A RETROSPECTIVE REVIEW OF ANOREXIA NERVOSA PATIENTS ADMITTED TO A SPECIALISED EATING DISORDERS INPATIENT UNIT COMPARING CLINICAL AND DEMOGRAPHIC CHARACTERISTICS OF SUBTYPES

Nadira Vahed

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Supervisor: Dr L.M Motlana

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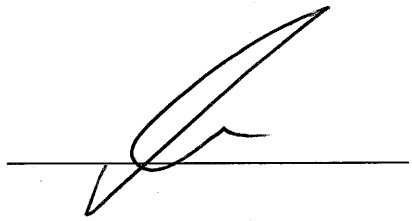
DECLARATION

I, Nadira Vahed, declare that this research report is my own work.

It is being submitted for the degree of Master of Medicine in Psychiatry at the University of the Witwatersrand.

It has not been previously submitted for any degree or examination at this, or any other, University.



Nadira Vahed

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ABSTRACT

Anorexia nervosa is a debilitating illness with the highest mortality rate of all psychiatric illnesses. Subtyping the illness into anorexia nervosa restricting subtype (AN-R) and anorexia nervosa binge-eating/purging subtype (AN-BP) has been a contentious issue since the inception of this subclassification in the 1994 DSM-IV. It has been proposed that there is little difference between the two subgroups and that categorising this eating disorder is of little utility and validity.

The aim of this study was to compare the characteristics of a group of anorexic nervosa patients admitted to a specialised inpatient eating disorders unit in Johannesburg, South Africa, to investigate the differences, if any, between the AN-R and AN-BP groups. The hypothesis was that there are aspects of the subtypes which differ and therefore validate the delineation of anorexia nervosa into the two subgroups.

The study sample consisted of 59 patients admitted to a specialised inpatient eating disorders unit with the diagnosis of anorexia nervosa, between January 2001 and December 2002. The study group was separated according to their sub-specific anorexia nervosa diagnosis: the AN-R sample (n=32) and the AN-BP sample (n=27). Various demographic and clinical features were reviewed.

This study's only significant result was the difference between the mean percentage of goal weight on admission between the two subtypes, with the average in the AN-R group being lower than that found in the AN-BP group (p-value=0.039). This study therefore does not provide sufficient evidence for the subclassification of anorexia nervosa. It is noted that a small sample size, inaccurate record-keeping and the possibility of diagnostic crossover may have influenced the outcome of this study.

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CHAPTER 1: INTRODUCTION

Eating disorders should be considered serious mental illnesses.(1)

Eating disorders (ED) are psychiatric disorders characterised by disturbances in eating behaviour, which are associated with significant emotional, physical and interpersonal distress. The Diagnostic and Statistical Manual of Mental Disorders, 4th edition, text revision (DSM-IV-TR), recognised 3 types of eating disorders: Anorexia Nervosa (AN), Bulimia Nervosa (BN) and Eating disorder not otherwise specified (EDNOS), which included eating disorder pathology which failed to meet the criteria for either AN or BN. This category also included Binge Eating Disorder which was described in Appendix B: Criteria Sets and Axes Provided for Further Study.(2)

"Overall, eating disorders are associated with some of the highest levels of medical and social disability of any psychiatric disorder. These conditions carry significant costs to the individual, their family members, and to society at large. Indeed, the 'life activities' of eating disorder sufferers are significantly impaired, sometimes to the point of early death."(1). AN accounts for 10-15% of all ED diagnoses (3) and has the highest mortality rate of all psychiatric illnesses. In addition, a study in the United States of America (USA) found AN to have a standardised mortality rate that is 12 times the annual mortality rate for all causes of death (natural and unnatural) among 15-24-year-old females.(4)

1.1 Definition

The direct translation of anorexia nervosa is 'nervous lack of appetite'. Its origins lie in the Greek words: *an* meaning absence or lack of, and *orexis* meaning appetite. This is combined with the Latin term *nervosa,* which signifies its association with what was thought to be a

'nervous' disorder. The term was first used in 1873, however the earliest medical description of this illness dates back to 1689.(5)

The DSM-IV-TR required four criteria to be met for a diagnosis of AN to be made:

A: Refusal[1] to maintain body weight at or above a minimally normal weight and height (e.g., weight loss leading to maintenance of body weight less than 85% of that expected; or failure to make expected weight gain during period of growth, leading to body weight less than 85% of that expected)

B: Intense fear of gaining weight or becoming fat, even though underweight

C: Disturbance in the way in which one's body weight or shape is experienced, undue influence of body weight or shape on self-evaluation, or denial of the seriousness of the current low body weight

D:[2]In post-menarcheal females, amenorrhea i.e., the absence of at least three consecutive menstrual cycles. (A woman is considered to have amenorrhea if her periods occur only following hormone, e.g., oestrogen administration) (2)

At the time of this study, the DSM-IV-TR, introduced in 2000, was still the diagnostic manual used by the psychiatric community. However, with the subsequent release of the Diagnostic and Statistical Manual of Mental Disorders, 5th edition (DSM-5) in May 2013, there have been significant changes to the eating disorders category, including a name-change to: Feeding and Eating disorders.

[1] The word 'refusal' has been removed from the DSM-5 diagnostic criteria for AN
[2] Criterion D has been removed from the DSM-5 diagnostic criteria for AN

The diagnostic criteria for AN have been revised:

- **Criterion A:** The word "refusal" (in terms of weight maintenance) has been removed, as it was felt that this implied intention on the part of the sufferer, and was viewed as possibly derogatory.

- **Criterion B: (amenorrhoea)** has been completely removed, as it does not represent pre-menarchal or post-menopausal females, females using oral contraceptives or males.

In addition:

- The frequency of binge eating episodes in Bulimia Nervosa has been reduced

- Binge eating disorder is now recognised as an Axis I eating disorder diagnosis

- The following disorders have been included in the DSM-5 Feeding and Eating disorders: pica, rumination disorder, avoidant/restrictive food intake disorder, other specified feeding or eating disorders and unspecified feeding or eating disorders (6)

This study utilised the DSM-IV-TR diagnostic criteria for AN.

1.1.1 Anorexia nervosa subtypes

The DSM-IV-TR specified AN (and the DSM-5 continues to specify AN) as either a restricting subtype (AN-R) or a binge-eating/purging subtype (binge/purge) (AN-BP). Individuals who fall under the restricting subtype essentially induce weight loss by limiting their calorie intake and may in conjunction increase their level of activity (e.g. excessive

exercise) in order to expend more calories. The latter group engage in binge-eating and subsequent purging behaviours (e.g. self-induced vomiting and laxative abuse) on a regular basis in order to maintain a low body weight. These binge-eating episodes are either subjective (i.e. the individual eats more than they intended to) or objective. The specific frequency of the binge/purge episodes is not defined.

The DSM-IV-TR specifies the anorexia nervosa subtypes as:

> **Restricting type:** during the current episode of Anorexia Nervosa, the person has not regularly engaged in binge-eating or purging behaviour (i.e. self-induced vomiting or the misuse of laxatives, diuretics, or enemas.
>
> **Binge-eating/purging type:** during the current episode of Anorexia Nervosa, the person has regularly engaged in binge-eating or purging behaviour (i.e. self-induced vomiting or the misuse of laxatives, diuretics, or enemas.(2)

The subtyping of anorexia nervosa into AN-R and AN-BP was first formally introduced in the DSM-IV (1994) and retained in the later published DSM-IV-TR (2000). With the review of eating disorders' criteria and classification in preparation for the recently released DSM-5, the subtyping of anorexia nervosa had been re-assessed. Despite the fact that it remains in the current DSM-5, whether these subtypes represent two distinct expressions of AN is still in question. Prior to the DSM-IV, anorexic patients who displayed binge-eating/purging behaviour were assigned a dual diagnosis of both anorexia and bulimia nervosa. However, there was already debate around the validity and utility of delineating AN.

The reasons for and against subtyping are numerous. Research has suggested that individuals with AN-BP tend to present later and have a longer duration of illness as opposed to their restricting counterparts.(7-10) The fact that the two groups have been found to differ in terms

of rates of psychopathology, types of psychopathology, family psychiatric history and rates of recovery, amongst others, is regarded as further evidence for this subclassification.(11, 12) However, some argue that eating disorders exist on a spectrum and that diagnoses do not remain static (13-15) making the subclassification of anorexia nervosa of little utility. Studies have shown that individuals may progress from the restricting form of AN to the binge/purge subtype, with crossover rates varying between 30% and 64%. The crossover rate from AN-BP to AN-R appears to be lower, ranging between 17% and 44%. (16, 17) It has been suggested that AN-BP may be a more chronologically advanced or severe form of AN, as opposed to a distinct phenotype(18), while Eddy et al. (2008) proposed that the AN-R and AN-BP subgroups may possibly represent phases, often recurrent, in anorexia nervosa. (17)

A valid classification system for an illness is a valuable clinical instrument. The clarification of diagnostic criteria in any disease, including AN, is important in implementing treatment, furthering research and planning effective prevention programs. Statistically significant evidence validating the AN subtyping schema would prove beneficial in the management of this illness.

1.2 Literature search method

In order to obtain source material for this literature review, an internet search using a number of internet-based search engines, including Pubmed,, Psychiatry online and the Cochrane library, was carried out. Once the pertinent information was identified, the applicable journal and any other relevant materials were reviewed for appropriate information. The reference lists of published literature were also reviewed. Search phrases and terms included: anorexia nervosa; anorexia nervosa restricting subtype; anorexia nervosa binge/purge subtype; differences between AN-R and AN-BP; anorexia nervosa phenotypes; subclassification of

eating disorders, and others, relevant to the material discussed in this research report. Literature that was not available in English was excluded.

