOS women's lives, there may be a link between PCOS physical symptom expression and severity with self-perceived body image. Body dissatisfactions may in turn contribute heavily to the females' life history perceptions of their quality of life and personal relationships. From this, we considered the possible trajectories of women with PCOS developing into adults with paralleling developmental appearance body image dissatisfaction due to PCOS symptoms (weight, acne, extra body hair). This combination of a PCOS phenotype and increased overall appearance dissatisfaction could have a significant role in the overall biopsychosocial development and behavioral trajectory of women with PCOS. As Thomas Pruzinsky and Thomas Cash explain, "the vital role of body image means that it has the potential to dramatically influence our quality of life. From early childhood on, body image effects our emotions, thoughts, and behaviors in everyday life... body image influences our relationships-those that are public as well as the most intimate" (Pruzinsky and Cash 2002:7).

The power that body image has on a person's quality of life can be broad in scope. Over years of scholarship since 1935, agreement on a true definition for "body image" has been challenging (Cash and Pruzinsky 2002). A variety of research avenues falling under the umbrella of "body image" characterize it as a "multidimensional phenomenon" (Cash and Pruzinsky 2002:7). Given this, body image can be vaguely defined as, "a person's perceptions, feelings and thoughts about his or her body, and is usually conceptualized as incorporating body size estimation, evaluation of body attractiveness

and emotions associated with body shape and size” (Grogan 2006). Multiple facets and terminology are used to investigate topics in body image such as attractiveness, weight (vigilance or deviance), fear of fatness, appearance, muscularity and fitness, body size, health, body dysmorphia, and disorders like, anorexia and bulimia (Cash and Pruzinsky 2002). Within this wide scope of research avenues, this thesis primarily focuses on self-perceived appearance evaluations, overweight preoccupation, and body area satisfaction and dissatisfaction.

### PCOS and Body Image

One of the first few comprehensive psychosocial studies of women with PCOS is Judy McCook’s published Ph.D. dissertation (2002). This study investigated the psychosocial health and well-being of 128 women with PCOS from two reproductive endocrinology clinics in the Southeastern U.S. (Johnson City, Tennessee and Asheville, North Carolina). The participants in this study were between the ages of 18-48, and their mean age was  $30.4 \pm .48$  years. The majority of these participants were categorized as white (97%), married (78%), and employed full time (77%) (McCook 2002:52-53). McCook sought to test how hyperandrogenemia, obesity, and fertility status (independent variables) may influence emotional health, relationship satisfaction, and personal image (dependant variables) of women with PCOS (2002:2).

In McCook’s study, psychosocial health and well-being was assessed using a survey compiled from eight standardized questionnaires (3 for Emotional Health [Brief Symptom Inventory (BSI), Derogatis Affects Balance Scale (DABS), PCOS Health Related Quality of Life Questionnaire PCOSQ]), 3 for Relationship Satisfaction (Brief Index of Sexual Functioning (BISF), Index of Sexual Functioning (ISS), Dyadic

Adjustment Scale (DAS), and 2 for Personal Image (Bem Sex Role Inventory-Short Form (BEM-SF), Body Dissatisfaction Scale from Eating Disorder Inventory (BDS from EAT). Results of this survey were compared statistically with hyperandrogen hormone levels, obesity severity, and fertility status. McCook found that although emotional distress was significant, there was a poor indication that hyperandrogen hormone levels predicted or mediated the emotional distress symptoms, relationship satisfaction, and personal image (2002).

In regard to obesity, only the weight subscale of the PCOSQ was significantly and negatively correlated with BMI (higher BMI was associated with lower perceived quality of life in weight subscale). None of the other subscales in the PCOSQ (emotion, body hair, infertility, and menstrual concerns) were statistically significantly correlated with obesity (McCook 2002). For relationship satisfaction and obesity, there was no significant correlation in any of the three survey tools used. Within the personal image domain, there was no significant difference in self-perceptions of masculinity and femininity between BMI groups. However, importantly, as it relates to this thesis, obesity and personal image were significantly correlated with more body dissatisfaction in obese PCOS participants versus non-obese participants. The higher degree of obesity was significantly correlated with more body dissatisfaction,

McCook combined her body image and gender identity investigations under the umbrella domain of “personal image”. In her study, body dissatisfaction was the only facet of body image (body part and overall body appearance) that she investigated; regardless, this study serves as one of the few to intentionally investigate body image perceptions of women with PCOS. Perhaps a more detailed investigation of separately

investigating gender identity and body image dissatisfactions may prove effective in better understanding the relationships between degrees of obesity and body image evaluations.

Another significant study on PCOS and body image prior to our pilot study was conducted by Melissa Himelein and Samuel Thatcher (2006). For this study, there were three groups: 40 patients with PCOS (with and without infertility), 40 patients with infertility, but not PCOS (recruited from two endocrinology offices in the Southeastern U.S.), and 60 women in the convenience control sample (recruited from outside the clinics) (Himelein and Thatcher 2006). The majority of the participants in the study was classified as white (98%) and had a mean age of 32.1 years. The majority of the women in the PCOS (88%) and infertility (95%) groups were more likely to be married than the control group (65%) ( $\chi^2(4, N = 140) = 15.85, p < .01$ ) (Himelein and Thatcher 2006: 617).

Himelein and Thatcher's study builds on the work of McCook (2002) and Weiner et al. (2004) (Thatcher was on McCook's dissertation committee). Himelein and Thatcher specifically investigated body image and depression while controlling for BMI. Depression was measured with the Beck Depression Inventory (Short Form) questionnaire, and body image was assessed using two subscales of the Multidimensional Body-Self Relations Questionnaire- Appearance Scales (MBSRQ-AS), Appearance Evaluation, and Appearance Orientation. Another measure for body image was constructed for their study which they called Body Features Satisfaction.

From statistical analysis, the PCOS group had a significantly higher BMI ( $M = 33.8, SD = 8.5, 65\%$  obese) than the infertility group ( $M = 23.4, SD = 3.6, 5\%$  obese), and convenience control ( $M = 25.8, SD = 5.1, 15\%$  obese) (Himelein and Thatcher

2006:618). Women with PCOS reported higher body dissatisfaction and more depressive symptoms than the other two groups. In the depression analysis, once weight was controlled for, depressive symptoms were not significant between the three groups suggesting that higher BMI may be negatively correlated with mood (Himelein and Thatcher 2006:622). However, for body image, after BMI was controlled for, the significant differences of the PCOS group having higher rates of body dissatisfaction than the controls still remained, albeit lessened from before.

Based on their findings, Himelein and Thatcher suggest that BMI may not be the sole indicator for greater body dissatisfaction for women with PCOS than control groups. Furthermore, women with PCOS reported greater dissatisfaction with their overall appearance including complexion, facial hair, and general hair features that are not directly related to BMI, but may be multiple facets within a PCOS diagnosis (Himelein and Thatcher 2006: 622). Lastly, a significant positive correlation between depressive symptoms and body dissatisfaction suggests to Himelein and Thatcher that either mood may impact perception of body image or negative body image perception may impact moods (2006). The results of this study were pivotal in emphasizing research on both mood and body image in my thesis. Given the probability that gender identity, PGWB including moods, and body image are intimately tied in the development of psychosocial behaviors for women with PCOS, more research to better understand these interrelated facets is warranted.

### Body Image in India

Given the short history of body image research with women who have PCOS, how does this fit in with modern body image research cross-culturally in India? The focus on

influences of media and Western notions of beauty on Indian body image has proven helpful in understanding multiple facets contributing to the fast evolving cultural ideals of beauty and body image in urban modern India (Batra 2007, Kapadia 2009, Shroff and Thompson 2004, Reddy 2006). Collectively, these studies indicate increasing prevalence of dissatisfactions with body image relating to a more desired thin ideal, thus a higher prevalence of eating disorder behaviors, and more body image dissatisfaction disturbances.

One study specifically investigated eating and weight concerns among 130 affluent adolescent females (16-18 years) in Delhi, India (Chugh and Puri, 2001). A survey designed to compare perceptions of body image and eating behaviors was given to these young women who were placed in one of three groups based on their BMI: underweight, normal weight, and “obese” (overweight to obese). The results indicated that although there were concerns about weight gain in all three groups, body image dissatisfaction increased with higher BMI scores. The “obese” group had dieted more, was unable to maintain their weight less often than the normal and underweight groups, and was at a greater risk of developing anorexic behavior (Chugh and Puri 2001). Chugh and Puri discuss a need for more research on body image and eating among teenagers in India, since the time of adolescence is when pathological behaviors begin to take shape (2001). More research like this previous study will aid in understanding behavioral, pathological, and developmental effects of media, cultural, and Western influences on body image concerns and dieting.

Cross-cultural comparisons investigating body image concerns including body dissatisfaction, fear of fatness, dieting and media internalization may help in

understanding the impact of these notions derived from Western ideals and lifestyles. For example, one study investigated body image concerns of 65 Canadian and 47 Indian women between the ages of 18-24, where they completed a survey of two weight related psychological subscales: (DT) Drive for Thinness and (BD) Body Dissatisfaction of the Eating Disorder Inventory (EDI). They also rated major areas of the body as overweight (i.e., abdomen, hips, and thighs) (Gupta et al. 2001).

Correcting effects of BMI differences between the two groups in statistical analysis, results revealed similar responses to the DT, BD, and body area dissatisfaction (abdomen, hips, thighs, and legs). However, one major difference was that the Indian group had a less distorted perception of body weight than the Canadian population, and more concern with upper torso (face, neck, shoulders, and chest) than the Canadian group (Gupta et al. 2001). The authors suggest that these findings indicate similar overall body image dissatisfactions in both study populations, however sociocultural differences may underlie specific disturbances (Gupta et al. 2001).

Although there is a small amount of literature regarding modern urban Indian women and body image, what has been published illustrates the importance of incorporating body image research in this thesis. Rapidly evolving body image ideals for young women of reproductive age in urban India, due to Westernization and modernization, contribute to a developmental life history trajectory for body image ideals.

#### Psychological Health and General Well-being (PGWB)

The investigation of PGWB included in this thesis, among urban female “Delhi-ites” with PCOS and controls, stemmed from our pilot study. From the results of the adult



portion of the pilot study, our PCOS group recalled less happiness (41% happy) in adulthood than controls (70.4% happy) (Manlove et al 2008). The results of this one question, although very broad, suggested a possible link with adult happiness and PGWB including mood dysfunction for women with PCOS. This is consistent with a growing body of literature linking mood dysfunction in women with PCOS such as depression, anxiety and disturbed stress responses (Adali et al. 2008, Bhattacharya and Jha 2010, Benson et al. 2009a, Benson et al. 2009b, Deeks et al. 2010, Hahn et al. 2005, Himelein and Thatcher 2006, Hollinrake et al. 2007, Jedel et al. 2010, Özenli et al. 2008, Schmid 2004, Weiner et al. 2004).

Also recently, a small, but steadily growing amount of literature has addressed the importance of observing and treating the psychosocial experience of women who have PCOS (Castillo 2008, Eggers and Kirchengast 2001, Esler et al. 2007, Moran et al. 2010, Rassi et al. 2010, Rofey et al. 2010, Sundararaman et al. 2008, Tan et al. 2010, Washington 2005, and Weiss 2009). Negative psychosocial experiences may decrease if PCOS symptoms are treated and ameliorated; however, since there is no cure, women diagnosed with PCOS may face a lifelong battle with psychosocial disturbances (Castillo 2008, Washington 2005, and Weiss 2009). Also, it is plausible that adult outcomes like depression have developmental roots in childhood or puberty and adolescence that influence their present form in adulthood (Weiner 2004). Given the possibilities that a developmental and chronic role in PGWB dysfunction can be persistent throughout a woman's life, the investigation of PGWB for women with PCOS in Delhi was appropriate for this thesis.

From this recent surge of research on psychosocial correlates of PCOS, results have shown that women with PCOS report significantly higher rates of psychosocial disturbances than controls. What is less clear is how or why this occurs for women with PCOS. We know that with a PCOS diagnosis, other health problems such as obesity, infertility, and hyperandrogenism can be present; however, researchers are unable to determine if there are any direct links between these health problems and psychosocial problems like depression. For example, obesity and depression have been reportedly linked in PCOS (Himelein and Thatcher 2006, Adali et al.2008). However, some researchers have been unable to confirm that depression in PCOS patients is related to obesity (Benson et al. 2008, Hahn et al. 2005, McCook 2002).

Variable results of activational influences of imbalanced androgen levels for women are another example of contention in the literature. High and low androgen levels in women have been thought to be directly related to depression (Rohr 2002). In fact, one earlier study found a curvilinear relationship with free testosterone levels and negative mood states with PCOS, where androgen levels a little above normal were associated with the highest rates of depression and negative mood states (Weiner et al. 2004). However, others have failed to find a direct relationship between high androgen levels and depression (Adali et al. 2008, Hahn et al. 2005, McCook 2002).

Infertility has been reported as a source of psychological distress like depressive symptoms in PCOS patients (Schmid 2004, Sundararaman et al. 2008). However, other researchers have been unable to link infertility with psychological distress symptoms (Hahn et al. 2005, Himelein and Thatcher 2006, McCook 2002, and Tan et al. 2008). Differences in the cultural background of study populations may explain discrepant

results concerning infertility and depression. One of the studies reporting a link with depression and fertility took place in Vienna, Austria. Researchers reported that Islamic migrants were more prone to report depressive symptoms linked to fertility than Austrian born women recruited from the same clinic (Schmid et al. 2004). Another study of South Indian women in Chennai, India reported infertility as a major source of psychosocial distress (Sundararaman et al. 2008). The other studies that reported no significant link between infertility and psychosocial distress in PCOS may involve populations with fewer cultural pressures related fertility status, such as Germany (Hahn et al. 2005, Tan et al. 2008) or the U.S. (Himelein and Thatcher 2006, McCook 2002).

#### PCOS and PGWB Research in India

Despite the growing knowledge concerning women with PCOS and PGWB dysfunctions, very little has been published on modern urban Indian women's PGWB, and especially those with PCOS. Only two published studies from India have surfaced regarding PCOS and psychosocial behaviors. One, as previously mentioned, focuses on the psychological and psychosocial aspects of South Indian women in Chennai, India diagnosed with PCOS. In this study, clinically diagnosed PCOS patients were given Goldberg's GHQ 28 (General Health Questionnaire). Although the results of this study reported more psychological distress for PCOS women who had more severe manifestation of PCOS symptoms and smaller family size, this study cannot generalize across all of Indian urban populations.

The other recent Indian study from Kolkata, India investigated the prevalence and risk of depressive symptoms among Indian women with PCOS using a self-administered questionnaire called, The Primary Care Evaluation of Mental Disorders Patient Health

Questionnaire 9 (PHQ-9) (Bhattacharya and Jha 2010). This investigation resulted in a statistically significant higher risk for depression in women with PCOS than controls without PCOS, even after controlling for BMI ( $P < .001$ ) (Bhattacharya and Jha 2010). The authors then compared the women with PCOS who are diagnosed with depression versus women with PCOS who are not diagnosed with depression. They concluded that there was no clear biological (BMI, waist circumference, or testosterone levels) or sociodemographic (Age, marital status, education, or occupation) explanation for why some of the women with PCOS had clinical depression diagnoses and others did not (Bhattacharya and Jha 2010).

The recent increase of these types of studies is helpful in understanding how PCOS may affect Indian populations physically and psychosocially, while also underscoring the importance of understanding challenges in women's health due to rapidly changing diets in lifestyles in India (Allahbadia and Merchant 2008). A better understanding of psychosocial correlates with PCOS such as gender identity, appearance body image and PGWB of women in Delhi diagnosed with PCOS will contribute to the dearth of literature for Indian women and on cross-cultural psychosocial aspects of PCOS.