1.3 Anorexia nervosa: an overview

1.3.1 Prevalence and incidence

The lifetime prevalence of AN varies but is generally lower than BN. The American Psychiatric Association places the lifetime prevalence of BN between 1%-4% and AN between 0.3%-3.7%. (19) In a study conducted in 6 European countries between 2001 and 2003, AN was shown to have a lifetime prevalence of 0.48% and BN 0.51%.(20) Although this was a mixed-gender sample, the researchers state that the eating disorders were three to eight times higher amongst women. A 2007 study conducted in the USA placed the lifetime prevalence of AN at 0.9% among women and 0.3% amongst men.(21)

The incidence of anorexia nervosa is on the increase in non-western countries. Between 1994 and 2002 the number of cases of AN in Singapore increased significantly from 2 to 24. Prevalence rates of 0.01% have been found in Chinese community samples, whilst in Japan, the prevalence rates of AN have been found to range between 0.025% and 0.03%.(22) There has also been a reported increase of eating disorders in Jamaica.(23)

There are South African studies of anorexia nervosa and eating disorders dating back to the 1970's, however, at the time of this study, there was no available current specific data regarding the prevalence of AN within the South African population.

1.3.2 Epidemiology

1.3.2.1 Gender and Race[3]

The ratios of female:male sufferers of AN range from 10 to 20:1(24), and, being of the female gender is considered to be a risk factor for the development of anorexia nervosa.(25) In North America, AN sufferers are found to be stereotypically white, adolescent females of the middle to upper socioeconomic bracket.(24) Likewise, this is the case in a large number of westernised countries. A similar demographic distribution of eating disorders has been found in South African studies. In a study carried out by Nash and Colburn (1994) in Cape Town, South Africa, looking at the outcome of hospitalised anorexics and bulimics between 1979 and 1989, the sample (n=49) was made up solely of white females from middle-class backgrounds.(26) However, research has demonstrated a growing trend of eating disorders amongst males and non-white females.(27) A 2007 study in the USA showed a 3:1 female:male ratio in their sample of AN sufferers.(21)

Within a South African context, a 10-year review (1987-1996 inclusive) (Gabriel & Szabo, 2001) of anorexia nervosa patients admitted to the Tara Psychiatric Hospital specialised inpatient eating disorders unit , showed that female and male admissions were 98% and 2% respectively. There was 1 male admission during the first 5 years of the study, while there were 4 male admissions during the second five-year period of the study. There were no recorded admissions of black patients during this ten-year period.(28) However, a later study done by Delport et al. (2008) demonstrated that black females accounted for 3% (n=13; 7 with the diagnosis of AN) of admissions to the same unit between 1998-2004.(29) It is anticipated that, within the South African context, the incidence of eating disorders amongst black individuals will increase. This is evidenced by studies demonstrating an emerging

[3] The terminology used to describe South African population groups (by race) in this study are: 'White' – of European descent; 'Black'- of African descent; 'Indian' – of Indian descent and 'Coloured'- of mixed-race descent. At certain points in this research report the term 'non-white' is used to refer to, collectively, those ethnic groups who are not of European descent. It is not the intention of the researcher to be derogatory or offensive in any way

pattern of disordered eating and abnormal eating attitudes amongst black South African adolescents.(30-32)

Subtypes: *gender and race*

There have been no specific studies looking at the distribution of race and gender amongst the AN-R and AN-BP subtypes. However, in South African studies of disordered eating patterns, black anorexic patients have been found more likely to present with bulimic symptoms as opposed to their white counterparts.(33, 34)

1.3.2.2 Age

Although the most common age of onset of AN is considered to be in the mid-teens and the period around puberty,(24) onset has been found in both younger and older individuals.(5)

A review of puberty in both human and animal studies has found data supporting the important role played by the onset of puberty in females as a risk factor for the development of eating disorders, including anorexia nervosa. This is most likely linked to a combination of both hormonal and psychological changes during this period.(24, 35)

Studies have utilised various cut-off ages for 'early' versus 'late-onset' anorexia nervosa, ranging between fourteen and fifty years. Looking at the differences between early-onset and late-onset anorexia nervosa, Matsumoto et al. (2001) showed that 48.4% of their study sample were under the age of 14 (where the definition of 'early-onset' was younger than 14 years of age).(36) It has been found that up to 5% of individuals experience the start of this eating disorder in their early twenties,(37) and a Western Australian community sample study revealed that 25% developed an eating disorder *(in general)* after the age of 30.(38) Lapid et al. (2010) showed, in a review of 48 published cases of eating disorders with persons over 50

years of age (where over 50 years of age was considered the cut-off for 'late-onset' of an eating disorder), that 81% of the cases had a diagnosis of anorexia nervosa.(39) It has been suggested that changes in family relationships and body changes related to age are linked to the development of eating disorders in elderly individuals.(40)

Subtypes: *age*

With regards to an individual's first presentation of AN, a study looking at 126 patients with anorexia showed that the majority of the 'early-onset' AN patients (<14 years old) were of the AN-R subtype, while those with AN-BP made up a larger percentage of the 'late-onset' group.(22)

Laessle et al. (1989) amongst others, have demonstrated that AN-R individuals are generally younger on intake, when reviewing the average age of the two subtypes on admission to an eating disorder program.(8, 41, 42)

Studies have shown that those anorexics who display binge/purge behaviour tend to present later and have a longer duration of illness as compared to those who limit their calorie intake.(8-10, 43) However, there is data to suggest that there is no difference between the ages of the two groups at first presentation.(44)

1.3.2.3 Marital status

Van den Broucke and Vanderyeycken (1988) reported that there may be a higher incidence of bulimic pathology amongst anorexia nervosa patients who are married, as opposed to those who are not.(45) However, it is noted that this may be due to the fact that married individuals are generally older and therefore presumably may have had a longer duration of illness. It has been suggested that anorexia nervosa symptomatology may progress over time from

restrictive-type eating behaviour to more binge/purge behaviour, resulting in those with longer duration of illness displaying more bulimic pathology.(18) Bussolotti et al. (2002) found that those patients diagnosed with eating disorders who lived with partners tended to display more eating disorder symptoms, even after the study results were controlled for the variable of age. They proposed that age was an important variable which would need to be controlled in future similar studies, and further research in this area was suggested. It has been further proposed that interpersonal interactions and conflicts in relationships may be a trigger for eating disorders and may perpetuate the illness.(46)

1.3.2.4 Special populations

Research has shown that AN is seen in greater frequencies amongst professions and activities where a low body fat composition is favoured, such as athletes, models and dancers.(24) Homosexuality has been postulated to be a risk factor for the development of eating disorders in males,(47) suggested by a higher incidence of homosexuality found in men with this psychiatric illness.(48) It is believed that homosexual men encounter sociocultural pressures similar to those experienced by women with regards to maintaining a slender physique. However, Carlat et al. (1997) suggested that the association between asexuality (as opposed to homosexuality) and AN may be greater.(49)

Subtypes: special populations

At the time of this study there was little research looking at the frequency of specifically AN-R and AN-BP amongst the aforementioned at-risk special populations. However, there are studies which have reviewed weight-control behaviours as a risk factor for eating disorders amongst athletes. Some studies have shown a predominance of restrictive-type eating behaviour, as opposed to purging-type behaviour (including the use of laxatives and

diuretics), amongst those in sports requiring leanness, while others showed no difference between "leanness" and "non-leanness" sports with regards to weight-control behaviour. Not all studies considered these behaviours pathogenic.(50)

1.3.3 Aetiology

The aetiology of AN has long been considered multifactorial. Interplay between genetic, biological and psychological factors is implicated. This, in combination with environmental factors, may result in disordered eating patterns.(1, 24) The concept of gene-environment interactions and correlations is considered important in the aetiology of anorexia nervosa.(51)

1.3.3.1 Biological factors

There is strong evidence found through family studies,(52) twin studies (53) and linkage studies (54) to suggest that AN may be heritable. Family studies have shown that female relatives of those individuals with eating disorders have a 7 to 20 times greater lifetime incidence of anorexia or bulimia nervosa than the general population.(52) Klump et al. (2001) demonstrated in twin studies that genetics accounted for 74% of the variance in AN.(53) Some of the characteristic features found in anorexia nervosa such as the 'drive for thinness' are also thought to be carried genetically.(54)

Further genetic research has shown that disturbances in the neuroendocrine system, and dysfunction in neuropeptides and neurotransmitters such as serotonin and noradrenalin, may contribute to the development of AN.(37, 55)

Differences in genotypes may result in varying sensitivities to environmental experiences (56), however, this is beyond the scope of this report.

Subtypes: *biological factors*

Evidence exists to show possible specific genetic underpinnings associated with AN-R. Studies have pointed to a potential genetic link distinguishing those with the restricting form of anorexia nervosa from their binge/purge counterparts.(54) In a study of a subset of 37 families by Grice et al. (2002)**,** in which at least two affected relatives had a diagnosis of AN-R, evidence for the presence of an AN-susceptibility locus was found on chromosome 1p.(57) In addition, differences in noradrenaline transporter genes have been shown to exist in restricting subgroup.(58, 59) A genome wide association study (2011) has produced evidence suggesting that common SNPs (single nucleotide polymorphisms) near the HTR1D gene may increase the risk of developing the restricting subtype of anorexia nervosa.(60) In addition, higher ghrelin concentrations have been found in the AN-BP subtype.(61) Variances in brain serotonergic metabolism have been found between AN-R and AN-BP, possibly implying that the mechanism behind these two subtypes of anorexia nervosa may differ.(62) In contrast, a more recent 2014 genome-wide association study (GWAS) study on anorexia nervosa failed to reveal findings of any significance, however, the authors do state that there is evidence to show that a larger sample size may reveal genetic differences between the two subtypes.(63)

1.3.3.2 Personality traits/temperament

Particular temperaments may make one more vulnerable to the development of AN, supported by the fact that certain traits have been found to endure following weight restoration and normalisation of menses (54, 64, 65) in anorexic individuals. However, these temperamental traits may also occur as a consequence of the illness.(24) Characteristics such as low self-esteem and a need to control ones' environment contribute to the development of anorexia nervosa, and may also perpetuate the disease.