Overall, the current literature on PCOS and PGWB collectively suggests that women with PCOS are at a significant risk of contending with psychosocial distress such as anxiety, depression and stress. However, the etiology for these disturbances remains unclear. Because of the multiple facets involved with the syndrome such as obesity, infertility, insulin resistance, and hyperandrogenemia, it has been difficult to find direct links with psychosocial disturbances. Perhaps elucidation of these phenomena will come

as future research begins to incorporate combined quantitative and qualitative methods of collecting data.

## CHAPTER 3

### RESEARCH DESIGN, OBJECTIVES, AND HYPOTHESES

#### Research Design

Results and limitations of our pilot study had implications for the study design of this thesis. From the analyses of the pilot study, a wider set of research interests than we originally investigated appeared worthwhile for future research and thus were included in the present research design. The following are these research interests: potential differences between PCOS and control women in career goals, leisure activities, relationships with significant others, maternal nurturing and gender roles as well as other diagnoses, like depression.

Results of the pilot study also indicated a developmental psychosocial trajectory that may be specific to women with PCOS. However, experimental and longitudinal human studies investigating possible effects of perinatal androgen excess are logistically and ethically challenging. Investigating cultural, social and behavioral facets appears as the next best choice. Hence, a case-control research design with a biocultural approach using both qualitative (interviews and participant observation) and quantitative (surveys) methods was employed to better understand a biopsychosocial developmental trajectory of PCOS.

#### Objectives

The objectives of the present thesis are 1) to determine whether patterns of gender identity, appearance body image and PGWB differ between urban Indian women with PCOS and control women; 2) to determine whether these differences appear earlier in

development (childhood, adolescence) or emerge at adulthood; and 3) to observe similarities and differences that may exist cross-culturally regarding gender identity, appearance body image and PGWB for women with and without PCOS.

## Hypotheses

H1a) Urban Indian women with PCOS would retrospectively recall feeling less feminine and participating in less feminine activities (in their childhood and/or adolescence) than controls.

H1b) Urban Indian women with PCOS would report currently feeling and looking less feminine and participating in less feminine activities than controls.

Differences between women with PCOS and the control's reports in our U.S. pilot study, in regard to childhood and adolescent activities, and feelings of femininity were observed. There was reason to believe that these differences may be observed in other populations cross-culturally.

H2) Urban Indian women with PCOS would report greater current adult dissatisfaction with their body image appearance than controls.

At least one other study discovered that women with PCOS reported lower body image than controls (Himelein and Thatcher 2006). It is plausible that the developmental manifestation of PCOS symptoms and expression of a PCOS phenotype may lead to greater body dissatisfaction for women with PCOS than controls. However, based on cultural ideals of beauty in urban India, there was a chance that the control group could report body image dissatisfaction as well. Nevertheless, it was hypothesized that PCOS women would express more severe dissatisfaction with their body image than controls.

H3) Urban Indian woman with PCOS would currently report a more negative PGWB or at least more severe depressive symptoms than controls.

Recent research has shaped our understanding of the association of PGWB, namely, consistently higher rates of depressive symptoms in women with PCOS (Benson et al. 2009; Hahn et al. 2006, Himelein and Thatcher 2006, Sundararaman et al. 2008, Tan et al. 2008, Wiener et al. 2004). However, talking about depression, or even admitting depressive symptoms, may not be a cultural norm for urban Indian women, thus both groups may not express any depressive symptoms. This finding could be important to understanding the psychosocial process of cultural pressures on topics of female reproductive health, family and beauty.

H4) Urban Indian women with PCOS would retrospectively report (in childhood and/or adolescence), participating in less social activities, and greater dissatisfaction with their appearance than controls.

This was a trend observed in the results of the adolescent section of our pilot study questionnaire. From this, it was advantageous to investigate if urban Indian women with PCOS would report being less social and greater dissatisfaction with their appearance in their adolescence compared to controls.

H5) Urban Indian women with PCOS would less likely be married, have children, or participate in family-based activities, but would be more likely to have a career and participate in more solitary activities than control women.

This hypothesis stemmed from a combination of sources. Urban Indian women are more likely to spend more time in careers with higher professional positions, and volunteer at NGOs, if they do not have children (Mitra and Knottnerus 2008,



Radhakrishnan 2009). Also based on behavioral studies of women with PCOS, they may be less interested in family and more interested in careers (Gorzynski and Katz 1977).

## CHAPTER 4

### METHODS

#### Participants

The methods for this study were approved by the Social/Behavioral Institutional Review Board at University of Nevada, Las Vegas (See Appendix 4). Participants were recruited from multiple field work sites in Delhi: the Department of Obstetrics and Gynaecology at Sant Parmanand Hospital in Civil Lines (North Delhi), at participants' homes, and at University of Delhi, North Campus. A total of 65 research subjects were recruited via word of mouth from either the participants themselves or from friends, family or their doctor. Of the 65 participants, 33 were in the experimental group diagnosed with PCOS. Of the 33 women in this group, 6 self-reported that a doctor has diagnosed them with PCOS (recruited at their homes or through friends) and 27 had a doctor-reported confirmation of a PCOS diagnosis (recruited at Sant Parmanand Hospital). Of the other 32 participants in the study that served as the control group, 12 had a doctor-reported confirmation (recruited from Sant Parmanand Hospital), and 20 self-reported that they were not diagnosed with PCOS (recruited from participant's homes or by friends).

All the participants in this study were between ages 18-35, not pregnant, not beginning menopause, and not taking exogenous steroid hormones (except oral contraceptives). The participants who met these criteria and agreed to be a part of the study were then given the consent form to read and sign. The consent form gave participants an option to fill out the survey only or to also participate in the half hour, semi-structured interview and/or agree to me conducting in-depth participant observation

of their daily lives. The majority of participants filled out the questionnaire on site at the time it was given to them; however, due to the multiple field working conditions (hospital, at people's homes or given to by friends or family), some surveys were filled out on the participants' own time and returned. Height, weight and waist circumference were taken at the time the survey was given to the participant (See Quantitative Methods). Participants were not paid or given any type of gift in exchange for participating in this study.

In accordance with the UNLV IRB requirements, the participant signed the consent waiver; however, the participants were instructed to not place any name or signature, or any other identifying information, on their survey. To ensure that their identity was not linked to the survey, a non-identifying number was placed on the survey for academic purposes and kept by the researcher.

### Quantitative Methods

The survey used in this study is a compilation of standardized published questionnaires. It was designed to investigate retrospective self-reports on childhood and current adult gender identity and roles, current self-reports on PGWB and appearance body image. The questionnaire also covers sociodemographic information such as occupation, marital status, education, and religious affiliation. Anthropometric measurements of body weight were taken in kilograms using a Tanita Innerscan Body Composition Monitor, model BC-534. Participant height was measured in metric centimeters using a GPM Swiss Made Anthropometer. Thereafter, a calculation of each participant's body mass index (BMI) was determined using the metric formula of

kg/m<sup>2</sup> and the measurements of height and weight. Measurements of waist circumference were completed in inches to the nearest centimeter using a non-stretch tailor's tape measure. Waist circumference was taken at the level of the umbilicus landmark (similar to Conn et al. 2000, Ehrmann et al. 2006, Rush et al. 2007), over one layer of clothing (due to cultural modesty traditions, also see Raman et al. 2010).

The same survey was given to both the PCOS and control group with one exception: the PCOS group was additionally given a Health Related Quality of Life Questionnaire for Women with Polycystic Ovary Syndrome (PCOSQ) (Cronin et al. 1998). This 26 item questionnaire measuring health related quality of life for women with PCOS includes five subscales: Emotions, Body Hair, Weight, Infertility, and Menstrual Problems. Both surveys (PCOS and control) included the Recalled Gender Identity/Role Questionnaire (Zucker et al. 2006), a 23 item questionnaire which measures recall of childhood gender-typed behaviors, gender role and gender identity and relative closeness to mother and father. Both surveys contained the Multidimensional Body-Self Relations Questionnaire-Appearance Scales, (MBSRQ-AS) (Cash 2000). This 34 item short form of the original MBSRQ focuses on assessment of the participant's attitude about their appearance. This includes five subscales: Appearance Evaluation, Appearance Orientation, Overweight Preoccupation, Self Classified Weight, and Body Area Satisfaction Scale. Also included in the survey for both the experimental and control group is the 22 item Psychological General Well-Being Index (PGWB) (Dupuy 1984), which evaluates self-perceived psychological health and well-being using six subscales, Anxiety, Depressed Mood, Positive Well-being, Self-control, General Health and Vitality. These four standardized

questionnaires have demonstrated reliability and validity in the samples in which they have previously been used.

Lastly, due to lack of appropriate measures for the purposes of this study, I constructed six questions intended to measure current gender identity and gender roles. Although standardized measures for adult gender identity do exist in the literature, they often focus on severe gender identity disorders and may have strayed from the focus of the current study's objective of determining a broader sense of self-perceived masculinity and femininity. The 6 constructed questions ask the participants to answer on a scale of 1-7 (1 being very masculine and 7 being very feminine), as an adult, how they would describe themselves and their friends, and how they would classify their own free time activities (See Appendix A).

## Qualitative Methods

### Semi-Structured Interviews

The semi-structured interviews used in this study focused on a developmental approach to gender identity, PGWB and appearance body image, particularly focusing on recalled adolescent feelings and behaviors (See Appendices B and C for full interview schedules). The participant was asked to choose a pseudonym that she would like me to use in place of her real name when discussing her in this thesis. The interview questions asked the participant to retrospectively recall and discuss psychosocial experiences growing up in India among friends, family, and peers and specifically between puberty and adolescence. The PCOS and control interviews differed in the Current Life/Adult Section, where the PCOS interview focuses on the participant's diagnosis of PCOS (See

Appendix B). However, the Adolescent Recall section was the same in both PCOS and Control Interviews (See Appendix C). Of the three PCOS interviews, only one had been recorded for further analysis. Due to scheduling conflicts, the other two PCOS interviews were conducted via email and through phone conversations. Both of the control interviews were recorded for further analysis.

### Participant Observation

Living in North Delhi for approximately four months (February 10, 2010 through June 8, 2010) and traveling to other cities in India, such as Jaipur, Dharamsala-Mcleod Ganj, Goa, Kolkata, and Mumbai, contribute to the broad scope of my ethnographic observations and field notes about India and Indian culture. However, the ethnographic observation component of my research methods involved participant observation of daily interactions and discussions with a few select women who agreed to participate in my research. A total of four women, two from the PCOS group and two from the control group, agreed to participate in all three portions of the study (survey, interview, and participant observation). Because of their full involvement in the study, the data I collected from their surveys, interviews, and participant observations are used to illustrate four key case studies.

The participant observation conducted with these four key participants consisted of my spending time with these women at their houses, with their families, out shopping in the markets, at the malls, and traveling. Field notes were taken about discussions we had, and their interactions with others and their behaviors during their daily life. These four key case studies cannot be used to make generalizations about either population, women with PCOS or controls in India; however, my experiences with them allowed me to get a

deeper sense of cultural customs in middle to upper class urban India in regard to gender role expectations, family responsibilities, and ideologies on beauty and body image. Taking part in everyday activities like eating, household chores, shopping and visiting friends, allowed me to observe outside these women's lives, and also observe men, children and other family members and friends. From this, I pull from situations observed in participant observation to better understand and illustrate the cultural context of my overall data in this study.

## CHAPTER 5

### RESULTS

#### Quantitative Results

Quantitative statistical analysis of the survey (N=65) was completed on PASW Statistics 18.0 (a.k.a. SPSS). Participants were categorized either in the experimental PCOS group (n=33) or control group (n=32), based on the recruitment criteria described in the methods section. The purpose of administering this survey was to elicit self-reported responses from the participants regarding the topics of childhood and adult gender identity, current PGWB, and body image.

Comparisons of nominal and ordinal data were completed using Chi-Square ( $\chi^2$ ) tests. After tests for normality on all data were completed, comparisons of continuous data between groups were completed using t-tests or Mann-Whitney U tests. Investigation of relationships between those survey subscales and demographic variables that significantly differed between groups were tested with correlational analysis and a modified multiple linear regression through the general linear model function on PASW. Upon determination of significant covariates for each subscale, group differences in survey responses were conducted using analysis of covariance (ANCOVA) to adjust for those factors that were associated with each subscale. All tests were two-tailed with alpha set at .05.

As summarized in Table 1, general demographic information was obtained. Age, education, and religion did not differ significantly between groups. Occupation, residence, and marital status did statistically differ ( $p \leq .05$ ). Notably, 64% of the PCOS group was housewives or unemployed, whereas 69% of the control group was students or



working. The majority (66%) of the control group resided in North Delhi, whereas the participants of the PCOS group were more dispersed geographically. The largest percentage (42%) of PCOS group participants fell into the Other category that comprised residents from East, West, Central, and otherwise unspecified regions of Delhi. Lastly, 91% of the PCOS group was married and the control group was split, 50% married and 50% unmarried.

For purposes of investigating menstruation patterns and history (typical of PCOS research), age at menarche and menstruation frequency was also taken. Age at menarche did not differ significantly between groups. However, as expected, fewer women in the PCOS group reported regular menstruation frequency (about every 30 days) than the control group.

Anthropometric measurements of waist circumference (WC) and body mass index (BMI; kg/m<sup>2</sup>) calculations are also summarized in Table 1. BMI and WC statistically differed (<0.05) between the PCOS and control group. The mean BMI score for the PCOS group was 25.5, whereas the control group's mean BMI score was 22.2. For waist circumference (WC), the mean was 33.7 inches for the PCOS group, whereas the control group's mean was 30.6 inches.

**Table 1** Demographic Characteristics

Variable	PCOS		Control		Statistic t, U, $\chi^2$ (p-value)
	n or mean	% or SD	n or mean	% or SD	
Current age	28.8	3.0	27.0	4.2	n.s.
Age at menarche	13.3	1.4	13.5	1.7	n.s.
Menstruation Frequency					$\chi^2=7.27$ (.01)
Regular	19.0	58%	28.0	88%	
Irregular/Absent	14.0	42%	4.0	13%	
BMI (kg/m <sup>2</sup> )	25.5	4.2	22.2	3.8	U=279.50 (.001)
$\geq 25$ (Int.l)	15.0	46%	7.0	22%	n.s.
$\geq 23$ (Asian)	25.0	74%	13.0	41%	$\chi^2=8.26$ (.006)
WC (in.)	33.7	4.1	30.6	3.2	U=277.50 (.001)
$\geq 34.6$ (Int.l)	11.0	33%	3.0	9%	$\chi^2=5.52$ (.033)
$\geq 31.5$ (Asian)	23.0	70%	11.0	34%	$\chi^2=8.13$ (.006)
Education					n.s.
Bachelor/ Vocational/Less	16.0	49%	21.0	66%	
Graduate/ Professional	17.0	52%	11.0	34%	
Occupation					$\chi^2=6.83$ (.013)
Housewife/ Unemployed	21.0	64%	10.0	31%	
Student/Working	12.0	36%	22.0	69%	
Residence					$\chi^2=7.66$ (.022)
North Delhi	11.0	33%	21.0	66%	
South Delhi	8.0	24%	6.0	19%	
Other	14.0	42%	14.0	22%	
Marital Status					$\chi^2=13.14$ (.000)
Married	30.0	91%	16.0	50%	
Unmarried	3.0	9%	16.0	50%	
Religion					n.s
Hindu	20.0	61%	18.0	59%	
Other	2.0	6%	6.0	19%	
None	11.0	33%	8.0	25%	

The World Health Organization's (WHO) International Classification for BMI (WHO 2004) (normal BMI= 18.50, overweight  $\geq 25$ -29.9, and obese  $\geq 30$ ) and the National Institute of Health (NIH) cut-off values of abdominal obesity (WC of  $\geq 34.6$  inches (88 cm)) were used to investigate BMI within and between groups. In addition, these data were further analyzed using culturally appropriate standard revised cut-off values for Asian (WHO expert consultation 2004) and particularly Indian populations (Snehalatha et al. 2003). Although the standard International Classification for BMI and the Asian cut-offs classify BMI scores into the same categories, (normal weight = 18.50-24.99, overweight= 25-29.9, and obese  $\geq 30$ ), the Asian cut-off point emphasizes that Indians are at moderate to high risk for metabolic health problems starting at a BMI of 23 rather than a BMI of 25 when using the International Classification (Snehalatha et al. 2003, WHO expert consultation 2004). Similarly, risk for metabolic disease is associated at 31.5 inches waist for Indians, as compared to the Western cut-off for abdominal obesity at 34.6 inches. Both international and revised Asian cut-off values for these measurements are delineated in Table 1, under BMI and WC headings, accordingly.