Subtypes: *personality traits/temperament*

Personality characteristics have been found to be subtype specific and strengthen the rationale behind the subtyping of AN.

There are studies to suggest that the AN-R subtype be considered a distinct phenotype, characterised by traits such as perfectionism, rigid thinking, obsessive-compulsive thinking, anxiety and increased harm avoidance, lower reward sensitivity, persistence and self-directedness; characteristics not shared to the same extent by their binge/purge counterparts.(24, 66-68) However in contrast, one particular study conducted in 2012 showed that their restricting sample of anorexia nervosa patients demonstrated lower scores on the Eating Disorders Inventory Scale -2 perfectionism subscale as compared to those who binge/purged.(69) Just as certain temperaments have been found to be common amongst those with AN-R, characteristics such as affective instability impulsivity, more substance abuse, more self-harm and novelty seeking behaviour, and greater psychopathology have been shown to feature prominently in anorexics that binge/purge.(70-74)

1.3.3.3 Environmental/sociocultural factors

Throughout history, the 'ideal' female form has been influenced by society, politics and the media. Although the characteristics of the 'ideal' figure have differed over decades, it has remained difficult to achieve.(75) It is well-known that society's current, narrow definition of beauty, as sometimes emaciated, and the importance society places on exercise, contributes to the development of low self-esteem, disordered eating patterns and body dissatisfaction. These are known contributors to the development of eating disorders.(24, 76)

Body image dissatisfaction is so prevalent in today's society that it has become a "normative discontent" (77) and has been shown to develop from as early as 5 to 7 years of age.(78) A

1994 survey found that at least 40% of 9-year-old children had engaged in dieting behaviour.(79)

The attainment of a low body weight, an intense fear of weight gain and a "drive for thinness", are the hallmarks of AN. Dieting resulting in weight loss becomes socially and positively reinforced (80) which entrenches maladaptive eating patterns, ultimately perpetuating the disease. Klump et al. (2001) showed that environmental factors accounted for 26% of the variance in AN.(53) The media encourages a slender physique, equating it with success. A 2002 study looking at ethnic Fijian adolescent girls demonstrated the impact of the media, namely television, on eating attitudes. Following prolonged television exposure, there was a significant increase in markers of disordered eating among the participants. In addition, subjects revealed that television had influenced their own body image and they expressed a desire to model themselves after the 'western' television characters. Furthermore, some subjects (40%) justified their aspiration to lose weight as a way to enhance their career prospects.(81)

In more recent years, the internet has proved to be an added platform for societal influence and the proliferation of pro-anorexic and 'thinspiration' websites have caused alarm.(75) In a recent 2013 study, Tiggemann and Slater (2013) concluded that the internet was a persuasive socio-cultural medium in the development of body image among adolescent girls. They found that the time spent on the internet correlated significantly with 'the 'drive for thinness', body surveillance and internalisation of the thin ideal amongst the 1087 13 to 15-year-old subjects.(82)

Males are not exempt from the influence of the media and sociocultural pressures, with adverse effects on males' body image seen with the media's portrayal of the 'ideal' male physique.(83)

Even though the media cannot be held entirely accountable for the development of eating disorders, including AN, as evidenced by the fact that not all individuals exposed to society's prescription of beauty go on to develop eating disorders, sociocultural influences on eating disorders are difficult to refute. However, the impact of pre-existing pathology or susceptibility cannot be forgotten. These may influence an individuals' response to media imagery.(84)

Acute or chronic life stressors may also precipitate the onset of anorexia nervosa.(85)

1.3.4 Comorbid axis I and II pathology

It has been found that comorbid axis I and II diagnoses are common amongst the AN population.(21) Shared genetics have been suggested as the reason why anorexia nervosa and other axis I disorders, such as major depressive disorder (MDD) and anxiety disorders, co-occur so frequently.(86, 87) Studies have suggested that comorbid conditions may not only increase treatment resistance amongst inpatient anorexics, but also the severity and chronicity of the illness.(88, 89)

Salbach-Andrae et al. (2008) showed that 73.3% of their 101 adolescent female AN population had at least one comorbid axis I diagnosis.(90) Reviewing anxiety disorders, mood disorders, impulse-control disorders and substance use disorders in eating disorders, Hudson et al. (2007) showed that 56.2% of their AN sample had at least one of these comorbid Axis I diagnoses.(21) Anorexia nervosa was shown by Blinder et al. (2006) to be associated with obsessive-compulsive disorder (OCD), posttraumatic stress disorder (PTSD) and psychotic disorders.(44) Major depressive disorder, in addition to anxiety disorders, have been found to be particularly common amongst those individuals suffering from anorexia nervosa.(1)

Subtypes: *comorbid axis I and II pathology*

Studies have further differentiated restricting from binge/purge anorexics with regards to the incidence of comorbidities found amongst these subtypes. However, data is conflicting. Herzog et al. (1992) demonstrated that 73% of AN-R patients and 82% of AN-BP patients had 1 or more co-existing Axis I diagnoses.(91) Psychotic disorders were found to be twice as likely in AN-R and 3 times as likely in AN-BP, as compared to other eating disorders.(44) Some studies have shown no difference in the lifetime prevalence of depression or anxiety disorders between the two anorexia subtypes.(9) A history of bipolar mood disorder (BMD), however, was found to be more prevalent amongst binge/purge anorexics (6% AN-BP vs. 0% AN-R).(8)

Comorbid personality pathology has been associated with negative outcomes in eating disorders. It has been shown that AN-BP sufferers tend to have more psychopathology (92-95) which contributes to the poor outcome in this particular subtype. There is a strong predominance of cluster B disorders, borderline personality disorder in particular, in AN-BP individuals.(95, 96) Obsessive-compulsive, schizoid and schizotypal personality disorders have been found to be more frequent amongst the restrictive subgroup of AN.(97) However, there is some conflicting evidence to suggest that this may not necessarily be the case. One particular study showed a higher rate of obsessive compulsive disorder within their AN-BP group as opposed to the AN-R group (36.1% vs 21.4% respectively).(95) It has also been found that the frequency of comorbidities may be equivalent in the two subtypes.(8) In addition, Eckert et al. (1987) found that there were little differences in the rates of psychopathology in AN-R and AN-BP individuals following treatment.(98)

1.3.5 Substance use/misuse/abuse/dependence

Substance use and misuse, although found to be more prevalent in BN and EDNOS, is common within the AN population.(99)

Subtypes: *substance use/misuse/abuse/dependence*

Ward et al. (2003) and Garfinkel et al. (1980), along with other researchers, have demonstrated a higher incidence of impulsive behaviours, such as substance abuse, amongst the AN-BP subtype.(70, 100, 101) In addition, a more recent latent class analysis found a higher rate of substance use in their 'AN-BP –like' empirically defined subgroup compared to their 'AN-R-like' subgroup.(102) This finding is regularly used in the argument for categorising anorexia nervosa into subtypes. In contrast, one particular study, in a sample of 136 women, showed no difference with regards to a substance abuse history between the two AN subtypes.(8) It is postulated that substance abuse may be a poor prognostic factor and influence relapse rates.

1.3.6 Family history

Research has shown that those of the AN-R subtype are more likely to have a family member with anorexia nervosa (103) as opposed to the AN-BP subtype, while a higher rate of other psychiatric conditions such as affective disorders, anxiety disorders and substance abuse has been found amongst the family members of those anorexics who engage in binge/purge behaviour. These findings are considered as possible supportive evidence for the differentiation of these two subtypes.(104, 105)

1.3.7 Body weight, BMI and rate of weight gain

There is no consistency across studies regarding the definition of ideal body weight (IBW). Nevertheless, it has been shown that those anorexics that restrict their caloric intake are admitted with a lower percentage of their IBW compared to their binge/purge equivalents.(7, 8, 106) It follows then that one would find a lower average BMI on intake amongst this same group.(9, 106) However, in one particular study comparing 100 restricting anorexics with 71 binge/purge anorexics, the average BMI at admission was shown to be equal.(101, 107) In addition to being admitted at a lower percentage of their ideal body weight, restricting anorexics tend to gain weight at a slower rate. This was shown by Neuberger et al. (1995) where subjects had a consistent calorie intake over a 30-day period.(7)

1.3.8 Presentation and core psychopathology

The most striking features of individuals with AN are their lack of insight into their illness (108, 109) and their resistance to change (80) which makes treatment challenging. Their disordered eating patterns are ego-syntonic, (92) making them largely unmotivated to alter their behaviour.