Summarized in Table 2 are the results of The Recalled Childhood Gender Identity/Gender Role Questionnaire. In accordance with the original publication (Zucker et al. 2006), the twenty-three questions of this portion of the survey were divided into 4 subscales, Overall Composite, Sex-difference Composite, Convention, and Parent-child. No statistically significant difference was observed between the PCOS and control group in any of these subscales.

**Table 2** Childhood Questionnaire

Subscale	PCOS		Control	
	mean	SD	mean	SD
Overall	3.6	0.4	3.5	0.4
Sex diff comp	3.7	0.5	3.6	0.4
Convention	3.7	0.4	3.5	0.5
Parent child	3.1	0.7	3.0	0.7

Table 3 summarizes results from the Psychological General Well-being Index (PGWB). In accordance with the original publication, the 22 items comprising the PGWB were divided into six subscales: Anxiety, Depressed mood, Positive Well-being, Self-control, General Health, and Vitality; also, an overall PGWB index score was derived. No statistically significant differences were found in mean scores between the PCOS and Control groups in any of the six subscales or on the Overall Index Score.

Results of the Multidimensional Body-Self Relations Questionnaire-Appearance Scales (MBSRQ-AS) are summarized in Table 4. In accordance with the original publication, this questionnaire was scored using the defined subscales: Appearance Evaluation, Appearance Orientation, Body Area Satisfaction, Overweight Preoccupation, and Self-Classified Weight. There were no statistically significant differences in mean group scores for Appearance Evaluation and Body Area Satisfaction. Notably, a trend in significance was observed in Appearance Orientation ( $p \leq .10$ ) where women in the PCOS group tended to invest more time and effort in their appearance more than controls. The Overweight Preoccupation ( $p \leq .05$ ) and Weight Class ( $p \leq .01$ ) subscales were statistically different between the two groups.

**Table 3** The Psychological General Well-being Index (PGWB)

Subscale	PCOS		Control	
	mean	SD	mean	SD
Overall	61.2	23.6	67.8	13.9
Anxiety	13.5	5.7	13.9	4.4
Depressed mood	9.8	3.6	10.5	2.7
Positive well-being	10.4	4.0	10.8	2.9
Self-control	8.6	4.0	10.1	2.6
General health	8.7	3.2	9.9	2.6
Vitality	11.4	3.8	12.6	3.0

The Overweight Preoccupation subscale pertains to how much the participant agrees with the following statements: “I constantly worry about becoming fat”, “I am very conscious of even small changes in my weight”, and “I am on a weight-loss diet,” on a Likert scale (1: definitely disagree through 5: definitely agree). The last question of this subscale asks the participant to report on a scale of 1-5 (1 signifying their answer is “never” through 5 signifying “very often”), in response to the statement, “I have tried to lose weight by fasting or going on crash diets.” The PCOS group reported higher overweight preoccupation in comparison to the control group.

**Table 4** Multidimensional Body-Self Relations Questionnaire-Appearance Scales (MBSRQ-AS)

Subscale	PCOS		Control		Between-Group Difference	
	mean	SD	mean	SD	t-statistic	p-value
Appeval	3.3	0.8	3.6	0.7	-1.2	n.s
Appor	3.8	0.4	3.5	0.5	1.9	.06
BASS	3.0	0.6	3.1	0.5	-1.1	n.s
Owpreoc	3.1	0.7	2.7	0.9	2.5	≤ .05
Wtclass	3.7	0.8	3.1	0.8	3.1	≤.01

Abbreviation of mean MBRSQ-AS subscales:

Appeval= Appearance Evaluation

Appor= Appearance Orientation

BASS= Body Areas Satisfaction Scale

Owpreoc= Overweight Preoccupation

Wtclass= Weight Class

For the Weight Class subscale, there are two unfinished statements regarding how the participant would classify their weight: “I think I am...” and “From looking at me, most other people would think I am...” These two unfinished statements require the participant to finish it with descriptions about themselves on a scale of 1-5, (1 signifying “very underweight” through 5, “very overweight”). The PCOS group reported higher mean scores for this subscale than did the control group.

Results of Overweight Preoccupation and Weight Class are statistically the most robust findings of the entire survey, in addition to group differences in BMI and WC. To investigate whether relationships exist between BMI and WC measurements and how participants answered these two subscales, correlation analysis was performed on each group (PCOS and Control) separately. As summarized in Table 5, there were statistically

significant relationships, with moderate effect size, between BMI and Overweight Preoccupation for the PCOS ( $p \leq .05$ ) and control ( $p \leq .05$ ) groups. An even stronger correlation with WC and overweight preoccupation was observed with the PCOS group ( $p \leq .01$ ), whereas there was no such relationship in the control group. In regard to Weight Class and BMI, strong relationships were observed for the PCOS group and the control group ( $p \leq .01$ ). Also Weight Class and WC correlations were moderate to strong in the PCOS group ( $p \leq .01$ ) and strong in the control group ( $p \leq .01$ ).

Table 5 summarizes results observed with a correlation analysis of the PCOS and control groups combined. Overweight Preoccupation was correlated with BMI and WC ( $p \leq .01$ ). Weight class was positively correlated with both BMI and WC ( $p \leq .01$ ).

**Table 5** Correlation Analysis of BMI, WC, Owpreocc and Wtclass

Subscale	PCOS		Control	
	BMI	WC	BMI	WC
Appeval	-.373*	-.247	-.127	-.144
Appor	-.198	.252	-.270	-.224
BASS	-.356*	-.266	-.178	-.176
Owpreocc	.421*	.469**	.381*	.287
Wtclass	.590**	.452**	.842**	.639**

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

A test of covariation was conducted via the General Linear Model function (Table 6) to investigate if WC and BMI co-vary with Overweight Preoccupation and Weight Class

subscales within the MBSRQ-AS. Also included in the analysis were demographic factors (geographic residence, occupation, and marital status (see Table 1) that significantly differed between the PCOS and control groups.

**Table 6** Test of Covariation and ANCOVA

Subscale/ Demographic	Covariate Test		Between-Group Adjusted	
	F-Statistic	p-value	F-Statistic	p-value
<u>Overweight Preoccupation</u>				
BMI	15.3	≤.001	1.2	n.s.
WC	14.1	≤.001	1.6	n.s.
Occupation	1.3	n.s.		
Marital Status	8.3	≤.01		
Residence	3.9	≤.01		
<u>Weight Class Subscale</u>				
BMI	63.1	≤.001	0.9	n.s.
WC	21.6	≤.001	2.2	n.s.
Occupation	0.0	n.s.		
Marital Status	1.0	n.s.		
Residence	1.3	n.s.		

Results of the covariation analysis indicated that WC ( $p \leq .001$ ), BMI ( $p \leq .001$ ), marital status ( $p \leq .01$ ), and residence ( $\leq .01$ ) co-varied with the women's responses in the Overweight Preoccupation subscale. However, occupation did not show a statistically significant relationship with Overweight Preoccupation. When controlling for these covariates, group differences for the Overweight Preoccupation subscale were no longer significant. Further analysis to account only for BMI or WC showed that adjusting for



these variables alone would nullify the significance between groups (data not shown) for this subscale. WC could not be included in the same ANCOVA test as BMI because they are collinear and therefore would have violated the assumptions of the test. However, a separate ANCOVA controlling for WC instead of BMI still yielded a non-significant finding between groups. Thus, it can be concluded that WC and BMI can be used interchangeably as stronger covariates for overweight preoccupation than would classification of PCOS within this study (See Table 6).

For Weight Class, the only statistically significant covariates were BMI and WC ( $p \leq .001$ ), whereas marital status, occupation, and residence were not associated with weight class. Results of the ANCOVA showed that there was no longer any significant difference between groups for the Weight Class subscale after controlling for either BMI or WC (See Table 6).

Upon determination of significant covariation, BMI, WC, marital status, and residence were analyzed for between-group differences by simple regression analysis to measure the strength and direction of influence for each factor. Higher BMI and WC were found to significantly increase scores of Overweight Preoccupation and Weight Class, and being married was statistically related to higher Overweight Preoccupation only (data not shown). Synthesizing the combined results of the correlation analyses, ANCOVAs, and regression analyses, differences in Overweight Preoccupation and Weight Class subscales between the PCOS and Control groups can be attributed largely to the participant's assessment of their BMI and/or WC. What can also be deduced from these results is that the higher the participant's BMI score or WC, the more likely they reported an overweight preoccupation while also reporting themselves in a higher weight

class, regardless of group (PCOS or control) distinction. Difference in mean scores between the PCOS and control groups was due to higher BMI and WC measurements among women in the PCOS group than controls (see Table 1).

**Table 7** Adult Gender Identity Questionnaire

Question (scale 1-7 (1= very masculine, 7= very feminine))	PCOS	Control	Statistic
	Median (inter quart.)	Median (inter quart.)	U (p-value)
How do you feel?	6.0 (1.0)	6.0 (1.00)	n.s.
How you think family members think of you?	6.0 (1.0)	6.0 (2.0)	n.s.
How you think strangers view you?	6.0 (1.0)	6.0 (1.0)	n.s.
How would you describe your free-time activities and hobbies?	6.0 (1.0)	4.0 (2.0)	355.50 ( $\leq 0.05$ )
What best describes your best girlfriend?	7.0 (1.0)	6.0 (0.0)	349.00 ( $\leq 0.05$ )
How do you feel about yourself when comparing to other women your age?	6.0 (1.0)	6.0 (2.0)	n.s.

Results of the Adult Gender Identity Questionnaire are summarized in Table 7. Mann-Whitney tests were completed on each of the six questions. An overall index score for this scale was not derived due to the exploratory nature of this scale. Of the 6 questions, the results of Question 4 and Question 5 differed significantly ( $p \leq 0.05$ ) between PCOS and control groups. Question 4 asks the participant on a scale of 1-7, one being very masculine and 7 being very feminine, “How would you describe your free-time activities and hobbies?” Women in the PCOS group reported higher femininity in their free-time activities than the controls. Question 5 asks the participant on the same scale of

1-7, “What describes your best girlfriend?” Women in the PCOS group were more likely to describe their best girlfriend as more feminine than the control group.

**Table 8** BMI, WC, and Adult Gender Identity

Question (scale 1-7 (1= very masculine,7= very feminine))	PCOS		Control	
	BMI	WC	BMI	WC
How do you feel?	-.177	.054	-.161	-.155
How you think family members think of you?	.098	.307	-.242	-.381*
How you think strangers view you?	.096	.074	-.200	-.220
Describe your free-time activities and hobbies?	-.061	.066	-.229	.133
What best describes your girlfriend?	.047	.141	-.340	-.427*
How do you feel about yourself when comparing to other women your age?	-.016	.242	-.332	-.398*

\*. Correlation is significant at the 0.05 level (2-tailed).

Spearman's Rho Correlation Coefficient

Exploratory correlation analysis of these gender questions with BMI and WC was completed to investigate if any type of relationship exists with these variables. As summarized in Table 8, neither BMI nor WC was significantly correlated with any of the gender questions for the PCOS group. However, quite puzzling, within the control group, there was a negative correlation with moderate effect size between Question 5 and WC ( $p \leq .05$ ). These results signify that among women in the control group, having higher waist circumferences was associated with lower femininity scores assigned to their best girlfriend. Also notable from Table 8, although there were no differences between groups on Questions 2 and 6, among women in the control group, there were significant negative

correlations with moderate effect size between higher WC and lower scores in femininity ( $p \leq .01$ ).

A test of covariation was conducted via the General Linear Model function (data not shown) to investigate if WC and BMI co-vary with questions 4 and 5 for the Adult Gender Identity Questionnaire. However, none of the demographic factors were significantly associated with responses for these questions.

Lastly, summarized in Table 9, are the results of Mann-Whitney U tests on the Polycystic Ovary Syndrome Quality of Life questionnaire (PCOSQ). This questionnaire was given to the PCOS group only. To investigate intra-group variation on responses to questions on the PCOSQ, the PCOS group ( $n=28$ ) was categorized by the standard BMI cut-offs for overweight/obese versus normal to underweight ( $BMI \geq 25$  vs.  $< 25$ ) and WC measurements of abdominal obesity versus non-abdominally obese ( $\geq 34.6$  inches (80cm) versus  $< 34.6$  inches (88cm)). Five of the PCOS participants were excluded since they did not complete the PCOSQ. Also delineated in Table 9 are categorizations of Asian (Indian) BMI cut-offs of  $\geq 23$  versus  $< 23$  and WC of  $\geq 31.5$  versus  $< 31.5$  inches (80cm). This categorization was helpful in understanding the relationship of both BMI and WC within the PCOS group regarding the domains specified in the original publication: emotions, body hair, weight, menstrual, and infertility.

**Table 9** PCOSQ

Grouping Sample Sizes		Normal/ Underweight	Overweight/ Obese	Total N = 28	
BMI $\geq$ 23 kg/m <sup>2</sup>		22	6		
BMI $\geq$ 25 kg/m <sup>2</sup>		13	15		
WC $\geq$ 31.5 in.		19	9		
WC $\geq$ 34.6 in.		10	18		
Subscale	Grouping	Median (Int.Quart.)	Median (Int.Quart.)	U-statistic	p-value
Emotions					
	BMI $\geq$ 23 kg/m <sup>2</sup>	4.3 (1.3)	4.6 (1.8)	62.0	n.s.
	BMI $\geq$ 25 kg/m <sup>2</sup>	4.5 (2.5)	3.8 (1.9)	67.0	n.s.
	WC $\geq$ 31.5 in.	4.5 (1.6)	4.4 (1.9)	70.0	n.s.
	WC $\geq$ 34.6 in.	4.3 (1.6)	4.8 (1.7)	79.5	n.s.
Body hair					
	BMI $\geq$ 23 kg/m <sup>2</sup>	4.6 (1.8)	5.6 (2.5)	37.5	n.s.
	BMI $\geq$ 25 kg/m <sup>2</sup>	4.8 (2.8)	5.4 (1.9)	97.0	n.s.
	WC $\geq$ 31.5 in.	4.8 (2.2)	5.4 (2.2)	76.0	n.s.
	WC $\geq$ 34.6 in.	5.0 (2.3)	6.0 (1.8)	66.0	n.s.
Weight					
	BMI $\geq$ 23 kg/m <sup>2</sup>	6.4 (1.6)	3.6 (3.5)	20.0	$\leq$ .01
	BMI $\geq$ 25 kg/m <sup>2</sup>	5.6 (4.4)	3.4 (2.7)	59.5	$\leq$ .10
	WC $\geq$ 31.5 in.	6.0 (1.6)	3.0 (3.8)	36.0	$\leq$ .05
	WC $\geq$ 34.6 in.	5.2 (3.7)	3.2 (3.4)	55.5	$\leq$ .10
Menstrual					
	BMI $\geq$ 23 kg/m <sup>2</sup>	5.6 (2.5)	5.4 (2.2)	62.5	n.s.
	BMI $\geq$ 25 kg/m <sup>2</sup>	5.4 (2.8)	4.3 (3.0)	63.0	n.s.
	WC $\geq$ 31.5 in.	5.8 (1.8)	4.5 (2.5)	65.0	n.s.
	WC $\geq$ 34.6 in.	5.4 (2.4)	5.1 (2.3)	85.0	n.s.
Infertility					
	BMI $\geq$ 23 kg/m <sup>2</sup>	3.6 (3.9)	3.6 (2.2)	49.0	n.s.
	BMI $\geq$ 25 kg/m <sup>2</sup>	5.3 (4.5)	2.4 (3.0)	87.0	n.s.
	WC $\geq$ 31.5 in.	5.5 (4.3)	3.3 (2.5)	61.5	n.s.
	WC $\geq$ 34.6 in.	5.4 (4.3)	4.8 (3.1)	63.5	n.s.

The weight domain was the only subscale that differed significantly between BMI and WC groups. Within this domain, the most significant differences were in median scores for the BMI of  $\geq 23$  vs.  $< 23$  ( $p \leq .01$ ) and the WC  $\geq 31.5$  vs.  $< 31.5$  inches ( $p \leq .05$ ) sub-groupings. The other two sub-groups of, BMI  $\geq 25$  vs.  $< 25$ , and WC  $\geq 34.6$  vs.  $< 34.6$  inches ( $p \leq .10$ ), are mentionable in trends toward a statistically significant difference in median scores between groups.

Lower scores on this questionnaire signify a greater impairment of the participant's assessment of their quality of life on a scale of 1-7. The Weight subscale consists of five questions involving concerns about being overweight, trouble staying at ideal weight, trouble dealing with weight, frustration in losing weight, and not feeling sexy because of weight (Cronin et al. 1998). The participants were asked to answer this according to how they felt about the question within the last two weeks. The median score for the underweight to normal group in the BMI  $\geq 23$  grouping was 6.4 whereas the overweight to obese median score was 3.60. For the WC  $\geq 31.5$  inch grouping, the median scores were 6.00 and 3.00 respectively.

### Qualitative Results

Qualitative methods of ethnographic field work were incorporated into my research design to complement the quantitative data, fostering a holistic biocultural perspective. This mixed method approach entailed administration of surveys, conducting semi-structured interviews and engaging in participant observation. Simultaneous qualitative and quantitative data collections during my four month stay in India provides more comprehensive data collection than one method alone, such as administering surveys. As

described in the recruitment strategy of my research methods, when participants were approached to complete the survey, they were also asked to participate in a semi-structured interview, and allow me to spend time with them and observe their daily lives. Of the 65 women who completed the surveys, five of them also completed the semi-structured interview. Of these five women, four of them also allowed me to engage in participant observation with them. Pseudonyms of these women are used in this thesis to discuss my interviews and participant observations with them in order to protect their identity.

Three women diagnosed with PCOS, Nandini, Preeti, and Pooja, completed both the survey and the semi-structured interview. I conducted participant observation with Nandini and Preeti. Pooja did agree to the participant observation; however, due to time constraints and scheduling conflicts, we were unable to complete it. Two participants from the control group, Aankhi and Alec, completed all three portions of the research. The following vignettes will introduce each of these five women I am highlighting as my key participants. The vignettes also introduce the most salient patterns or themes present within the qualitative results of the data set. These themes include body image evaluations, and preoccupation with body weight in relation with health, fatness and appearance. The results of the qualitative data dovetail with the quantitative statistical results. Within the qualitative data, the majority of time was spent observing and discussing with participants similar topics involving health, eating habits, weight problems, appearance and how this relates with cultural expectations of marriage, children and beauty. The amount of time I spent with participants discussing these topics far surpassed the amount of time spent on child or adult gender identity. Thus, because of

the significance of weight, appearance, and psychosocial experiences observed in my fieldwork, the qualitative results in this section focus most on these topics.

### Vignette I: Nandini

Nandini is 33 years old and was diagnosed with PCOS two years ago. She is married and lives in Gurgaon, which is a suburb of Delhi located approximately 18 miles Southwest of Central Delhi. Although Nandini actually resides in the state of Haryana, Gurgaon is one of the four major satellite cities included in the National Capital Region (NCR), and its population of 500,000 contributes to the overall NCR population of 25 million people. Nandini and her husband of three years live together in a high-rise apartment that they own. She describes her social class as “upper-middle class” and enjoys living in the suburbs rather than busy South Delhi, where they lived previously. Nandini is a housewife who is starting her own outdoor trekking tour company. Her husband works in Delhi and sometimes at home. Nandini’s job duties include managing their housekeeper and cooks, ensuring household maintenance, and paying bills.

Nandini and I would often go shopping together at the mall, or run errands regarding her household duties at the local markets. One day while I was staying with her, we drove to Gurgaon’s main marketplace and decided to stop in Café Coffee Day (a.k.a. CCD, similar to Starbucks) while waiting for some pictures to be framed. This CCD is a small establishment amidst other small shops. Inside, it is crowded, and urban Gurgaon-ites are sitting tightly squeezed around tiny tables with lattes and pastries in hand. After we order our coffees and find a table to squeeze in to, I observe that Nandini is uncomfortable as she looks around at the other tables. As I wonder what she is thinking, she says, “You know, it is times like this that I feel the worst about myself”.



After asking her to explain, she says, “ I never use to worry much about what people were looking at before, but in the last few years, when people look at me, I feel like they are staring at how fat and ugly I am”. I tried to assure her that everyone was staring at us because they are wondering who the big American girl is. We both laughed, and then she said, “Seriously though, I have such anxiety walking into places like this when so many people are staring.” She then discussed how she has so many clothes in her wardrobe that she could not wear anymore because she has gained so much weight since being diagnosed with PCOS.

This was the first time Nandini mentioned this to me, as she had not yet completed the survey or the interview. Nandini is 5’7, which is considered tall compared to other Indian women in my study. Her BMI is 23.1 and her WC is 32 inches. According to the international BMI standards she would not be considered overweight, and by the revised Asian standards she would just make the cut-off for ideal BMI of 23. Her WC is ½ of an inch over the cut-off for Asian abdominal obesity. During her interview, she said that weight gain was the worst symptom of PCOS, and when I asked her to rate on a scale of 1-10, 10 being the most bothersome, she rated it an 8. She said before she was diagnosed, she was twenty kilograms less and her waist was 28 inches.

#### Vignette II: Preeti

Preeti is 32 years old and was diagnosed with PCOS 5 years ago. She lives in Central Delhi with her husband and two daughters. Her husband is a physician and she is a housewife who cares for her children with the help of two nannies. Preeti’s family is well known in Delhi as both of her parents own businesses and both of her grandfathers were in politics.

She is very close with her parents and often visits them at their home in a 'posh' area of North Delhi. I met her during one of these visits while I was staying with her parents, and her mom mentioned that Preeti has PCOS. In the sitting room during the early evening tea time, she plopped on the chair with her young daughter straddled over her lap and sighed a big sigh. "Oh, I am so tired, as usual.... It is always something... one daughter was sick, and now this one... ". We started discussing my work with PCOS, and she said, "Oh, it is horrible, I just want it to go away. My doctor says I am a weird case because she says I thinner than most women with PCOS and I have no problems with fertility that is for sure." (She smiles and nods to both of her young daughters). As we laugh, she says, "I guess I should feel lucky that I am not as big as some of the women having PCOS and all, because I would not be able to handle it very well".

She then went on to explain that she was bulimic during her early to mid twenties and she works hard to not be obsessive with her weight. She explained that she went to some specialists in London to recover from bulimia. I asked her if she felt recovered, and she said that it is quite difficult, but says she manages it better than before she got help. She said, "My mom thinks I am still too thin, but I think I am fine now"... as she looks at her mom who is across the room and listening to our conversation. She then continues, "But I did have a lot of weight gain before when they put me on the pill, I gained 3 kilos instantly and had hot flashes, so my doctor took me off them and now I am only on Aldactone to help with acne and my hair falling out".

Just then, her driver entered the room and reminded her that they need to leave because her physical trainer is waiting for her at her home. As she was packing her daughter's things to go, she said, "See even though people think I am too thin, I still have

to work out because my doctor says I could become diabetic if I don't improve my blood work results... but I don't do cardio, just muscle exercises with the trainer." As we say our goodbyes, I ponder on her situation. Preeti's BMI is 18 and her waist circumference is 31.3, so she falls just short of the "normal range" BMI which starts at 18.50 classifying her in the "underweight range". Also she is 5'9, so she may appear even thinner to some because of her weight distribution for her height. Her thin phenotype and lack of fertility problems in her early reproductive years is illustrative of the diversity in PCOS manifestation and expression of symptoms.

### Vignette III: Pooja

Pooja is a 25 year old graduate student at Jawaharlal Nehru University in South Delhi. She is unmarried but dating someone, and lives in a student hostel on campus. Pooja grew up in West Delhi and was diagnosed with PCOS three years ago. I met Pooja through a mutual friend who she had been classmates with. Because we were unable to complete the participant observation, I will describe my salient interview experiences with her.

When Pooja was 22, she went to a gynecologist due to irregular, painful, and heavy flowing periods, mood swings and weight problems. She mentioned that she has had weight gain and irregular periods since puberty and was worried that it would affect her fertility. During the interview process, Pooja mentioned that the mood swings and weight gain were the worst symptoms for her to deal with. On a scale of 1-10, 10 being the most bothersome, she rated these symptoms a 9. When asking her what aspect of her life was most affected because of PCOS, she answered "Health... it can lead to complications in

pregnancy, so later in my life I might have this problem and secondly weight gain is also a serious area of concern for me.”

Pooja has a BMI of 28.8, which places her in the “overweight/pre-obese International BMI category, and a WC of 33.5 inches, which places her into the abdominally obese category for Asian standards but not for International standards. At the end of the interview, when I asked her if she had any additional comments to make about the interview topics, she said, “With time I have learnt that nothing in the world is perfect so one has to nurture the way one is. So I am satisfied with the way I look. The only concern for me regarding PCOD (PCOS is commonly called PCOD in India), is about health problems and protruding fat”. Pooja mentioned her problems with weight gain or fatness numerous (6) times during her interview. Even though she says she is “satisfied” with the way she looks, her concerns involving health and fertility may play an integral role in her worries about being overweight and having PCOS.

#### Vignette IV: Aankhi

Aankhi is a participant in the control group. She is originally from Kolkata, but lives in a West Delhi sub-city called Dwarka and has lived in Delhi for five years. Dwarka is a master planned residential area where middle to upper class residents can live away from the heavy traffic and inner city lifestyle of Central, North and South Delhi. Aankhi is 28, married and lives with her husband in an apartment. She is currently a housewife while awaiting admission to Ph.D. programs. I met her at the University of Delhi and we often ate out together, shopped at major malls and local markets and went to the movies.

One night, while staying with her and her husband in their apartment, we decided to order Dominos pizza before going out to a dance club. After the pizza arrived, the three

of us were discussing the difference between American pizza and Indian pizza. Her husband often travels to the U.S. for business so he could comment on both. Aankhi made a comment about how he eats pizza too often. She then points at his stomach to show me how chubby he is. He looks at me, and says humorously, “Do you think she should be allowed to make comments since no matter what she eats, she does not gain weight?” As we laugh, he comments that she thinks he is too chubby and he thinks she is too thin. She admitted that she is underweight, but that she does not want to gain weight.

As we finished eating and started getting dressed to go out, she looks at herself in the full length mirror, and turns toward me as asks, “Do you think I am pretty?” It was surprising that she asked me this, since she appeared self assured and confident in any other interaction I had with her. It is not clear if the underweight conversation at dinner sparked her asking me what I thought about her appearance; however, it was clear that she was concerned about how others perceive her appearance. Aankhi is 5’3 and her BMI is 17.6, which is classified within the “underweight range” for both the international and Asian revised BMI standards. Aankhi and I had multiple conversations about weight and in particular my own experiences. She is interested in the topic of obesity academically and admitted that she thinks thinner people are more attractive. Although the topic of Aankhi’s appearance was rarely discussed, it was clear from these experiences that she places an importance on weight and it’s relation with appearances.

#### Vignette V: Alec

Alec is 28 years old and has been living in Delhi the last 3 years to complete her Master’s degree. She is originally from the Northeast Indian state of Manipur, but before moving to Delhi, she completed her bachelor’s degree in Mumbai. She lives in North

Delhi at a University of Delhi hostel for female graduate students. I met her while I was staying at her hostel as a guest. She was one of the first women in the hostel to talk to me. She was instantly helpful and outgoing and we quickly became friends. We often spent time in each other's room talking about school, daily happenings, and frequently, we would go across the street to the market place or out to dinner.

One night while she was visiting in my room, I asked her if she wanted to be a participant in my research and she asked me what it entailed. When I told her that I will need to take her height, weight and waist circumference measurements, her eyes became big and she exclaimed... “ Really? Oh my... I know I have gained so many kilos since I got here (in the hostel)...” When I pulled out my research weight scale to show her, she wanted to see how much she weighed, but also did not want to know because she knew she had gained weight. I told her that she does not have to do it, but she said, “No no, I need to know” after she stood on the scale, she said, “oh... great, I have gained 10 kilos since I moved into the hostel, I have to reduce or I won't get my chums.” When I looked at her quizzically and repeated, “Chums?” she said, “Yeah no period”. She then explained how important it was for her to have her period every month so she can have children when she gets married. She said she is dating a guy from back home in Manipur and she wants to make sure she can have children if they get married. She said she knows that if women become too overweight, they lose their “chums”.

Alec has a BMI of 34.2 and a waist circumference of 37.2 inches. With these measurements she is classified into the “obese class 1” for BMI and classified as abdominally obese for both Asian and NIH standards. After she was talking to me about my research, she wondered if she had PCOS. About a week later, she actually came into

the Sant Parmanand gynecology clinic (where I was recruiting participants from) for other reasons. While she was there, she asked if she had PCOS and after they ran some tests, the doctor said no. Afterwards, she mentioned to me that she was relieved because she did not want to worry about fertility problems, but knew that she still needed to lose weight just in case.

### Vignette Summary

The five vignettes outlined above not only introduce the key participants, but also illustrate salient themes that were observed during my interviews and participant observations regarding overweight preoccupation, thin weight ideal, and body image. More importantly, these vignettes are demonstrative of the complexity between and within the PCOS and control groups. For example, within the PCOS group, Nandini, Preeti and Pooja all contend with symptoms related to their PCOS diagnosis, particularly managing their weight. However, Preeti is classified as underweight, Nandini classified on the cusp of normal to overweight by Asian standards and Pooja classified as overweight/pre-obese. If BMI is statistically predictive of how women report their evaluations of body image, what are the nuanced facets of body image and PCOS? Also, the two control key participants, Alec and Aankhi both demonstrate an importance of maintaining a thin body type ideal, however these two women can be very different where Aankhi is classified as underweight and Alec is classified as obese. The vignettes showcase the importance of the mixed method design, where in the case of this research, the qualitative data I collected illustrate a complexity of nuanced behaviors and feelings by the key participants in the study that the quantitative data alone may not capture.