Dieting behaviours in these individuals usually begin as innocent efforts to lose weight, however, over time, "take on a life of their own".(80) Rules around eating and food become increasingly restrictive and these individuals begin to withdraw socially. They lose interest in other activities and prioritise their relationship with their body and food over relationships with others.(110) Eventually, their lives consist of not much more than work, exercise and food.(24)

The disordered eating behaviours displayed by anorexics are many and vary between subtypes. Restrictive behaviour not only includes the limiting of calorie intake but also in the

application of rules as to what foods are ‘allowed’ to be eaten, with little variation in diet. Sufferers of AN often eat vicariously through others and are preoccupied with food and calories. Despite this preoccupation they display an altered drive to eat, often denying hunger.(24)

Binge-eating is characterised by consuming large amounts of food in a short period of time. This act is usually performed in secret and is associated with feelings of self-loathing. Anorectics compensate for these binges with the use of, amongst others, laxatives, diuretics and overactivity.

A disturbance in body image is a salient feature of AN and an anorectics’ self-worth is unjustifiably influenced by weight and shape. They often display body-checking behaviours such as obsessive mirror-gazing and weighing.(111) They may also show body-avoidance behaviour such as refusing to be weighed and avoiding physical contact with others.(110) Overactivity, or hyperactivity, is considered by some to be a core clinical characteristic of anorexia nervosa.(24, 112) These include behaviours such as excessive standing, fidgeting and excessive sports activity.(24)

Cognitive impairments are common amongst those with AN. They display indecisiveness and are rigid and inflexible. They have been found to have impairments in executive functioning such as attention, memory and set-shifting, especially at low body weights.(110, 113) Some executive functioning deficits persist after weight restoration.(114) However some studies have shown that there is some improvement in cognitive deficits following weight gain.(115)

Affective disturbances occur, particularly at low body weights, in the form of, amongst others, depression, irritability and anxiety. There has been seen to be some amelioration of

symptoms following nutritional rehabilitation (116) however, not all of these improve with weight restoration.(117)

The physical complications of the disease are numerous and are due to both starvation and consequences of purging behaviour. Signs and symptoms of extreme caloric restriction and weight loss include cold intolerance secondary to the loss of fat and muscle, dehydration, peripheral oedema, fatigue, hair loss, the development of lanugo, osteoporosis, leucopaenia, abnormal taste sensation and peripheral neuropathies. They also develop cardiovascular complications (loss of cardiac muscle, cardiac arrhythmias and hypotension), gastrointestinal complications (abdominal pain, gastric dilation, delayed gastric emptying) and endocrine dysfunction (amenorrhoea in females, disturbance in sex-hormones with fertility problems and thyroid abnormalities) amongst others.

Symptoms and signs specifically related to purging include: electrolyte imbalances; gastric and oesophageal tears and erosion; dental enamel erosion; salivary gland and pancreatic swelling.

1.3.9 Course, outcome and recovery

Anorexia nervosa has a chronic and protracted course and is notoriously difficult to treat. As a result, a number of patients often have repeated admissions, to both psychiatric and non-psychiatric inpatient units.

Research has shown that just under 50% of AN patients recover, 33% show some improvement and 20% remain chronically ill.(118) However, there are no clear, consistent recovery criteria used in studies regarding anorexia nervosa and recovery rates differ depending on, in part, the criteria used by different researchers.(119, 120)

Subtypes: *course, outcome and recovery*

It has been proposed that hospitalisation may be more likely in the AN-R subgroup because of their protracted and constant weight loss, not as commonly shared by their binge/purge counterparts. That being said, anorexic inpatients displaying purgative symptoms are more likely than their restrictive-subtype equivalents to require repeated admissions.(99) and have been shown to have poorer outcomes.(100, 121, 122) Studies have produced conflicting results regarding recovery rates between the two subtypes of AN. Eddy et al. (2008) showed partial recovery and full recovery rates to be 82.5% and 32.5% amongst the AN-R subtype, while those belonging to the binge/purge group had partial and full recovery rates of 75% and 22.9% respectively.(17) Hertzog et al. (1996) however, showed the converse to be true in their longitudinal naturalistic study: 17% of the AN-BP participants were found to have fully recovered (asymptomatic for eight consecutive weeks) compared to 8% of the restrictors. However, they do state that stricter recovery criteria were used, as compared to those used in several of the studies referenced. Despite this contradictory finding, among others, found in this study, the researchers still concluded that there lies some justification in the subtyping of anorexia nervosa.(123)

1.3.10 Drop-out rates

Non-completion of eating disorder programs and refusal of hospital treatment is seen more frequently in those with AN as opposed to any other psychiatric diagnoses (124) and is indicative of the enduring nature of this illness. Drop-out rates as high as 51% have been found.(125)

Subtypes: *drop-out rates*

The relatively higher dropout rates from eating disorder programs found amongst those anorexics who binge/purge are thought to set them apart from those anorexics that restrict.(100, 102, 121, 124) Non-completers of eating disorder programmes are thought to have poorer prognoses than those completing treatment.(121)

1.3.11 Prognostic factors

There is conflicting data regarding prognostic factors in AN. Patients presenting with vomiting, laxative abuse (126, 127) and binge-eating, those with comorbid pathology, and, those that have had a longer duration of illness and hospital readmissions have been found to have unfavourable long term outcomes. It is not surprising then that a number of studies associate a poorer prognosis with AN-BP individuals.(124) In addition, the medical complications associated with binging and purging tend to be more severe, contributing to a poorer prognosis. On the contrary, some researchers have found a better prognosis in individuals that binge/purge,(123) while others concluded that there was little significant association between purging pathology and outcome.(128) Eckert et al. (1987) found no differences in outcome between the AN-R and AN-BP subtypes.(98) It should be noted however that these subjects were only followed up for a period of 32 days.

Readmissions imply a poorer prognosis and are associated with admissions at a younger age, shorter admissions, lower rates of weight gain, and lower BMIs and weights on admission and discharge.

1.3.12 Morbidity and mortality

Eating disorders have the highest mortality rate amongst psychiatric illnesses, with AN at the top of the eating disorder category. In a literature review done on the course and outcome of eating disorders AN was shown to have a mortality rate ranging from 0%-8%, with a cumulative mortality rate of 2.8%. The same study showed a crude mortality rate ranging between 0% and 4% for bulimia nervosa, with a cumulative mortality rate of 0.4%.(129) A more recent meta-analysis has shown a weighted mortality rate (i.e. deaths per 1000-person years) of 5.1 for AN, 1.7 for BN and 3.3 for EDNOS.(130)

A 2013 study found AN to have a standardised mortality rate of 4.37 for lifetime anorexia nervosa, greater than that for bulimia nervosa. Patients were followed up for a mean of 9 ½ years.(14)

Deaths in AN are usually as a result of chronic starvation, infection or suicide. It has been suggested that poor psychosocial functioning, low weight, substance abuse and a long duration of illness increase mortality risk.

Subtypes: *morbidity and mortality*

There is little data looking specifically at the differences in mortality between the AN-R and AN-BP subtypes. However, the presence of purging in an individual has been found to contribute to a poorer outcome and greater morbidity.(126, 127, 131) A 2011 latent class analysis showed that their 'AN-BP-like' latent class had a lower survival rate than their 'AN-R-like' class.(102) One particular study by Eddy et al. (2002) found no difference in mortality between the AN-R group and AN-BP during an eight-year follow up.(8) Research by Franko et al. (2013) showed that 7 of the 16 deaths in a longitudinal study (mean follow up of 20 years) belonged to the AN-R subtype (the intake diagnosis) while 6 belonged to the AN-BP (the intake diagnosis) subtype. (Of the remaining 3 deaths in the study: 2 had

diagnoses of BN and 1 had a diagnosis of BN on intake which subsequently changed to AN).(14)

1.3.13 Management

There are various treatment options employed in the management of AN and these may be offered in a number of different settings, including: outpatient treatment, day-patient treatment and inpatient treatment.(132) However, with regards to patient outcome, there is little empirical evidence supporting the strength of one treatment setting over another.(132)

There is research concerning the pharmacological treatment of anorexia nervosa, though information regarding its long term efficacy is scarce.(133) Psychotherapy remains the treatment of choice in the management of anorexia nervosa.(134)

Inpatient treatment

According to the American Psychiatric Association's *Practice guidelines for the Treatment of Patients with Eating Disorders*, anorexia nervosa patients are admitted to inpatient hospital units when their weights are generally lower than 85% of expected body weight, or if there is acute weight decline accompanied by food refusal. In addition, supervision during and after meals and a structured environment are usually necessary.(19) It is suggested that those individuals who are less than 30% below their expected weight should be admitted to a psychiatric unit for two to six months.(37)

The treatment aims of AN are two-fold: weight restoration and psychological intervention; the latter to address, amongst others, the cognitive disturbances and maladaptive coping mechanisms present amongst these individuals. Weight gain alone may not be sufficient to keep anorexics out of hospital. Disordered eating patterns could persist,(119) and may well

contribute to relapse.(135) Psychotherapy may be useful once malnutrition has been corrected and weight gain has begun.(19) Studies have shown that both cognitive behavioural therapy (CBT) and motivational enhancement therapy promote at least partial remission and treatment continuation.(136, 137)

A number of studies have attempted to clarify differences between the anorexia nervosa phenotypes in order to justify current AN nosology. One of the most important justifications for categorising AN is that the defining characteristics of the phenotypes may be useful in tailoring more effective management plans and treatment. A 2009 review by Peat et al. examined the validity and utility of subtyping anorexia nervosa into the two categories discussed above. Although they concluded that there was little predictive validity for AN subtyping, largely due to the frequent diagnostic crossover found between the subtypes, the authors do acknowledge that removing the current subtyping nosology completely would make difficult the conveyance of subclassification information, which may prove useful in treatment and management planning. This is an important focus for future anorexia nervosa research due to the scarcity of data regarding this particular issue.(16)