## Semi-structured Interviews

The semi-structured interview was designed to elicit the participant's retrospective descriptions of their adolescent behaviors and feelings about their gender identity, body image, and PGWB. Although some questions were asked about their adulthood health and activities, and knowledge about PCOS, the majority of the interview focused on their experiences during adolescence. In the broad scope of my research project, the interview was designed to investigate developmental trajectories of gender identity, body image, and PGWB. Similar interviews were given to the PCOS and Control groups. The only difference was in the current adult section of the interview, where the PCOS participants were asked to elaborate on their PCOS knowledge, diagnosis, and symptoms, whereas the control group were only asked if they knew about PCOS or anyone diagnosed with it. The adolescent sections were the same for both groups and they followed a specific guideline of topics and questions (See Appendices B and C). Although most interviews stayed within these topics, the participant were encouraged to be as descriptive as possible, and were free to answer my questions in as much detail as they liked.

### PCOS Interviews

One of the interesting themes of the interview among women within the PCOS group was their adult experience with a PCOS diagnosis, and how they are dealing with PCOS symptoms. Given that PCOS symptom manifestation and phenotypic expression is heterogeneous, it is not surprising that the three PCOS group key participants were vastly different in their phenotypes and experiences. Nandini and Preeti were not diagnosed until their late 20's and early 30's, and they claim that they were not symptomatic until around the time of their diagnoses. However, Pooja claimed to have weight gain and



irregular periods since puberty and was diagnosed in her early 20's. Also, Nandini lists polycystic ovaries, a miscarriage, mood swings, including depression, and weight gain as her PCOS symptoms. Preeti complains of acne, a small amount of facial hair which she bleaches, dandruff, and her hair falling out, plus being tired because of the medication, Aldactone (anti-androgenic), that she is taking. Pooja's biggest symptom complaints, as described above, are weight gain, mood swings and irregular periods. Interestingly, all three women say they know people with PCOS and some have similar issues and some do not. For example, Preeti's two best friends also have PCOS and they have major fertility issues but she did not, however, she is not trying to get pregnant now that she is diagnosed.

Another theme within the PCOS participant's interviews was when they described in their own words what PCOS is and how they got it. Interestingly, in all three participants' answers (during their individual interviews), weight gain was listed to "explain" what PCOS is:

Me: "In your own words, how would you explain what PCOS is?"

Nandini: "It is something that causes... or some kind of hormonal balance in your body, so with increased testosterone levels, and if you are gaining too much weight, it may be the cause of that, excess hair on the body, could be the cause of that, and fertility issues".

Preeti: "A horror story... Acne, hair fall, weight gain before, and all the horrible side effects of the medication later."

Pooja: “It is a disease with multiple cyst formation in the ovaries and gives symptoms like weight gain, stomach cramps during periods, headache, mood swings, and this has relation with the weight of the body.”

Me: “Do you know how you got PCOS?”

Nandini: “No, I am clueless about it, and I tried to ask my doctor, ‘do you think this is something I did, because I started smoking, or is it because I was on the pill for three years?’” and she was like, “I can’t say” ... and she is one of the best gynecologists, from a very good hospital, and she is a well reputed doctor from a very good school and everything.. it was like she was trying to give me the message like, how you got it was not really going to affect your life so why concern your head about it”.

Preeti: “No idea. Think it is inherent. I do not know much about it. I have never researched it or anything; I just want to get rid of it.”

Pooja: “No idea. Probably due to my lifestyle and food habits, but my sister is not very healthy either and she does not have it.”

In the adolescent section for the PCOS group, of course all the key participants have unique individual experiences, however, Nandini, and Preeti again have similar responses compared to Pooja. When asking if they were shy or outgoing during the ages of 13-18, Nandini explained that she started out shy but became outgoing. Preeti said she was, “definitely outgoing”, whereas Pooja said she was shy. When asking if it was easy for them to make friends during their adolescence, Nandini and Preeti said yes, however Pooja responded with, “no, not much”. These responses aid in understanding possible relationships of body image evaluation and self confidence from a developmental view.

Interestingly, both Nandini and Preeti were at least somewhat satisfied with their appearance in adolescence based on their responses to the following questions, however Pooja was not.

Me: “Did you feel as pretty as your friends when you were a teenager? If no, why not?”

Nandini: “I felt reasonably pretty, I think I was. I never thought of myself as being extremely pretty, but I was like, o.k., I am decent looking, I am not someone who is going to scare off people”.

Preeti: “Ya kind of, but not more pretty.”

Pooja: “No, because of my weight and dark complexion.”

Me: Were you self conscious of the way you looked?

Nandini: “No I wasn’t, I was very confident. I knew that I was looking o.k. and that was good for me.”

Preeti: “Yes”.

Pooja: “Yes.”

Me: “Did you like the way you looked and what you wore?”

Nandini: “Yes, but it wasn’t a big deal for me, it was like I could wear anything and carry it off so....”

Preeti: “Yes, I think I did.”

Pooja: “At times no.”

Me: “Did you worry about your physical appearance?”

Nandini: “As long as my hair was brushed and my nails were neat, ya know? ... and if I had taken a shower then that was good”.

Preeti: “Ya, hair and weight, etc.”

Pooja: “Yes.”

From this portion of the interview, in adolescence, Nandini appears to have been very confident and pleased with her appearance, and Preeti, mostly pleased, but was concerned about weight gain. However, Pooja was overall unhappy about her appearance and was definitely concerned about it. Even further into the interview, when asking what they remembered worrying about most in their adolescence, Nandini discussed worrying about her relationship with her mom, Preeti responded, “Career and ambitions”, and Pooja said, “About my appearance and future life partner”. Again, Pooja discusses appearance as her biggest worry, while the others did not.

Interviewing Nandini, Preeti, and Pooja about their adolescent experiences, in particular with their appearance, was helpful in illustrating possible developmental trajectories of personal evaluations of their body image in regard to their current appearance evaluations. Although I did not interview them on their appearance as adults, I reviewed their survey answers individually and observed some patterns during my participant observation with Nandini and Preeti.

Specifically focusing on their responses to the MBSRQ-AS, as summarized on Table 10, I compared each key participant’s individual average score for each of the five subscales. Nandini’s mean score of 1.3 on a scale of 1-5, for the Appearance Evaluation subscale, was the lowest of all the five key participants. The lower the average score on this subscale means more negative feelings of attractiveness and that the person is generally unhappy about their physical appearance. Out of the three key PCOS participants, Preeti scored the highest on this subscale. Interestingly, Preeti also scored

the highest in the Appearance Orientation (4.3/5), which means she reported extensive grooming behaviors and more investment in her appearance. On the Appearance Orientation, Nandini reported a 3.5 and Pooja a 3.4. Preeti also scored the highest in the Body Area Satisfaction Scale, a 2.8/ 5, meaning that she had the most body area satisfaction out of the PCOS key participants. Interestingly, Preeti also scored the highest, on the Overweight Preoccupation Scale, meaning that she was more preoccupied than the other two. For the Weight Class scale, of 1 being very underweight and 5 being very overweight, Nandini and Pooja reported a mean score of 4, whereas Preeti reported a 2.5.

Observing the key participant's individual mean scores as adults compared to their adolescent survey answers, Nandini appears to have been the most changed in this regard. She reported being very confident about her appearance in adolescence. That has altered drastically now in her adulthood, especially since she scored the highest of the five key participants on negative feelings about her appearance evaluation and body area satisfaction. This makes sense in light of my participant observations with her at Café Coffee Day described in her vignette.

Although Preeti scored the highest in positive evaluations of appearance and body area satisfaction out of the three in the PCOS group, she also scored the highest in overweight preoccupation. This too makes sense because of her history with bulimia. However, Preeti scored the lowest of the three in reporting her weight class, meaning that aside from her overweight preoccupations, she recognizes and reports that she is underweight. Pooja's scores fit mostly in the middle of the other two women in all subscales except, interestingly, she was the least preoccupied with being overweight, although she has the highest BMI and WC of the three women.

**Table 10** Key Participant Information and MBSRQ-AS

Name	PCOS Nandini	PCOS Preeti	PCOS Pooja	Control Aankhi	Control Alec
Age	33.0	32.0	25.0	28.0	28.0
BMI	23.1	18.0	28.8	17.6	34.2
WC (inches)	32.0	31.3	33.5	28.0	37.2
Marital Status	Married	Married	Single	Married	Single
Occupation	Housewife	Housewife	Student	Housewife	Student
Education	Bachelor	Masters	Masters	Masters	Masters
Medical Conditions	PCOS	PCOS	PCOS	None	None
Born	Derhadun	North Delhi	West Delhi	Kolkata	Manipur
Residence	SW Delhi	Central Delhi	South Delhi	West Delhi	North Delhi
Religion	Hindu	Hindu	Hindu	Hindu	Hindu
	Nandini	Preeti	Pooja	Aankhi	Alec
<b>MBSRQ-AS</b>	<b>Mean (total subscale score)</b>				
Appearance Eval.	1.3	3.3	2.4	4.9	3.9
Appearance Oreint.	3.5	4.3	3.4	4.0	2.4
Body Area Satis.	1.8	2.8	1.9	3.8	2.8
Overweight Preocc.	3.3	3.8	3.0	2.8	3.5
Weight Class	4.0	2.5	4.0	2.0	5.0
Appearance Eval.	Scale 1-5, 1=neg, 5=pos				
Appearance Oreint.	Scale 1-5, 1=low effort, 5=high effort				
Body Area Satis.	Scale 1-5, 1=unhappy with several areas, 5= general content				
Overweight Preocc.	Scale 1-5, 1= less preocc, 5= more preocc				
Weight Class	Scale 1-5, 1=underweight, 5=overweight				

Also, she reported problems with her weight more often than Nandini and Preeti during their interviews in the adolescent section, and was comparatively similar in adult troubles with being overweight along with Nandini.

Through my analysis of the interviews of these key participants from the PCOS group, Nandini and Preeti were not bothered too much by weight in adolescence, although Preeti admitted to worrying about it, she was not physically overweight during her adolescence. Also, both Nandini and Preeti, were at least somewhat happy with their appearance in adolescence whereas Pooja definitely was not. What is interesting about this pattern is that not only did Pooja battle with being overweight as an adolescent, but she also was experiencing PCOS symptoms like irregular, painful periods and mood swings during her adolescence. For Pooja, dealing with these issues during adolescence may have contributed to her overall unhappiness and worries about her weight and appearance in adolescence, thus causing her to be less outgoing and finding it difficult to make friends.

However, for Nandini and Preeti, both women, Preeti in her early 20's and Nandini in her 30's, have experienced extreme negative feelings of problems and fears of being overweight, especially Preeti, having to seek professional help for bulimia. Although she was not diagnosed with PCOS until her late 20's, it is difficult to disentangle her overweight preoccupation with bulimia and PCOS, especially since she still scores the highest out of the three women in overweight preoccupation, although she says she is more or less managing a recovery from bulimia.

Because the qualitative data presented in this section are based on the semi-structured interview and the key participant's individual survey answers, these patterns of appearance evaluations and overweight preoccupations may not be generalizable within the entire population of women in Delhi, or even within my research population of women with PCOS. However, these patterns are important to point out and may be

illustrative of similar situations that other women in Delhi with PCOS can relate to as adults and from their adolescence.

### Control Interviews

The two key participants from the control group, Aankhi and Alec, have stark contrasts phenotypically and they are both from different backgrounds, where Aankhi is from West Bengal and is married and Alec unmarried and from Manipur. Highlighting these two participants, however, is illustrative of the diversity of Indian women living in Delhi. They are similar in a few ways. Apart from both of them being 28 years old, each moved to Delhi to complete their Masters degree at Delhi University, and they do not suffer from any known health problems. The following are their responses to my questions from the adolescent section of the interview:

Me: “Were you outgoing or shy between the ages of 13-18?”

Aankhi: “No, I was never shy in my life; I think I was very outgoing”.

Alec: “Never”.

Me: “Was it easy for you to make friends?”

Aankhi: “Yes”

Alec: “Yes, always”

Me: “Did you feel as pretty as your friends when you were a teenager? If no, why not?”

Aankhi: “I never thought of myself as pretty, but I never thought of myself as ugly. I was okay”.

Alec: I used to feel like I was dark and I always wanted to be fair, but without using the fairness cream. I used to feel like, why are they more girlier than me?”.



Me: “Where you self conscious of the way you looked?”

Aankhi: “As a teenager no, I always had a conception about myself that I am always presentable. If I don’t wear a cosmetic or something artificial, I am always presentable and have a presentable attitude which makes me presentable”.

Alec: “Yes”.

Me: “Did you like the way you looked and what you wore?”

Aankhi: “Yes, yes, absolutely. I never had a problem with that part. I can understand if my friends are prettier than me, but in my opinion, I had a different shine in myself, which nobody could ever compete”.

Alec: “During uniform time yes, but sometimes I used to be conscious because we were uh, co-ed, co education, but most of the time, my friends were to be along with the boys so I was least bothered (meaning she was not bothered because she was friends with the boys). But there was certain times that you had to dress up in ethnic attire and you had to look more feminine and at that time it bothered me quite a bit”.

Me: “Did you worry about your physical appearance?”

Aankhi: “No, not at all. I love my smile, that is very important”.

Alec: “I was really worried about my physical appearance, especially my calf muscle and thighs,(laughs). Other than that, nothing else”.

Me: “Do you remember what you worried about most during your adolescence?”

Aankhi: “Yeah, I used to worry about my academics. I was not good at academics at that time. For that, my parents, especially my mom was very worried”.

Alec: “That I am a tomboy and I will never get a propose from any guy, (laughs) being a tomboy”.

From these excerpts of the adolescent portion of the interview, Aankhi and Alec had very different responses regarding their appearance in adolescence. Whereas Aankhi was not worried or bothered by her appearance very much, Alec was. However, interestingly, neither discussed any problems with weight. Alec was more bothered by wanting to be fairer, and she did not like her legs, however, she never actually mentioned weight problems or weight gain. Alec reported that being a tomboy and not feeling as feminine as her female peers was a prominent reason for some of her worries about her appearance as an adolescent.

Alec never mentioned if she was overweight in her adolescence, even in my participant observations with her. She did mention that she has gained more weight since she moved to Delhi. As summarized on Table 10, Alec has the highest BMI (34.2) and WC (37.2 inches) of all of the key participants (PCOS and Control). In contrast, Aankhi had the lowest BMI (17.6) and smallest WC (28 inches) of the five key participants. Even then, both of them place as the extremes for BMI and WC with the key participants; it is interesting that neither Aankhi nor Alec reported growing up though adolescence with any type of negative issues or preoccupation with weight or fatness like Preeti and Pooja reported.

Also summarized in Table 10 are the comparisons of Aankhi and Alec's mean scores on the five MBSRQ-AS subscales. Aankhi has the most positive evaluation of her appearance out of any of the key participants with a mean score of 4.9/ 5 and Alec is the second highest out of all the key participants with a mean score of 3.9. However, Alec scored the lowest out of all the key participants in the Appearance Orientation scale, meaning that she reports making the least investment in her appearance, whereas Aankhi

is just a little less than Preeti's score 4.3 with a mean score of 4. However, Alec is second highest in overweight preoccupation out of all the key participants falling just under Preeti's score of 3.8 with a score of 3.5. In regard to reporting their weight class, Alec's mean score was the highest of all the key participants with a 5/5, where Aankhi scored the lowest of the key participants with a 2/5.

### Qualitative Results Summary

Collectively, the results of all the key participants' interviews dovetail with the quantitative results in regard to overweight preoccupation and reporting their weight class. The interviews also highlight the diversity within the PCOS group and control groups along with the differences between groups. For example, the differences and sometimes stark contrasts between and within the PCOS group with regard to BMI and symptom expression are clearly illustrated with Preeti being classified as underweight and Pooja being overweight, and Nandini in the middle of the two. Also the stark contrast between Aankhi and Alec in BMI and WC within the control group illustrates how diverse the urban Delhi-ite woman can be. However, given these differences within groups, it is interesting that all three PCOS participants as adults reported feeling less satisfied with overall appearance than the control group key participants (See Appearance Evaluation on Table 10). Also the two women with the lowest BMI and WC, Preeti and Aankhi, reported investing the most in their appearance and grooming behaviors (See Appearance Orientation on Table 10). Even though the Appearance Evaluation and Orientation subscales did not differ between the PCOS and Control Groups statistically in the quantitative results, these trends within the key participants were mentionable in regard to possible patterns with BMI and WC.

The individual key participant results of the Overweight Preoccupation scale on the MBSRQ-AS, followed a similar pattern with the quantitative results; the higher the participant's BMI, the more likely they are to report more preoccupation with being overweight. Preeti is an exception because of her history with weight preoccupation and bulimia. In light of this quantitative and qualitative finding, it makes sense that Alec's scores placed her as having the most overweight preoccupation (highest BMI and WC of the key participants), Nandini and Pooja next in line, and lastly, Aankhi (with the smallest BMI and WC) reporting the least amount of overweight preoccupation. These results also fall in line with the overall quantitative results in that, regardless of group affiliation, women with higher BMI and WC will more likely report more overweight preoccupation.

Also noteworthy is the pattern of overweight preoccupation in the PCOS key participants' reports of their adolescence compared to almost no overweight preoccupation reported from the control's adolescent experience. This is mentionable as it may be an indication of a possible predisposing developmental psychosocial trajectory for women with PCOS. Although this may be too speculative based on reports from only five key participants, it may be worth investigating in future research. Also, the stark differences between Pooja's responses about her appearance as an adolescent compared to Nandini and Preeti's are interesting because Pooja is the only key participant to report undergoing PCOS symptoms of weight gain and irregular periods during her adolescence. Thus, she may be reporting the psychosocial experience of dealing with these problems while in adolescence, rather than only in adulthood like Nandini and Preeti. Based on this, more qualitative research on developmental psychosocial experiences of PCOS in

adolescence is warranted. Lastly, and most impressive, are the results of how all the key participants reported their weight class on the survey. These results are consistent with the quantitative results in that overall this study population reports a fair evaluation of their weight class on a scale of 1-5, 1 being the very underweight and 5 being very overweight. For the most part, all key participants reported the weight class most similar to their BMI classification. Nandini is a partial exception in that she is on the cusp of normal to overweight and she reported a 4 (overweight). However, each key participant reported in correct succession according to their BMI (Aankhi's Wt.Class= 2 (BMI 17.6), Preeti's Wt. class=2.5(BMI 18), Nandini's Wt. Class=4(BMI 23), Pooja's Wt. Class=4(BMI 28.8), and Alec's Wt. Class=34.2 (BMI 34.2). More impressive is that that these key participants report a fair weight class for themselves despite any degree of overweight preoccupation.

## CHAPTER 6

### DISCUSSION

In this discussion, the present results are interpreted within the scope of modern Delhi culture, specifically in light of a rapid transition to a Westernized lifestyle including an influx of new cultural concepts of beauty and the “new Indian woman”. I also place my research within a wider context of anthropology, psychology, public health and medicine in India.

#### Summary of Key Results

The PCOS group had significantly higher body mass index (BMI) and waist circumference (WC) than the control group. However, regardless of PCOS and control group affiliation, within my research population of urban Indian women, preoccupations with being overweight were most notably associated with higher BMI and WC measurements. The higher the BMI or WC measurement of the women in my study, the more likely they reported a higher overweight preoccupation. Furthermore, regardless of their BMI classification or level of weight preoccupations, women of both groups reported a fair evaluation of their weight class in accordance with their BMI or WC classification.

#### Group Differences in BMI and WC

Unsurprisingly, the mean BMI and WC measurements of the PCOS group were higher than the control group. The mean BMI among women in the PCOS group was 25.5. The mean BMI among women in the control group was 22.2. Using the WHO’s

International BMI Classification this places the PCOS group's mean BMI score in the overweight category. For WC, the mean was 33.7 inches for the PCOS group, and the mean for the control group was 30.6 inches. The PCOS group was also categorized in the abdominally obese category using the Asian WC standards, but not the NIH standards.

This difference in BMI and WC between the PCOS and control groups is not surprising since the majority of women diagnosed with PCOS also contend with issues of overweight, obesity, or at least excess abdominal fat. Breaking down BMI and WC by both the International and Asian BMI Cut-offs underscores the significance of using the Asian cut-offs when researching Asian populations. As explained in Chapter 5, the WHO's assignment of weight class status based on BMI classifications of normal, overweight and obese, does not change when using Asian BMI cut-offs. What does change is the moderate health risk guidelines start at a BMI of 23 for Indians rather than at 25 with the international standard. This means that for clinicians using Asian cut-offs, an ideal BMI of less than 23 rather than 25 is the goal to maintain a lower risk of metabolic health problems such as diabetes. In other words, a patient who has a BMI of 23 will be treated the same as one that has a 25 in regard to metabolic risk prevention.

When using the International BMI classifications, the PCOS group was 46% overweight/obese. Using the Asian cut-offs, 76% of the PCOS group, rather than the 46%, were placed in the moderate to high risk category for metabolic health disturbance. For WC of the PCOS group, if I used the NIH WC classification, 33% of the PCOS group was considered abdominally obese. However, using the Asian cut-off instead places 70% of the PCOS group into an abdominally obese classification.

This difference in percentage of BMI when using the Asian cut-off entails a 30% difference between the two standards. This difference represents a substantial number of women who would be overlooked for having the same degree of health risks as the women originally accounted for. As for WC, when using the Asian WC standard there was a 36% difference for the PCOS group. Again, this difference represents many women who would be overlooked and not considered abdominally obese, when by Asian standards, they should be. Using the Asian cut-offs for Indian metabolic health studies like mine is warranted; earlier detection of these metabolic health risks may aid in preventing the health risks from escalating (Snehalatha et al. 2003).

#### Overweight Preoccupation

The participant's perception of their BMI (or weight) and WC and their overweight preoccupation may have most heavily influenced how they answered the survey questions on this subscale. Again, using Asian classifications of BMI and WC data from Table 1, 74% of the PCOS group was at least overweight ( $BMI \geq 23$ ) and 70% were classified as abdominally obese ( $\geq 31.5$  inches), whereas comparable classifications for the control group were 41% and 34% respectively.

In regard to the PCOS and control groups, before multivariate analyses were completed, the groups differed significantly in the MBSRQ-AS subscale Overweight Preoccupation. Women in the PCOS group reported a higher overweight preoccupation than controls. Within middle to upper class women in Delhi, if bigger women are more preoccupied with their weight there may be a developmental trajectory of this preoccupation that is evident in adolescence. Briefly discussed in Chapter 2, results of



Chugh and Puri's study indicate that participant concerns about being overweight were prevalent in all groupings of adolescent Delhi-ites (underweight, normal weight, and overweight/obese), however the overweight/obese group was more likely to report a higher concern with being overweight and body image dissatisfaction (Chugh and Puri 2001). Chugh and Puri did not investigate PCOS, however given the scant literature on these topics of urban Indian women, especially Delhi-ites, this study is worth comparing from a developmental aspect.

As discussed in the results, once controlling for confounding effects of BMI and WC, marital status, and geographic location, there were no longer statistically significant differences between the PCOS and control groups in their survey answers on the Overweight Preoccupation subscale. These analyses indicate that these confounding variables (e.g., BMI) accounted for the group differences in Overweight Preoccupation that had arisen in univariate analyses. Considering the differences in BMI and WC between the PCOS and control group, 30% more women in the PCOS group were at least overweight and abdominally obese. Given this, BMI and WC can be used interchangeably in this study as they are colinear covariates with respect to Overweight Preoccupation. When adjusting for BMI and WC, higher BMI and WC measurements for the PCOS group accounted for the difference in scores for this subscale, thereby negating differences between group scores. Additionally, single adjustments for either marital status or geographic location alone did not sufficiently explain these differences.

As for marital status, 91% of the PCOS group was married as opposed to 50% of the control group. The mean score on the Overweight Preoccupation scale of all the married women in the study (n=46) was 3.04 (on a 1 – 5 scale), whereas the score of unmarried

women (n=19) was 2.59. However, the married women also had a mean BMI score of 24.3 (WC 32.8) and the unmarried were 22.6 (WC 30.5). So although marital status covaried with how women answered the Overweight Preoccupation scale, the BMI difference between married and non-married women may have explained overweight preoccupation differences.

As for geographical residence, the majority of the control group (65%) resided in North Delhi, whereas the PCOS group was spread out more geographically (33% of the PCOS participants live in North Delhi, 24% South Delhi, and 42% in the Other category). Although this statistically appears to be a covarying factor in survey answers, it is difficult to pinpoint why this was. Delhi exhibits regional diversity. For example, North Delhi manifests a more conservative and traditional lifestyle, whereas South Delhi presents a more modern and liberal lifestyle. However the Other category includes women from East, West, and any unspecified area in the Delhi National Capital Region (NCR), meaning that women who did not specify what particular area within Delhi they live in could have been from any part of the city.

These three geographic categories were constructed this way in order to not violate statistical assumptions of the Chi-Square test. Because of the small sample size, it was impossible to incorporate all the residential areas individually in the Chi-Square test. This classification makes it difficult to accurately assess the difference in survey answers according to geographic residence. Although there may be patterns of differences in body image appearance and overweight preoccupation geographically in Delhi, due to highly diverse lifestyles associated in each location, my study cannot accurately resolve them.

## Weight Class

For the Weight Class Scale, only BMI and WC served as significant covariates in how women reported their weight class. Before statistical regressions and ANCOVA tests were conducted, the PCOS group and control group differed significantly in the MBSRQ-AS subscales and Weight Class, in that the PCOS women's self-reported mean weight was higher than that of the controls. The PCOS group classified themselves into a higher weight class than the controls; realistically, the majority of them were. This finding of a fair and realistic evaluation of weight class by urban Indian women of reproductive age is somewhat consistent with results from the study of Indian and Canadian women discussed in my literature review (Gupta et al. 2001). Gupta et al. concluded that Indian women in their study were less likely to report a distorted or overestimation of fatness in body areas of abdomen, hips, thighs, and legs, than the Canadian women, even after controlling for BMI (Gupta et al. 2001).

These results may seem intuitive and rather simple in that, naturally, if a person is classified as overweight according to their BMI or WC, they would classify themselves as overweight. However, this may be truer among Indian women, as Gupta et al. found, compared to women in other populations. Interestingly, the urban Indian women in my research population were incredibly in tune with the experience of their body habitus and how they fit into the rapidly evolving urban Indian perceptions and cultural ideals for weight status

## Results and Hypotheses

How do the key findings align with my thesis hypotheses? As listed in Chapter 3, I sought to test the following hypotheses based from knowledge of current literature in biology, endocrinology, psychology and cultural anthropology, plus additionally, results of my pilot study:

H1a) Urban Indian women with PCOS would retrospectively recall feeling less feminine and participating in less feminine activities (in their childhood and/or adolescence) than controls.

This hypothesis was not supported. Quantitative tests of this hypothesis suggested no significant differences between groups based on recollections from their childhood. If there were pre-dispositional gender identity or sex role differences in feelings and behaviors from childhood, between women with PCOS and controls, the nuances may have been too subtle for the survey to detect. Also, I am unaware of any Asian or Indian version of The Recalled Childhood Gender Identity/Gender Role Questionnaire, or for that matter, any other survey recalling childhood gender that has been developed for urban Indian use. Therefore, it is not entirely clear if these questions are culturally sensitive to urban Indian populations. For example, one question on the survey asks how the participant felt about being a girl during her childhood; another question asks if as children if they ever have a desire to be boy? Many of the participants completing the survey would mention to me that they would often want to be a boy. When I asked them to explain this to me, their answers were based on social norms for boys receiving preferential treatment, since boys are often the desired sex of the parents in traditional Indian cultures. This questionnaire does not discern the meaning of “wanting to be a boy”

in regard to gender identity versus having access to more resources because of cultural customs; therefore wishing they had been born a boy so they would receive the resources and appreciation that sons have received in the past.

Qualitatively, this hypothesis was not supported either. Within the adolescent section of the interview, I did ask about free time activities and if women felt like other girls their age. My data suggest that there were no adolescent patterns that differed between the PCOS and Control groups. However, these results were only based on the five key participants. Also, not all the key participants resided in Delhi during their adolescence, so even if there were small differences, it is difficult to disentangle the diversity of different Indian populations in regard to femininity and feminine activities.

H1b) Urban Indian women with PCOS would report currently feeling and looking less feminine and participating in less feminine activities than controls.

This hypothesis was not supported. The Adult Gender Identity questions that I crafted were the quantitative measures used to test this hypothesis (See Appendix A). Described in Chapter 5, one of the questions that differed significantly between the PCOS and Control groups was how they rate their adult free time activities, from very masculine to very feminine. Surprisingly, the PCOS group reported more feminine responses than the controls. This result may have arisen for several reasons. Perhaps the women with PCOS felt that they needed to respond with more feminine answers to keep in line with similar answers to the rest of the questions, whereas the controls did not. However, from this one question, it is difficult to discern a pattern of gender differences in adulthood between groups. Similarly, the PCOS group reported their best girlfriend as being more feminine than the control group. Qualitatively, there were no patterns in interviews or participant

observation indicating that PCOS or control women felt differently about their current femininity.

H2) Urban Indian women with PCOS would report currently as an adult feeling more dissatisfied with their body image and appearance than controls.

This hypothesis was partially supported. Quantitatively, the only body image results that differed between groups were the Overweight Preoccupation and Weight Class subscales. The Overweight Preoccupation scale did not directly ask about body satisfaction; however, the scale assesses the participant's fat anxiety, weight vigilance, dieting and eating restraint (Cash 2000). Participants with higher Overweight Preoccupation subscales scores reported higher frequencies of these behaviors possibly due to body image appearance dissatisfaction. Qualitatively, discussions with many Indians, in addition to my participants, about importance of appearance and striving to be thin illustrated why controls and women with PCOS were both dissatisfied with their appearance.

All of my key participants were interested in talking about body image and appearance with me, and the importance of it for health and beauty. However, the three PCOS women appeared more distressed about their weight in regard to emotions and attractiveness, whereas my conversations with Aankhi and Alec (controls) were based on health concerns rather than beauty.

H3) Urban Indian woman with PCOS would report current a more negative PGWB or at least more severe depressive symptoms than controls.

This hypothesis was not supported. Although these results do not coincide with previously discussed literature from Chapter 2, there are a number of reasons this could

be. Given that the majority of the PCOS group was married, live in different areas of Delhi, and have a higher BMI and WC than the controls, it is quite surprising that there was no statistically significant difference on the PGWB on any of the 6 subscales between groups. However, there may be pressures in both group's lifestyles: being married or unmarried, living in North Delhi or South Delhi, being thin or heavy, student or housewife. Collectively, these pressures may equal up to similar sources of anxiety or depression and overall psychological health and well-being.

H4) Urban Indian women with PCOS would retrospectively report (in childhood and/or adolescence), participating in less social activities, and greater dissatisfaction with their appearance than controls.

This hypothesis was not supported. No quantitative measure was used to investigate this, and only one of the three key participants, Pooja, reported being less social, outgoing, and satisfied with her appearance as a child and adolescent. However, interestingly, Pooja was the only key PCOS group participant who had PCOS symptoms in her adolescence such as weight problems. In contrast, Preeti and Nandini, both control women, did not report PCOS symptoms until they were adults. This rationale for this hypothesis was based on a developmental biopsychosocial and behavioral trajectory of pubescent young women with PCOS symptoms, like Pooja. This hypothesis did not account for women not being diagnosed with PCOS until adulthood. This is not to say that women, who are symptomatic later in life, were not predisposed at an early age. Rather, the developmental trajectories for PCOS may be more variable than I previously hypothesized.