It is noted that, at the time of this study, there was little recent literature specifically regarding direct comparisons between the existing two defined subtypes of AN. More recent studies have focused on classifying eating disorder phenotypes empirically, evaluating personality profiles and clinical variables, as opposed to using existing DSM diagnostic criteria, making direct comparison of literature challenging at times.(66, 102, 138-140) Using latent profile and latent class analyses, these studies have identified empirical latent class phenotypes of eating disorders including anorexia nervosa. Although some studies have separated binge-eating and purging behaviours,(139) while others have identified variations of the AN-R and AN-BP groups (for example: ‘fat phobic’ versus ‘non-fat phobic’),(138) a distinct latent class

which is ‘AN-R like’, or described as a ‘restricted eating’ class, has been identified, recognising this group as a distinct phenotype.(66, 102, 139) This is despite sampling differences and the use of different indicators in these studies. In addition, three of the more recent latent class analyses (2011 and 2013) reveal evidence in support of the differentiation of anorexics who restrict and those who engage in binging/purging.(102, 138, 139) Conversely, a 2012 taxometric investigation of the latent structure of eating disorders has shown no support for the distinction between the two groups.(69)

This literature review provides a general overview of anorexia nervosa including prevalence, epidemiology, comorbidities, presentation and clinical characteristics, prognostic factors, morbidity and mortality and focuses briefly on management. In addition, it highlights some of the key areas which are thought by a number of researchers to differentiate AN-R from AN-BP. Even though there is some data to the contrary and it is acknowledged that diagnostic crossover can occur, there appears to be compelling evidence in support of the DSM-IV-TR subclassification schema, namely: the differences in psychopathology, substance use, family history, temperament and prognosis between the AN-R and the AN-BP groups. Genetics and neurobiological mechanisms mentioned also seem to suggest aetiological differences between the two subtypes, with research ongoing. In addition, recent latent class analyses evaluating empirical phenotypes, based on clinical variables and various personality traits, have produced evidence for a distinct AN-R like phenotype.

In light of the above, further research in this field is vital to clarify this contentious issue.

1.4 Aim of the study

The aim of the study was to describe the clinical and demographic profile of a group of anorexia nervosa patients admitted to a specialised inpatient eating disorders unit at Tara

Psychiatric Hospital between January 2001 and December 2002. In addition, clinical and demographic characteristics of the two anorexia nervosa subtypes (AN-R and AN-BP) were compared to identify any differences in the presentation of these two groups.

1.5 Hypothesis

The subtypes of anorexia nervosa, AN-R and AN-BP, would differ with regard to clinical and demographic characteristics.

1.5 Objectives of the study

1. To describe the clinical and demographic profile of anorexia nervosa patients admitted to a specialised inpatient eating disorders unit between January 2001 and December 2002.
2. To compare the differences in the clinical and demographic characteristics of patients with AN-R to those with AN-BP.

CHAPTER 2: STUDY SETTING

2.1 Site of study

In this study the setting is a psychiatric hospital inpatient eating disorders unit which utilises a multidisciplinary team approach to treatment. In line with worldwide practices, the team consists of doctors, nurses, psychologists, social workers, occupational therapists and a dietician.

The eating disorder unit at Tara the H. Moross Hospital in Sandton, Johannesburg, South Africa, is an 8-bed unit that operates on a referral basis. Referrals from medical practitioners (from both the public and private sector) and psychologists, throughout South Africa, are accepted. Those with diagnoses of anorexia nervosa, bulimia nervosa and eating disorders not otherwise specified are accepted.

2.2 Assessment for admission

An interview is held with the prospective patient and the multidisciplinary team comprising of the psychiatrist, and allied health professionals involved in the hospital programme. Admissions are decided on an individual basis, taking into account the prospective patient's overall physical condition, social circumstances, psychological state and behaviours, but generally follow the recommendations set out in the widely accepted American Psychiatric Associations' *Practice guideline for the treatment of patients with eating disorders* (2006).

As mentioned in the previous chapter, AN patients are admitted to inpatient hospital units when their weights are generally lower than 85% of expected body weight, or if there is acute weight decline accompanied by food refusal.(19)

There are circumstances where individuals may be admitted to the unit despite their weights being greater than 85% of that which is expected. These include: where the patient has met criteria for AN prior to admission, however gains weight while awaiting admission; where the patient may show a decrease in weight over time and there is a concern regarding progress; admission as a result of the impact of comorbid conditions, or, the patient is unable to adhere to an outpatient program. Family support and a willingness to be actively involved in the program are encouraged. In addition, patients need to be medically stable prior to admission. Individuals who are not willing to be admitted are excluded, as the eating disorder program is voluntary.

A discharge date is calculated for each anorexia nervosa patient admitted, using their weight on admission and a pre-determined rate of weight gain (0.75 kg per week is utilised by the Tara Hospital Eating Disorders unit), including a two-week consolidation phase. However, not all patients reach their target weight by the estimated discharge date. The length of stay may also be adjusted according to the psychological progress the patient has made.

2.3 Treatment aims

As previously mentioned, the treatment aims of AN include both weight restoration and psychological intervention**.**

CHAPTER 3: METHODS

3.1 Study design

This was a retrospective cohort study encompassing a review of the clinical records of all anorexic patients admitted to the Tara Hospital Eating Disorders unit between January 2001 and December 2002.

3.2 Study population

All patients admitted to the unit between January 2001 and December 2002 with the diagnosis of anorexia nervosa, as documented in the admission log book, were included (n=90).

This study sample was initially part of an 8-year follow-up study, in which a 2-year sample was needed to accommodate follow-up. This 2-year period (2001-2002) yielded the largest potential study population documented in the admission logbook, between the years 2000 and 2010. Due to paucity of data it was necessary to amend the initial study, however, the study sample remained the same.

Of the 90 records requested 18 files were missing, and the total number of case files available for review was 72 (80%). Of the 72 case records 13 were rejected, which resulted in a total sample size of 59 (65.6% of original total of 90). There were a total of six patients who were admitted more than once during this study period: five patients had been admitted twice and one patient had been admitted three times during this period with a diagnosis of anorexia nervosa. They were included as they met the criteria for the study. Of the 13 records that were rejected, 11 patients had the diagnosis of EDNOS and 2 were found unsuitable for the program, with diagnoses of substance abuse.

3.3 Measurements/Observations

The following demographic data and clinical characteristics of the 59 anorexic patients who qualified for the study were recorded:

- Age
- Gender
- Race
- Marital status
- Index/repeat admission for an eating disorder
- Highest level of education (primary, secondary or tertiary)
- Anorexia nervosa subtype (as documented on the official discharge summary)
- Height (m)
- Weight on admission (kg)
- Weight on discharge (kg)
- BMI on admission (kg/m^2)
- BMI on discharge (kg/m^2)
- Goal weight (kg) (as calculated from documented measurements)
- Percentage of goal weight (%) on admission and discharge
- Percentage under/overweight (%) on admission and discharge
- If goal weight was reached on discharge
- Comorbid Axis I[4] diagnoses (as documented on the official discharge summary)
- Comorbid Axis II[5] diagnoses/traits (as documented on the official discharge summary)

[4] Axis I conditions include all those as defined by the DSM IV-TR

[5] Axis II conditions/traits include all those as defined by the DSM IV-TR

- History of, or current, substance use/misuse/abuse/dependence
- Family history of an eating disorder
- Family history of any other psychiatric disorder
- Weight gain/loss
- Rate of weight gain (g/week)
- Length of stay (days)
- Type of discharge (RHT; Normal; Administrative)

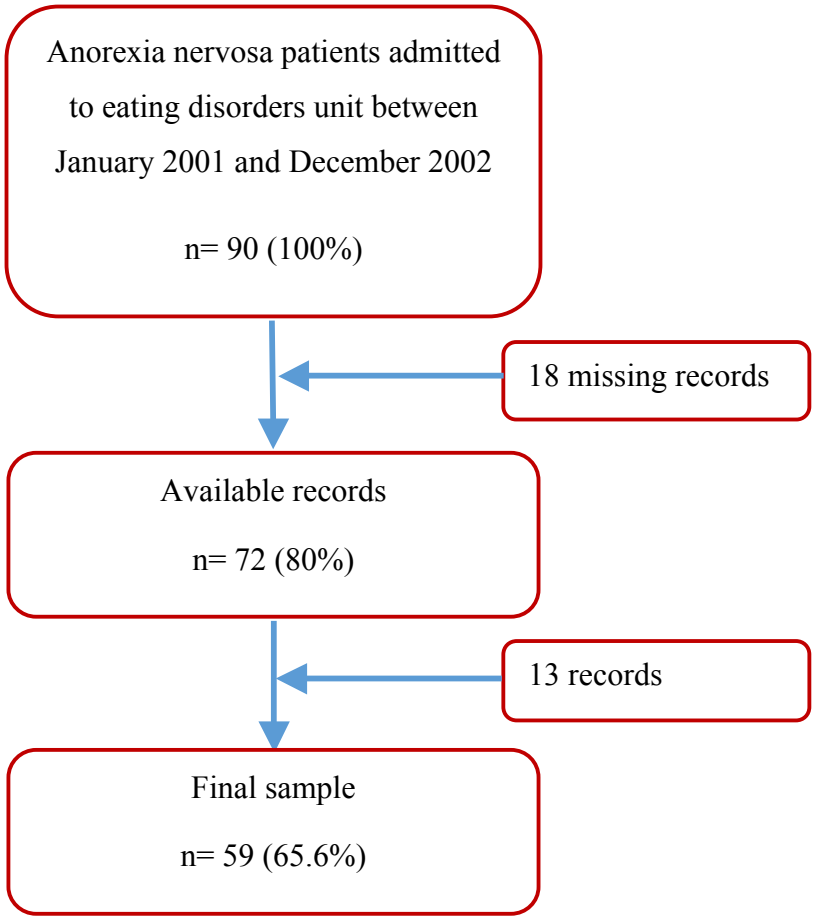


FIGURE 3. 1 FLOW DIAGRAM DEPICTING SELECTION OF STUDY SAMPLE (N=59)

3.4 Measurements and calculations

3.4.1 Body Mass Index (BMI)

Definition: An index of weight-for-height used to classify individuals into weight categories

BMI = weight (kg)/(height (m))^2

The mean BMI on admission and discharge was calculated. In addition, patients were divided into BMI categories on admission and discharge.

3.4.2 Goal weight (GW)

Goal weight was calculated according to the formula used in the eating disorders unit at Tara Hospital. Percentage of goal weight on admission and discharge were calculated.

GW (kg) = Height (m) x Height (m) x BMI

Where:

BMI = 18 (if under 16 years)

BMI = 19 (if over 16 and female)

BMI = 20 (if over 16 and male)

3.4.3 Percentage under/overweight

100% - (Actual weight (kg) /Goal weight (kg)) x 100%

Percentage under/overweight on admission and discharge were calculated

3.4.4 Rate of weight gain (kg/week)

Total weight gain (g) / length of stay (weeks)

3.4.5 Length of admission (days)

As documented in the patients' file

3.4.6 Expected length of admission (days)

Expected length of admission (in weeks) = (Goal weight – admission weight) / 0.75[*]) + 2 weeks. (x7 = length of in days)

3.4.7 Rate of weight gain (g/week)

Total weight gain (g) / length of stay (weeks)

*A targeted rate of weight gain of 750g (0.75kg) per week is used in the Tara Hospital eating disorders unit

3.5 Data collection and statistical analysis

Data was recorded on a specifically designed data sheet and each record was assigned a number in order to ensure subject anonymity.

The collected data was entered into a Microsoft Excel spreadsheet. Data was then imported into a statistical package (STATA version 12) for data cleaning (looking for missing data, inconsistencies and extreme values) and coding purposes.

Categorical data was described in terms of frequencies and percentages. Numerical data was described in terms of mean and standard deviation (if normally distributed) or median and interquartile range (if data was skewed). Fischer's exact test was used to test for associations between two categorical variables (variables that had less than 5 counts per cell). Chi-square test was used to test for associations between two categorical variables with more than 5 counts per cell. T-test was used to test for mean differences between binary categorical data and normally distributed data. The Mann-Whitney test was used to test for mean differences between binary categorical data and skewed data.

Results were presented in frequency tables and bar graphs.

3.6 Ethics

Signed consent was obtained from patients, or their guardians, on admission to the unit *d*uring the defined study period, allowing use of data from the files for research purposes. Permission to access records was granted by the CEO of Tara Hospital at the time of data collection. Ethics clearance was obtained from the University of the Witwatersrand's Human Research Ethics Committee.

Ethics approval number: M12024

Date granted: 18 March 2013

(See appendix II)

CHAPTER 4: RESULTS

4.1 Gender, race, marital status and highest level of education

A total of 59 patients met the inclusion criteria and formed the analytical sample. The majority were females (96.6%; n=57), white (89.8%; n=53), single (81.4%; n=48), and had attained, or were currently completing, a secondary level education (59.3%; n=35) (Table 4.1) (Figure 4.1). Over half of the white population had the diagnosis of AN-R (58.5%; n=31), while the majority of the non-white patients belonged to the AN-BP subtype (83.3%; n=5). The majority of the AN sample met the criteria for the restricting subtype (54.2%; n=32) (Table 4.2).

A greater proportion of the total AN group were readmissions for an eating disorder (n= 32; 54.2%) (Table 4.2) with the AN-R and AN-BP subtypes making up equal proportions of the index group. There were six 'multiple' admissions (patients admitted more than once) during the study period. None were index admissions. Five of these individuals were admitted twice: two where both admissions were for AN-R, and three where both admissions were for AN-BP. One of the six 'multiple' admissions had been admitted 3 times: once with a diagnosis of AN-R and two subsequent admissions with a diagnosis of AN-BP.

Subtypes: Gender, race, marital status and highest level of education

The majority of cases of both the AN-R and AN-BP subtypes were single (87.5% and 74.1% respectively) had achieved, or were currently completing, a secondary level of education and were white (Table 4.3). The two males in the study were diagnosed with AN-R and there were no black patients in the AN-R group (Table 4.3).

TABLE 4. 1 DEMOGRAPHIC CHARACTERISTICS OF AN PATIENTS ON ADMISSION TO THE TARA HOSPITAL EATING DISORDERS UNIT BETWEEN JANUARY 2001 AND DECEMBER 2002 (N=59)

Variables	n (%)
Gender	
Females	57 (96.6%)
Males	2 (3.4%)
Race	
White	53 (89.8%)
Indian	4 (6.8%)
Black	2 (3.4%)
Coloured	0 (0.0%)
Total non-white	*6 (10.2%)*
Marital status*	
Single	48 (81.4%)
Married	7 (11.9%)
Divorced	4 (6.8%)
Level of education	
Primary	0 (0.0%)
Secondary	35 (59.3%)
Tertiary	24 (40.7%)
Age group on admission (years)[#]	
10-20	34 (57.6%)
21-30	11 (18.6%)
31-40	11 (18.6%)
41-50	2 (3.4%)
51-60	1 (1.7%)
BMI on admission (kg/m^2)	
9-12.0	5 (8.5%)
>12-15.0	31 (52.5%)
>15-18.0	23 (39.0%)
>18-20.0	0 (0%)
BMI on discharge (kg/m^2)	
9-12.0	3 (5.1%)
>12-15.0	8 (13.6%)
>15-18.0	33 (55.9%)
>18-20.0	15 (25.4%)

*Total percentage equals 100.1% as values rounded-off to 1st decimal place
#Total equals 99.9% as values rounded-off to 1st decimal place
BMI = body mass index
AN = anorexia nervosa

TABLE 4. 2 CLINICAL CHARACTERISTICS OF AN PATIENTS ON ADMISSION (N=59) TO THE TARA HOSPITAL SPECIALISED INPATIENT EATING DISORDERS UNIT BETWEEN JANUARY 2001 AND DECEMBER 2002

Variable	n (%)
Type of admission	
Index	27 (45.8%)
Readmission	32 (54.2%)
Anorexia nervosa subtypes	
AN-R	32 (54.2%)
AN-BP	27 (45.8%)
Axis I disorder	
Yes	15 (25.4%)
No	44 (74.6%)
Axis I type[#]	
Anxiety disorder	8 (53.3%)
Mood disorder	8 (53.3%)
Psychotic disorder	0 (0.0%)
PSA Abuse + H Dependence disorder	1 (6.7%)
Other disorder*	3 (20.0%)
Axis II disorder/trait	
Yes	22 (37.3%)
No	37 (62.7%)
Axis II cluster[#]	
Cluster A	0 (0.0%)
Cluster B	13 (59.1%)
Cluster C	12 (54.5%)
Substance use (history or current)	
Yes	5 (8.5%)
No	54 (91.5%)
Family eating disorder history	
Yes	7 (11.9%)
No	50 (84.7%)
Missing data	2 (3.4%)
Other family psychiatric history	
Yes	31(52.5%)
No	26(44.1%)
Missing data	2(3.4%)
Weight gain/loss	
Gain	50 (84.7%)
Loss	3 (5.1%)
N/A (admission <7 days)	6 (10.2%)
Goal weight reached on discharge	
Yes	10 (16.9%)
No	49 (83.1%)
Duration of stay[£]	
Admission longer than expected length of stay	10 (17.0%)
Admission expected length of stay	1 (1.7%)
Admission shorter than expected length of stay	48 (81.4%)

Total percentage equal >100% as some patients had more than 1 diagnosis
*Other disorder = Adjustment disorder (n=1); Factitious disorder (n=2)
£ Total percentage equals 100.1% as values rounded off to 1st decimal place
PSA = poly-substance abuse H = heroin
AN = anorexia nervosa
AN-R = anorexia nervosa restricting subtype
AN-BP = anorexia nervosa binge-eating/purging subtype