H5) Urban Indian women with PCOS would less likely be married, have children, or participate in family-based activities, but more likely to have a career and participate in more solitary activities than control women.

This hypothesis was not supported based on the demographic information of the women who participated in the survey portion of my research. As summarized on Table 1, the women in the PCOS group were more likely to be married (91% of PCOS group), unemployed or housewives (64%) and 52% of them had an education of a master's degree or higher. Of the control group, 50% were married, 69% of them were either students or working, and 34% of them had an education at a master's degree level or higher.

However, these results may be explained by a few factors that were not controlled for in my research. The majority (27) of the PCOS group were recruited from Dr. Agarwal's clinic, whereas the majority of the control women (20) were recruited by word of mouth. As discussed earlier, the majority of women who come to see Dr. Agarwal are married; therefore, this hypothesis could not be tested without a marriage bias. Also, since it is uncommon in India for middle and upper class women to have children unless they are married, this hypothesis cannot be tested properly for the unmarried women in my research population.

Qualitatively, I was unable to collect data on solitary or non-solitary activities of research participants or understand the reason why women in the PCOS group were more educated. From conversations with multiple Indians, middle to upper class women do not typically get married until they at least they have their bachelor's degree, and after that, they may carry on with further education after they are married. Therefore, some of the



control group may be single and finishing their education, or married and finishing their education. Therefore, these major differences between the groups hindered reaching any conclusive tests of this hypothesis.

### Limitations

Throughout this thesis, I have alluded to many of the study's limitations. First and foremost, recruiting women in Delhi that fit my recruitment specifications was challenging. Most challenging was recruiting women who are diagnosed with PCOS without the collaboration of a physician. Dr. Agarwal at Sant Parmanand agreed to collaborate with me on short notice, given that my collaborations with other hospitals fell through shortly before I arrived in Delhi. The trade-off of having access to doctor-confirmed cases of PCOS was that I quite possibly recruited a sample of women who are not representative of the population of women residing in Delhi diagnosed with PCOS. Furthermore, upon recruiting from the clinic, the next challenge was to recruit a group of women who would serve as a representative population of control women. Recruiting controls only from the clinic seemed like the best scenario given that they may be going through similar fertility situations without PCOS. Thus, the PCOS diagnosis would be the only major difference between the groups. Because of time and funding constraints, I was unable to recruit the majority of my controls from the clinic; therefore I began recruiting controls from other contacts.

Another limitation in recruitment was a language barrier. Only women who could read English were recruited for my study. Therefore, I missed the opportunity of recruiting women who only read and spoke Hindi or another language. Because of the

many languages spoken in India, within Delhi at least, people are more commonly fluent in Hindi and less commonly fluent in English, unless they are more upper class and have a higher education, or specifically studied English in their education.

Once recruited in the clinic, I gave the participant the consent and survey to complete while they were waiting to see Dr. Agarwal or after seeing her or to bring back to the clinic at another time. At any of these moments, the social environment in the clinic means that family members, clinic staff, or others may be able to view women's answers to survey questions. Therefore, women completing the survey in the clinic may not have been as honest or careful about how they answered the survey. Most often couples and their mother-in-law came together to see Dr. Agarwal, so anyone accompanying the participant may have watched how she answered or even helped her fill out the survey. Even for participants who were recruited outside of the clinic, others may see what the participant answered or have influenced the participant's answer.

Another limitation in my recruitment was that many of the participants from the PCOS group who were recruited from the clinic did not even know they had PCOS when I approached them. They may have been told that they have hormonal dysfunctions, but they may not have been aware that they were even diagnosed with PCOS. A lack of conceptualization of having a PCOS diagnosis was not controlled for in my recruitment strategy. While some women knew about the syndrome and knew they had it, others had no clue about it. Since these participants most likely came to Dr. Agarwal for fertility treatment, she may not be treating them for PCOS per se, but treating the fertility issue. There may be a difference in the way that women answered this survey if they are aware of PCOS and its symptoms versus women who have PCOS and do not even know they

have it, or if they do, know very little about it. Alternatively, some of my control group may actually have PCOS and not even know it, especially if they are not married or trying to get pregnant.

Given that many urban Indian women do not go to a gynecologist before they are married, they are often not diagnosed with PCOS until after adolescence and in their mid to late twenties. The basis of this research was to investigate a possible developmental trajectory of phenotypical and behavioral predispositions for PCOS women who can be diagnosed with PCOS during puberty. Hence they would then be forced to cope biopsychosocially with PCOS symptoms from adolescence into adulthood. This hypothesized developmental trajectory may not be cross-culturally applicable. There may be different pathways to the development and conceptualization of this syndrome in India compared with the more typical processes of diagnosis in the U.S. or Europe. There may be a higher prevalence of “late onset” or at least late diagnosis in India, perhaps influencing how women answered questions on the survey or during interviews.

More research that investigates differences in the biomedical definition and treatment of reproductive disorders such as PCOS is clearly warranted given the differences observed in my study. Lastly, regarding recruitment, Delhi is culturally diverse. Since Delhi is one of the largest metropolitan cities in India, many Indians have migrated there in search of jobs, education and opportunities for improved living conditions. Given this, it is very difficult to recruit women with similar socio-demographic profiles. Within Delhi itself, geographical locations are diverse in lifestyle, housing, and social class. Even people living in the same neighborhood can have completely different lifestyles. For example, some families are very modern, living in a nuclear family where the wife

has a career outside of the home, while their neighbors may live a more traditional lifestyle living with joint families where the wife works in the home under the supervision of the mother-in-law. Women from both of these families can dress, work, and live completely different lifestyles. This diversity between and within geographic locations of Delhi NCR may affect how women answer their surveys or interviews, regardless of being in the PCOS or control group.

Lastly, living in Delhi for four months was not enough time to adequately collect field data on such complex topics such as gender identity, body image, and psychological health and well-being of women with PCOS and controls. Although the mixed-method approach was helpful in providing a data-rich experience, more in-depth observations about Delhi culture and women are needed to fully understand the complexities of this research.

#### Implications for Delhi Culture

“Delhi is the city whose reach always exceeds its grasp and when today becomes tomorrow as we speak” (Santosh Desai, 2010:252).

In light of a rapid flux of Western influences on lifestyle and cultural ideas of beauty, an increase in high BMI and WC prevalence in urban India is currently underway. Delhi is often described as the most rapidly changing metropolis in India (Sengupta 2007). It is a hub of rapid negotiations between modern influences and traditional ideals of the “new Indian woman” (Kakar and Kakar 2007). It has been described that this change from the traditional to modern is that now, “women are being allowed to come out of homes only to be locked up inside the mental cage of external appearance...triumph in job interviews,

successful marriages, dates with hot hunks, approval of peers, all need to be won through slick surfaces” ( Desai, 2010:268-269).

Media in the form of print and television wield influential Western ideals of how modern women should act and look (Batra 2007, Desai 2010). The shift toward advertising Western and “thin ideals” of beauty for Indian women has largely taken place within the last two decades (Batra 2007). This shift was inspired by the promise of the rising middle class consumers of modern India (Batra 2007). With this middle class economic upheaval in urban India, global markets of foreign beauty products like Neutrogena, Garnier, and Revlon can be seen on cable TV commercials, billboards, and in women’s magazines like Femina (Batra 2007). However, urban Indian women are not completely sucked into the vortex of Western ideals of beauty. These foreign beauty product companies cater to the “new Indian woman’s” needs and tastes. For example, ads offer beauty products that are comprised of ingredients and fragrances that Indian women are used to and prefer. This represents a kind of aesthetic syncretism. The emphasis of modern and Western beauty in Indian media ads have had an influence on today’s urban and modern Delhi-ite’s body image evaluations.

Paradoxically, thin ideals aren’t the only incoming changes to Indic culture, with Westernization also comes the rising global obesity epidemic. As discussed in the introduction, India is experiencing a rapid increase in Western diets of high calorie, high fat, processed foods in conjunction with more sedentary jobs like working in call centers. Since the 1970’s, this influx of rapid changes in ideals of beauty to a thinner body type (Batra 2007) has being challenged by the ever increasing obesity epidemic in middle to upper class urban India. As if the “new Indian woman” had enough to contend with, the

impact of this thin ideal-obesity epidemic on urban Indian women's biopsychosocial experience has yet to fully unfold. In the next decade, urban Indians will have to negotiate these challenges to their health and psychological well-being.

The high prevalence of overweight and obese women diagnosed with PCOS in my study is an important contribution to the growing literature on PCOS cross-culturally and in Asian populations, specifically Indians. This high prevalence within my sample population may be indicative of the many urban Indian women who are at a serious risk for multiple metabolic and reproductive implications such as diabetes and infertility (Allahbadia and Merchant 2008, Snehalatha et al. 2003). Understanding these health issues and possible psychosocial implications may better prepare Indians who are grappling with the after effects of chronic irreversible metabolic and reproductive health sequelae, like PCOS, that is associated with the global obesity epidemic.

#### Evolutionary Approach to Westernized Ideals of Beauty

“It is certainly not true that there is in the mind of man any universal standard of beauty with respect to the human body” (Darwin, 1871:353).

Can Charles Darwin's account of cross-cultural differences in beauty ideals withstand the globalization of Western notions of beauty? As briefly discussed in the body image literature review in Chapter 2, a person's own body image evaluations and other's evaluations of them can have a large impact on daily interactions (Pruzinsky and Cash 2002, Swami and Furnham 2008). Cultural concepts about human appearance body image and physical attractiveness have evolutionary roots serving as cues for reproductive maturity and health. These cues are “accessible” visual information for

strangers and well known family and friend's judgments of a person (Furnham and Swami 2007, Swami and Furnham 2008:10). These judgments may have long term impacts on a person's quality of life trajectories (Swami and Furnham 2008). For example, on average, attractive individuals are often equated with more positive attributes than less attractive people (Calogero et al. 2007, Swami and Furnham 2008).

Previous research has shown that physically attractive babies and children receive the most attention from mothers and caregivers. In school they tend to be more popular with teachers and other students and are more likely to prosper academically. Continuing with this positive trajectory, in college, attractive students are prone to have good grades in college, regardless of their quality of work (Furnham and Swami 2007). These positive developmental experiences can impact adulthood, where attractive adults are known to marry and get hired for jobs with higher salaries, than less attractive adults (Furnham and Swami 2007).

Evolutionary adaptations of visual cues influence cultural attitudes about appearances. Within each culture, a healthy physical appearance of a person informs possible mates that they are reproductively viable and healthy. Thus, healthy appearances are associated with positive attitudes toward that appearance, where negative attitudes are associated with unhealthy appearances. In competition for reproductive fitness, if healthy bodies are associated with physical attractiveness, importance on physical beauty and attractiveness have evolutionary roots based on biological and ecological adaptationist theories (Anderson et al. 1992, Furnham and Swami 2007, Swami and Furnham 2008).

Within the broad scope of human physical attractiveness, importance on body weight is particularly relevant to this thesis. Male preferences for female's body weight and

shape has been debated considerably among scholars (Anderson et al. 1992, Scott et al. 2007, Swami and Furnham 2008). Some research suggests that a female's body weight may be one of the most important factors in what makes them attractive to men (See Swami and Furnham 2008 for review). This appears intuitive given that a person's body weight or body habitus is first evaluated, even from a distance (Swami and Furnham 2008). Evolutionarily, cues of body weight can be reliable sources for information on health and reproductive qualities where women who are too heavy or too thin may not be healthy or reproductively fit. However, there is no universal consensus on ideal body weight or fatness (Swami and Furnham 2008).

Some differences in body weight preferences have been explained by different levels of socioeconomic status where, generally, lower socioeconomic groups tend to prefer heavier women and higher socioeconomic groups tend to prefer thinner women (Tovée et al. 2007, Swami and Furnham 2008). Also the modernity status of populations can influence population preferences on body weight such as differences between urban versus rural Indian populations (Swami and Furnham 2008). Urban India is undergoing such rapid economic and socioeconomic change as seen by a rising middle class and the migration of rural workers to urban cities. From the influx of socioeconomic changes for urban Indians, constant negotiation of cultural ideals of beauty and body weight attractiveness can take place across all socioeconomic levels.

Within one generation's time for some Indians, Western notions of beauty and thin ideals, pushed through the media, are supreme goals for young urban Indian women in their efforts to secure their future in marriage, careers, and social status (Batra 2007). Due to socioeconomic increases of the middle class, they have gained the spending power to



buy the types of food like Western style fast food, which their parents may not have afforded. With stable food resources, urban middle class Indians can be less concerned with such matters as finding a next meal; rather, concerns about appearance, and even weight gain may be more frequent. As India develops and the middle class continues to gain more spending power as international consumers, Western notions of the thin ideal for physical attractiveness will surely stay. However, along with the permanence of a thin attractiveness ideal, so too will be the permanence of consumption of calories and increased sedentism that Western populations have already and still contend with.

This paradoxical relationship of thin ideals of attractiveness and an obesity epidemic has strong biopsychosocial implications for urban Indians, where being overweight and obese has negative associations with poor health and unattractiveness. This is indicated by the results of this study where the heavier women reported having more overweight preoccupation. However, rural India is not exempt of these implications as cultural negotiations of Western and traditional ideals spread through transmigration and trade to and from rural India. Among these cultural negotiations, traditional ideals about fatness being positively associated with upper class and attractiveness can shift toward negative associations with fatness due to Westernized urban influences.

These negotiations of body size and Western ideals between rural and urban populations, and also modern and traditional attractiveness ideals, have been observed in other cross-cultural societies such as, rural and urban Samoans in American Samoa. Researchers have observed differences in the internalization of Western thin body image ideals and dissatisfaction with body fatness for urban Samoans in American Samoa versus less body fatness dissatisfaction for rural Samoans where fatness has traditionally

been praised as beautiful (Swami and Furnham 2008). Further research will be helpful in understanding the influential impact of Western diet, lifestyle, and body image ideals to the biopsychosocial experience for rural and urban Indians during this time of rapid change.

## CHAPTER 7

### CONCLUSION

“You can tell the condition of a nation by looking at the status of its women”.

- Jawaharlal Nehru (India’s first prime minister)

“Indic culture and the historical change in the wake of India’s encounter with the West is most clearly seen in the case of the modern, urban Indian woman... (who) is engaged in a struggle between two opposing forces in her psyche as she seeks to reconcile traditional ideals with modern aspirations (Kakar and Kakar 2007: 41-42).

In light of negotiations described in the above quote for “new Indian women”, balancing traditional ideals on health and fertility with modern metabolic and reproductive burdens are not easily reconciled. Paradoxical relationships with modern lifestyles of over-consumption and weight gain are then haunted by Westernizing notions of beauty, health, and a thin ideal. Negotiating overconsumption with thin ideals will no doubt adversely affect the physical and psychosocial health of present and future generations of Indians, especially women diagnosed with PCOS.

If this is true about psychosocial trajectories adversely affecting urban Indian women with PCOS, then how can I explain my results? As listed in Chapter 3, the objectives of this thesis were : 1) to determine whether patterns of gender identity, body image and PGWB differ between urban Indian women with PCOS and control women; 2) to determine whether these differences appear earlier in development (childhood, adolescence) or emerge at adulthood; and 3) to observe similarities and differences that may exist cross-culturally regarding gender identity, body image and PGWB for women

with and without PCOS in urban India. However, I was unable to determine if patterns of gender identity or PGWB differed between the PCOS or control groups. The quantitative data would suggest no, and the qualitative data were not sufficient to reach a conclusion on gender identity or PGWB. As for body image, the subscales of overweight preoccupation and weight class appeared significantly different between the two groups until confounding demographic and anthropometric data were controlled for statistically.