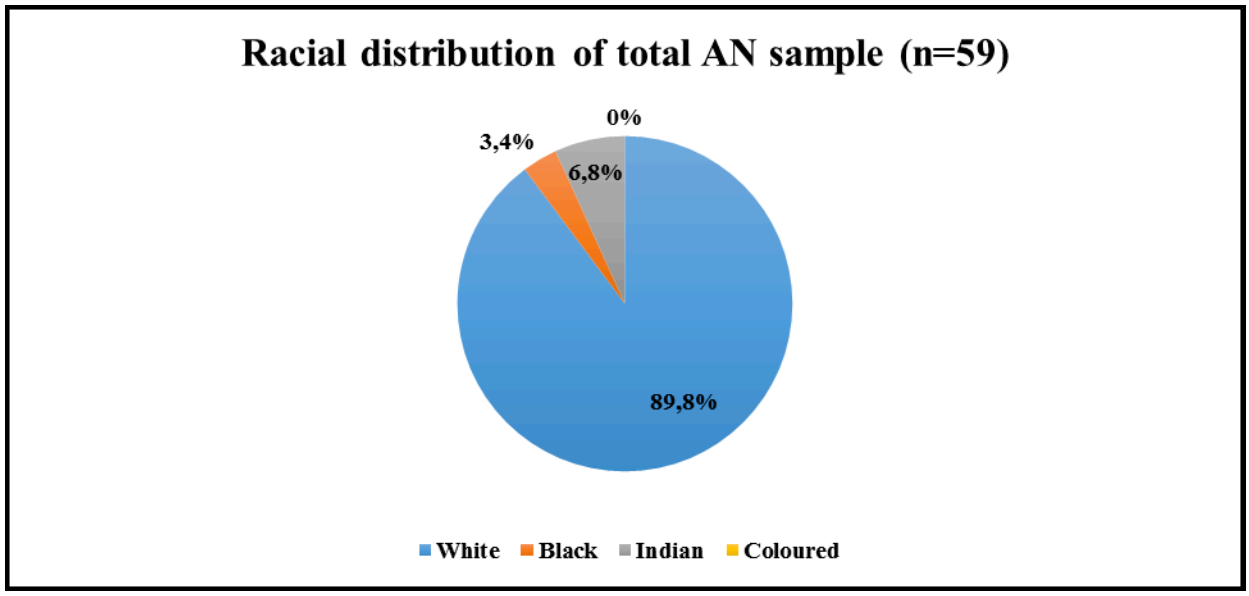


FIGURE 4. 1 RACIAL DISTRIBUTION OF ANOREXIA NERVOSA PATIENTS (N=59) ADMITTED TO THE TARA HOSPITAL EATING DISORDERS UNIT BETWEEN JANUARY 2001 AND DECEMBER 2002

4.2 Age

The median age of the total sample (n=59) on intake was 18 years (interquartile range 14-40) (Table 4.4), with the majority of the individuals between the ages of 12 and 20 (n= 34; 57.6%) (Table 4.1). The two youngest individuals were 12 years of age (1 AN-R, 1 AN-BP) while the oldest was 56 years of age (AN-BP). There were no index admissions over the age of 40 years (Table 4.5), however there were three readmissions over the age of 40 (all with the diagnosis of AN-BP) (Table 4.5).

Subtypes: *Age*

Age on admission

The mean age at intake of the AN-R subtype admissions was slightly younger than the AN-BP subtype (Table 4.5). The majority of patients in the AN-R group were between the ages

of 10 and 20 years (n=20; 62.5%) (Table 4.5). The AN-BP group included three individuals over the age of 40 years on their admission to the ward (Table 4.5).

Age of index admissions and readmissions

A greater percentage of the AN-R group were index presentations for an eating disorder (Table 4.5) however there was no significant difference (p=0.937) between the mean ages at index presentations of the two groups (Table 4.5). A larger proportion of the AN-R index group were between the ages of 10 and 20 years (Table 4.5) with the youngest index admission being 12 and the oldest 36 years (n=2) of age. The youngest AN-BP index admission was 12 years of age and the oldest was 56 years of age. A greater number of those who binge/purged were readmissions for an eating disorder (Table 4.5), and the mean age of the readmissions was slightly higher in this group (Table 4.5).

TABLE 4. 3 COMPARISON OF THE DEMOGRAPHIC CHARACTERISTICS OF AN-R PATIENTS (N=32) AND AN-BP PATIENTS (N=27) ADMITTED TO THE TARA HOSPITAL EATING DISORDERS UNIT BETWEEN JANUARY 2001 AND DECEMBER 2002

Variable	AN-R n (%)	AN-BP n (%)	P-value
Gender			
Females	30 (93.7%)	27 (100%)	0.495
Males	2 (6.3%)	0 (0%)	
Race			
White	31 (96.9%)	22 (81.5%)	
Indian	1 (3.1%)	3 (11.1%)	
Black	0 (0.0%)	2 (7.4%)	0.116
Coloured	0 (0.0%)	0 (0.0%)	
Total non-White	*1 (3.1%)*	*5 (18.5%)*	
Marital status			
Single	28 (87.5%)	20 (74.1%)	
Married	4 (12.5%)	3 (11.1%)	0.093
Divorced	0 (0%)	4 (14.8%)	
Level of education			
Primary	0 (0.0%)	0 (0.0%)	
Secondary	18 (56.3%)	17 (63.0%)	0.791
Tertiary	14 (43.7%)	10 (37.0%)	

AN-R = anorexia nervosa restricting subtype
AN-BP = anorexia nervosa binge-eating/purging subtype

TABLE 4. 4 CLINICAL CHARACTERISTICS OF AN PATIENTS (N=59) ON ADMISSION TO THE TARA HOSPITAL EATING DISORDERS UNIT BETWEEN JANUARY 2001 AND DECEMBER 2002

Variables	Value
Age (yrs) (Median and interquartile range)	18 (14-40)
Mean height (m)	1.63±0.082
Mean weight at admission (kg)	38.5±6.5
Mean weight at discharge (kg)	44.1±6.8
Mean BMI at admission (kg/m^2)	14.5±1.7
Mean BMI at discharge (kg/m^2)	16.6±2.1
Mean percentage underweight on admission (%)	22.85±8.64
Percentage underweight on discharge (%) (Median & interquartile range)	8.31 (-2.28 – 33.33)
Rate of weight gain (g/week) (Median & interquartile range)	638.8 (425.925 – 987.013)

BMI = Body mass index
AN = anorexia nervosa

4.3 Comorbid diagnoses

4.3.1 Axis I

Most of the total AN sample (n=59) had no axis I or II disorder/trait (74.6%; n=44 and 62.7%; n=37 respectively) (Table 4.2). Of the 15 cases found to have comorbid axis I diagnoses (25.4%) (Table 4.2) the frequency in total of mood disorders and anxiety disorders, either alone or with an additional axis I disorder, was found to be equal (n=8; 53.3%) (Table 4.2).

Six patients had a comorbid mood disorder (40%) while three (20%) had a diagnosis of an anxiety disorder alone. Two patients had a diagnosis of both an anxiety and mood disorder (AN-R), one had both an anxiety and adjustment disorder (AN-BP) and there were two cases of a comorbid anxiety and factitious disorder (AN-BP) (although these belonged to the same patient who had been readmitted during the study period). One case was documented as having a poly-substance abuse disorder and heroin dependence on axis I (AN-BP). This was

the only documented substance abuse on axis I, even though there were other cases where substance use or abuse were documented elsewhere in the file. There were no patients with psychotic disorders as defined by the DSM-IV-TR (Table 4.2).

TABLE 4. 5 MEAN AGES AND AGE DISTRIBUTIONS OF AN-R (N=32) AND AN-BP (N=27) PATIENTS ON ADMISSION, OF INDEX ADMISSIONS AND OF READMISSIONS TO THE TARA HOSPITAL EATING DISORDERS UNIT BETWEEN JANUARY 2001 AND DECEMBER 2002

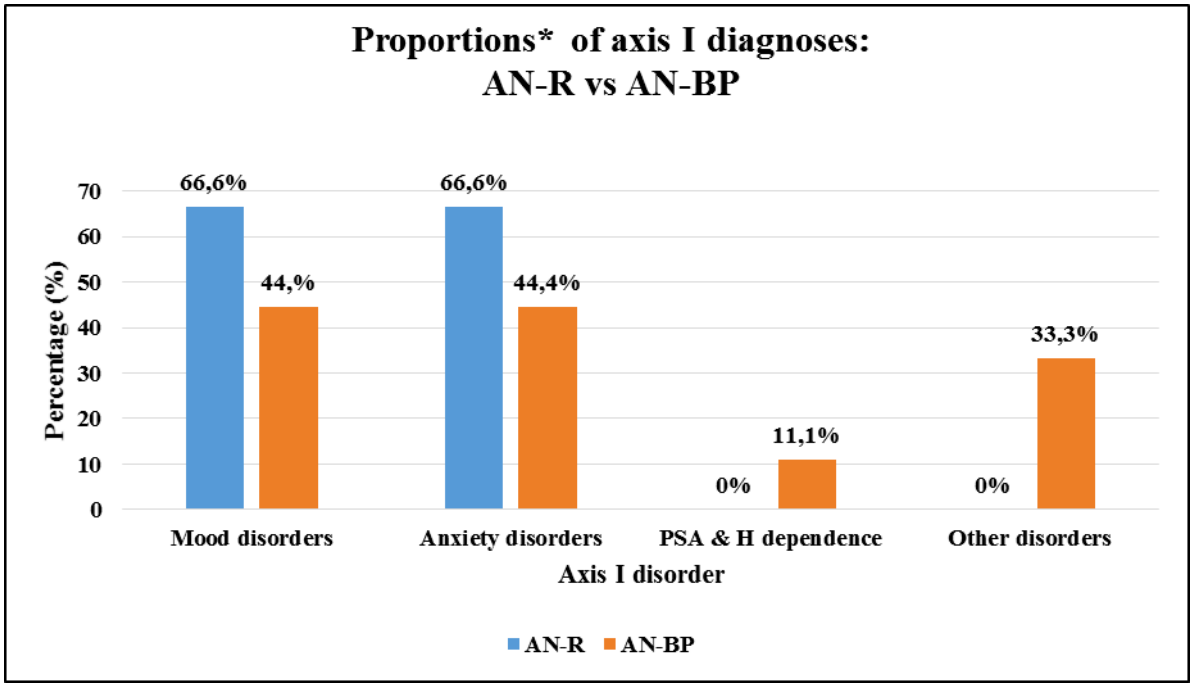
Variable	AN-R n (%)	AN-BP n (%)	P-value
Mean age on admission (years) (AN-R n=32) (AN-BP n=27)	21.15±7.44	24±2.2	0.255
Age distribution on admission (years) (AN-R n=32) (AN-BP n=27)			
10-20	20 (62.5%)	14 (51.9%)	
21-30	5 (15.6%)	6 (22.2%)	
31-40	7 (21.9%)	4 (14.8%)	0.334
41-50	0 (0.0%)	2 (7.4%)	
51-60	0 (0.0%)	1 (3.7%)	
Mean age of index admissions (years) (n=27)	18.44 ± 5.75	18.68 ± 2.17	0.937
Age distribution of index admissions (years) (AN-R n=16)* (AN-BP n=11)			
10-20	14 (87.5%)	9 (81.8%)	
21-30	1 (6.3%)	0 (0.0%)	
31-40	1 (6.3%)	2 (18.2%)	0.737
41-50	0 (0.0%)	0 (0.0%)	
51-60	0 (0.0%)	0 (0.0%)	
Mean age of readmissions (years) (n=32)	23.87 ± 8.11	27.68 ± 12.5	0.315
Age distribution of readmissions (years) (AN-R n=16) (AN-BP n=16)#			
10 -20	6 (37.5%)	5 (31.3%)	
21-30	4 (25.0%)	6 (37.5%)	
31-40	6 (37.5%)	2 (12.5%)	0.239
41-50	0 (0.0%)	2 (12.5%)	
51-60	0 (0.0%)	1 (6.3%)	