Although my data suggest that no differences in gender identity, PGWB, and body image exist between the PCOS and control groups, there are some strong signs that these results may not fully reflect the realities of women with PCOS. It is possible that I had not used the appropriate survey or interview tools sensitive to this particular population of women. Given the limitations outlined in Chapter 6, and what is understood about the psychosocial experience of women with PCOS in the literature, it is questionable that differences do not exist in these psychosocial realms for this study population. For example, in this study, the women of the PCOS group have significantly higher BMI's and WC measurements than the control group.

There is strong evidence to suggest that weight gain and inability to lose weight, as symptoms of PCOS, may have negative effects on the psychosocial health and well-being and experiences of urban Indian women in Delhi diagnosed with PCOS. This is plausible, given the present results that heavier women on average were more preoccupied with their weight and the PCOS group was on average heavier than the control group. Perhaps further in-depth research in these relationships with marital status, economic level, and geographic location may aid in illustrating possible unique psychosocial patterns of body weight appearance in urban India.

My qualitative observations of the five key participants, and my experiences in Delhi culture, illustrate a more complex situation for women with PCOS than what the quantitative results indicate. Weight gain but also inabilities to lose weight or conceive a baby are important topics on the minds of women of whom I spoke with. Women with PCOS in Delhi contend with these issues coupled with the stressors of being “new Indian women”. As “new Indian women”, the participants in my study undergo daily pressures of adhering to traditional ideals of womanhood and marriage while incorporating modern ideals of independence, media and cultural influences of beauty and health. Despite exciting changes in socioeconomic status and modernity, Indian women of reproductive age encounter other stressors such as a diagnosis of PCOS, including obesity and infertility. A better understanding of urban India in this time of flux, in regard urban women’s roles, diet, lifestyle and consequential physical and psychosocial health, especially for women with PCOS, is highly warranted.

Within the clinical, public health and research sectors, using a multidisciplinary approach of evolutionary, cross-cultural, historical, psychological, and holistic medical contributions may prove effective in better understanding, treating and possible prevention of such health and psychosocial issues related with PCOS in India and cross-culturally. Furthermore, using culturally appropriate standards such as the Asian BMI and abdominal obesity cut-offs will be integral in effective treatment and prevention of exacerbated health disturbances for Indians. Differences in the percentage of overweight and obese women in the present study when using the standard international BMI and WC criteria, versus the Asian cut-offs are statistically significant, and rather shocking. If these differences (up to 30% of women possibly categorized as being at low-risk for

metabolic disease instead of moderate-high risk based on their BMI or WC), are representative of Delhi, or urban India, then there is a strong possibility that this percentage of women are at significant risk for type 2 diabetes and related health sequelae and do not know it. This example from my study illustrates the importance of using culturally appropriate diagnostic tools.

Of great significance for future work, the present study also highlights the complexity of conducting research on PCOS in urban India and, specifically, in Delhi. A small body of research exists on middle to upper-class women in Delhi in regard to gender identity, body image and PGWB, let alone PCOS. I was unable to locate any support groups dedicated to women with PCOS in Delhi, within the city itself, or on the Internet. Many discussions with Delhi-ites on this subject were helpful in understanding why this could be. Delhi is known to be traditional and more conservative than other urban cosmopolitan cities in India south of Delhi, like Mumbai. Seeking emotional and educational support on sensitive topics such as PCOS symptoms of infertility and obesity from strangers is not traditionally a cultural practice in Delhi.

Support networks for this type of topic include other close women such as moms, aunts, and friends. However, if their friends or family have not experienced these problems, or know much about them, then a woman with PCOS may not have much support on the subject. Also, if the woman with PCOS resides in a traditional living arrangement with her in-laws, and in most cases not near her family and friends, it is possible that they do not have much of an emotional or educational support network on these matters. Given all of this, it is quite possible that many of the women in Delhi, who

have PCOS, may not know they do, and if they do, they likely are not participating in open discussions about it.

Recruitment of women with PCOS is much different in Western countries such as the U.S., where women discuss these issues on open forums with strangers on the Internet, and attend PCOS support groups in their community. American women even openly identify themselves as women with PCOS by wearing the dedicated teal PCOS awareness ribbons and posting their awareness and acceptance of having PCOS on their blogs and websites. Approaching women with PCOS in the West is quite different as they seem much more open to strangers about their symptoms and how it affects them, whereas, with my experience in Delhi, it was difficult for some of these women to open up about it, or express how they feel about it. As discussed previously, the diagnosis, treatment and conceptualization of PCOS may be quite different within Indian populations and especially cross-culturally.

Although the prevalence of a clinic diagnosis is similar to Western countries, my qualitative experience suggests that a PCOS diagnosis and treatment may be conceptualized differently in other populations within India, but also cross-culturally. In my travels to Goa, Mumbai, and Kolkata during my stay in India, conversations with other women who have PCOS helped illustrate how prevalent PCOS is in other urban areas of India, but the approach of how it is coped with, treated and understood is quite different. Where some know a lot about it, and actively participate in their treatment, others are aware of the syndrome but did not worry much to do anything about it, while others had little to no knowledge or awareness on how to alleviate the symptoms.

From a medical anthropology and public health perspective, more research on how women with PCOS cope with the diagnosis, symptoms, and treatment, and how this may affect outcomes of physical and psychosocial health, is warranted. Also, investigating how clinicians conceptualize and treat PCOS and outcomes of their patients would prove helpful in understanding differences in cross-cultural health disturbances.

In closing, the present research contributes to the understanding of a growing PCOS epidemic in urban India and specifically in Delhi. “Epidemic” was the term most frequently used by physicians in Delhi to describe the prevalence of PCOS in Delhi. This concern for the metabolic and reproductive health for these women does not include the women who may have PCOS and have never been to a gynecologist and who have yet to be married. The focus of this thesis was to understand the psychosocial effects of having PCOS in regard to gender identity, appearance body image and PGWB. Although the hypotheses regarding these topics were not confirmed quantitatively, the qualitative data presented a more complex picture regarding women in Delhi with PCOS. This qualitative data suggest the possibility that women with PCOS do contend with a different set of issues physically and psychosocially that women without PCOS, such as an inability to lose weight and infertility.

These additional stressors, in a culture that places great importance on a thin appearance and fertility, may affect the psychosocial health of women with PCOS adversely and may be more so than the average stressors of being a “new Indian woman” in urban India. One of the major themes that came out of both the quantitative and qualitative research presented here is a preoccupation with being overweight. Although the heaviest women were the most preoccupied with weight, my qualitative work



suggests that the importance on being thin is common for all middle to upper-class women in Delhi, especially those of reproductive age who are trying to get married or have children. The results presented here indicate that further research on conceptualization, coping and treatment of PCOS, diet, lifestyle, gender roles, PGWB, body image, marital status, socioeconomic status and geographic location, is necessary to better understand the physical and psychosocial dimensions and effects for urban Indian women with PCOS. Future research on these topics is important during this paradoxical flux where modern influence and aspirations come with harsh physical and psychosocial realities for urban Indians.

APPENDIX 1

ADULT GENDER IDENTITY QUESTIONS

You are asked to indicate the extent to which each statement pertains to you personally. Please indicate your answer by entering the number that your answer best describes on the line provided. There is no right or wrong answers. Just give the answer that is most accurate for you. Remember, your responses are confidential, so please be completely honest and answer all items. The number that you indicate as your answer is based on a scale of 1-7.

1	2	3	4	5	6	7
Very Masculine	Mostly Masculine	Somewhat Masculine	Neither Masculine Nor Feminine	Somewhat Feminine	Mostly Feminine	Very Feminine

1. \_\_\_\_ Choose the number in the scale above that best describes how you feel.
2. \_\_\_\_ Choose the number that best describes how you think family members think of you.
3. \_\_\_\_ Choose the number that best describes how you think strangers view you.
4. \_\_\_\_ When thinking about your favorite free-time activities, choose a number in the scale above that best describes the activities or hobbies that you like to do.
5. \_\_\_\_ When thinking of your best girl friend, choose a number above that best describes her in your opinion.
6. \_\_\_\_ Using this scale above, how do you feel about yourself when you compare yourself to other women your age?

## APPENDIX 2

### CURRENT ADULT SECTION INTERVIEW

#### PCOS Interview

Interview # \_\_\_\_\_

Interview Date \_\_\_\_\_

I have asked you to come back for an interview because I would like to know more about specific experiences from your adolescence and also in your current life. I will be asking you to remember when you were a teenager and the activities you did and also how you felt at specific times. Please take your time when you answer me, and please be as honest as you can. I am happy to hear anything you have to say, and please remember that you will remain anonymous on the voice recorder as well as on my research notes.

1. Do you like living in Delhi?
  - a. If so what do you like about it?
  - b. What do you least like about it?
2. What do you do in your free time?
  - a. Do you have any special talents or craft
3. How old were you when you were diagnosed with polycystic ovary syndrome, or PCOS?
4. In your own words, how would you explain what PCOS is?
  - a. Do you know how you got PCOS?
  - b. What are the symptoms you have because of PCOS? (in other words, how did your doctor diagnose you?)
  - c. Which symptoms have been the worst for you to deal with?

- d. On a scale of 1-10, how would you rate the worst symptom? (1 being the least bothersome and 10 being the most bothersome)
5. Do you know anyone else with PCOS?
  - a. If so, do you have similar issues or complaints associated with PCOS? (menstrual cycle problems, weight gain, acne)
6. How are you and your doctor treating the PCOS symptoms? (Medicines? Diet? Exercise?)
  - a. How long have you been doing this?
  - b. Have your symptoms gotten better? Worse? Or the same?
7. What aspect of your life is most affected because of PCOS? (health, work, relationships)
8. Do you have children? If yes, how many?
  - a. If yes, was it hard to get pregnant?
  - b. If you have more than one child, was it hard to get pregnant with any of them?
9. If no, have you tried to get pregnant before?

### Control Interview

Interview # \_\_\_\_\_

Interview Date \_\_\_\_\_

I have asked you to come back for an interview because I would like to know more about your current life and specific experiences from your adolescence. I will be asking you to remember when you were a teenager, between the ages of 13-18, and the activities you did and also how you felt at specific times. Please take your time when you answer me, and please be as honest as you can. I am happy to hear anything you have to say, and please remember that you will remain anonymous on the voice recorder as well as on my research notes. Remember that you can leave the interview at anytime, if you do not want to complete it.

1. Do you like living in Delhi?
  - a. If so what do you like about it?
  - b. What do you least like about it?
2. What do you do in your free time?
  - a. Do you have any special talents or craft?
3. Do you have any medical or health issues that you see a doctor for?
  - a. If so, what are they?
  - b. What are the symptoms of each health issue?
  - c. On a scale of 1-10 how bothersome are your symptoms? (1 being the least and 10 being the most bothersome.
  - d. How has your life been affected by your health problems?
4. Do you know what polycystic ovary syndrome or PCOS is?

- a. If so, can you explain what it is
  - b. Do you know anyone with PCOS?
    - 1. If so, how do you know them?
5. Do you have children?
- a. If yes, how many?
  - b. If yes, was it hard to get pregnant? Please explain what happened.
  - c. If you have more than one child, was it hard to get pregnant with any of them?  
Please explain what happened?
6. If no, have you tried to get pregnant before?
- a. If yes, please explain your process(s) of what you did to try to get pregnant (IVF etc...).

## APPENDIX 3

### ADOLESCENT RECALL INTERVIEW

Now I am going to ask you to remember some experiences and feelings from when you were in your adolescence (13-18 years of age). Some of the questions I will ask may be hard for you to remember, so please be as honest as possible and if you do not know or remember, please just say so. Remember that your answers will remain anonymous and take your time in answering the questions.

1. In your early adolescence, (13-15), what were your favorite activities? (Reading, being with friends, games)
2. What about later between the ages 16-18? Did you still do the same activities? Or were you interested in new activities?
3. Where there activities that you liked that both boys and girls participated in ages 13-18?
  - a. If so what were they?
  - b. What was it about them that you liked?
4. Where there any activities that you liked that you did mostly with boys?
  - a. If so, what were they?
5. Where you outgoing or shy between the ages of 13-18?
  - a. Was it easy for you to make friends?
6. Between the ages of 13-18, did you spend most of your time with others your age?
  - a. Or of different ages? (what ages
  - b. If so, where they friends or relatives?

7. Did you like to do things alone?
8. What did you do alone?
9. Were you interested in fashion and beauty products between the ages of 13-18?
  - a. If yes, at what age(s)
  - b. If so, like what types of fashion or beauty products were of interest to you? Styles?
  - c. Did you read any women's magazines like Femina?
10. Did you read Fiction novels?
11. Did you dress the same as your friends?
  - a. How was your fashion style different?
12. Did you feel as pretty as your friends when you were a teenager? If no, why not?
13. Were you self-conscious about the way you looked?
  - a. Did you like the way you looked? And what you wore
  - b. Did you worry about your physical appearance?
14. What activity made you happiest when you were doing it?
15. Do you remember what you worried about the most during your adolescence?
16. Did you like your adolescent years? Or were you happy to become an adult? Why?
17. During your adolescence what was your biggest dream or wish for the future?
18. Was there anyone famous that you wanted to be like? Or look like?
  - a. If so, who and why?

Additional Comments



APPENDIX 4

IRB APPROVAL



**Social/Behavioral IRB – Expedited Review  
Approval Notice**

**NOTICE TO ALL RESEARCHERS:**

*Please be aware that a protocol violation (e.g., failure to submit a modification for any change) of an IRB approved protocol may result in mandatory remedial education, additional audits, re-consenting subjects, researcher probation suspension of any research protocol at issue, suspension of additional existing research protocols, invalidation of all research conducted under the research protocol at issue, and further appropriate consequences as determined by the IRB and the Institutional Officer.*

**DATE:** January 12, 2010  
**TO:** Dr. Peter Gray, Anthropology  
**FROM:** Office for the Protection of Research Subjects  
**RE:** Notification of IRB Action by Dr. Paul Jones, Chair *PJ/lt*  
Protocol Title: **Polycystic Ovary Syndrome (PCOS) in Urban India**  
Protocol #: 0910-3249

This memorandum is notification that the project referenced above has been reviewed by the UNLV Social/Behavioral Institutional Review Board (IRB) as indicated in Federal regulatory statutes 45 CFR 46. The protocol has been reviewed and approved.

The protocol is approved for a period of one year from the date of IRB approval. The expiration date of this protocol is December 17, 2010. Work on the project may begin as soon as you receive written notification from the Office for the Protection of Research Subjects (OPRS).

**PLEASE NOTE:**

Attached to this approval notice is the **official Informed Consent/Assent (IC/IA) Form** for this study. The IC/IA contains an official approval stamp. Only copies of this official IC/IA form may be used when obtaining consent. Please keep the original for your records.

Should there be *any* change to the protocol, it will be necessary to submit a **Modification Form** through OPRS. No changes may be made to the existing protocol until modifications have been approved by the IRB.

Should the use of human subjects described in this protocol continue beyond December 17, 2010, it would be necessary to submit a **Continuing Review Request Form 60 days** before the expiration date.

If you have questions or require any assistance, please contact the Office for the Protection of Research Subjects at [OPRSHumanSubjects@unlv.edu](mailto:OPRSHumanSubjects@unlv.edu) or call 895-2794.

Office for the Protection of Research Subjects  
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