*Total percentage within the AN-R group equals 100.1% as values rounded-off to 1st decimal place
Total percentage within the AN-BP group equals 100.1% as values rounded-off to 1st decimal place
AN-R = anorexia nervosa restricting subtype
AN-BP = anorexia nervosa binge/purge subtype

TABLE 4. 6 CLINICAL CHARACTERISTICS OF AN-R PATIENTS (N=32) AND AN-BP PATIENTS (N=27) ADMITTED TO THE TARA HOSPITAL EATING DISORDERS UNIT BETWEEN JANUARY 2001 AND DECEMBER 2002

Variable	AN-R n (%)	AN-BP n (%)	P-value
Index presentation			
Yes	16 (50.0%)	11 (40.7%)	0.477
No	16 (50.0%)	16 (59.3%)	
Axis I disorder #			
Yes	6 (18.8%)	9 (33.3%)	0.200
No	26 (81.3%)	18 (66.7%)	
Axis II disorder/trait			
Yes	11 (34.4%)	11 (40.7%)	0.614
No	21 (65.6%)	16 (59.3%)	
Substance use (history/current)[#]			
Yes	2 (6.3%)	3 (11.1%)	0.652
No	30 (93.8%)	24 (88.9%)	
Family eating disorder history			
Yes	5 (15.6%)	2 (7.4%)	0.715
No	26 (81.3%)	24 (88.9%)	
Missing	1 (3.1%)	1 (3.7%)	
Family psychiatric history			
Yes	16 (50.0%)	15 (55.6%)	0.894
No	15 (46.9%)	11 (40.7%)	
Missing	1 (3.1%)	1 (3.7%)	
Goal weight reached			
Yes	4 (12.5%)	6 (22.2%)	0.321
No	28 (87.5%)	21 (77.8%)	
Weight gain/loss			
Gained	27 (84.4%)	23 (85.2%)	0.643
Lost	1 (3.1%)	2 (7.4%)	
N/A (admission <7 days)	4 (12.5%)	2 (7.4%)	
Method of discharge#			
RHT	17 (53.1%)	12 (44.4%)	0.730
Administrative	4 (12.5%)	3 (11.1%)	
Normal	11 (34.4%)	12 (44.4%)	

#Total percentage within each group equals 100.1% as values rounded-off to 1st decimal place
AN-R = anorexia nervosa restricting subtype
AN-BP = anorexia nervosa binge-eating/purging subtype



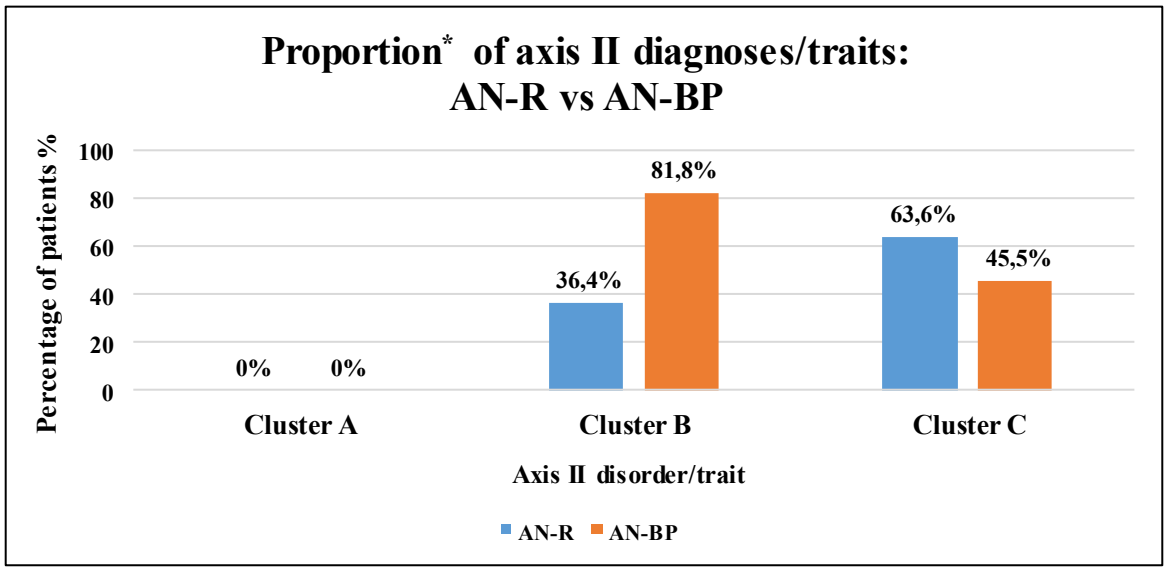
PSA = poly-substance abuse H = heroin
AN-R = anorexia nervosa restricting subtype
AN-BP = anorexia nervosa binge/purge subtype
Other disorders = adjustment disorder (n=1) and factitious disorder (n=2)
***Percentages will not total 100% within each group as some patients had more than 1 comorbid axis I diagnosis**

FIGURE 4. 2 COMPARISON OF PROPORTIONS* OF COMORBID AXIS I DIAGNOSES BETWEEN THE AN-R (N=32) AND AN-BP (N=27) PATIENTS ADMITTED TO THE TARA HOSPITAL EATING DISORDERS UNIT BETWEEN JANUARY 2001 AND DECEMBER 2002

Subtypes: *Axis I*

The AN-BP demonstrated more psychopathology (Table 4.6) and a greater percentage of this group had both axis I and II comorbid diagnoses concurrently (22.2%; n=6). Only six (18.8%) of the AN-R group had a comorbid axis I diagnosis (Table 4.6): two anxiety disorders; two mood disorders and two with both anxiety and mood disorders. Four individuals belonging to the AN-BP subtype had more than one axis I diagnosis. Amongst the AN-BP group there were four cases (44.4%) of mood disorders, one case (11.1%) of an anxiety disorder alone, three cases (33.3%) of anxiety and an additional 'other' axis I diagnosis (adjustment disorder (n=1) and factitious disorder (n=2) and one case (11.1%) of

poly-substance abuse and heroin dependence disorder. The percentage of both anxiety and mood disorders were found to be equal within the groups respectively (Figure 4.2).



AN-R= anorexia nervosa restricting subtype
AN-BP= anorexia nervosa binge/purge subtype
***Percentages will not total 100% within each group as some patients had more than 1 comorbid axis II diagnosis**

FIGURE 4. 3 COMPARISON OF PROPORTIONS* OF COMORBID AXIS II DIAGNOSES BETWEEN THE AN-R (N=32) AND AN-BP (N=27) PATIENTS ADMITTED TO THE TARA HOSPITAL EATING DISORDERS UNIT BETWEEN JANUARY 2001 AND DECEMBER 2002

4.3.2 Axis II disorders/traits

37.3% (n=22) of the total sample (n=59) were found to have an axis II diagnosis/trait (Table 4.2). 19 were diagnosed with axis II traits of which: 8 had only cluster B traits, 8 had only cluster C traits and 1 patient had both B and C traits. Two cases were documented as having both cluster B traits and a cluster C disorder (diagnosis of AN-BP; same patient who was readmitted during the study period). Only 1 of the 22 individuals was assigned the diagnosis of a cluster B disorder (AN-BP). It was unclear in two cases as to whether they had traits or disorders (1 cluster B and 1 cluster C). The total percentage of cluster B disorders/traits was

greater than cluster C disorders/traits within the total AN sample (Table 4.2). There were no cluster A disorders (Table 4.2). There were 10 subjects in the total study sample (16.9%) assigned both an axis I and axis II comorbid diagnosis. Sixty percent (n=6) of these individuals belonged to the AN-BP subtype.

Subtypes: *Axis II disorders/traits*

40.7% (n=11) of the binge/purge subtype sample were diagnosed with a personality disorder/personality trait (Table 4.6), more than half of which belonged to the cluster B group (Figure 4.3) (3 had diagnoses/traits belonging to both cluster B and C groups). In comparison, only 34.4% (n=11) of the restricting group had an axis II disorder, the majority of which belonged to the cluster C group (Figure 4.3).

4.4 Substance use/misuse/abuse/dependence

The use of substances was reviewed separately from other axis I disorders due to the number of studies suggesting correlations between the subtypes of AN and substance use/misuse/abuse/dependence. There were five individuals with current substance use/abuse, or with a history of substance use/abuse (8.5%) (Table 4.2).

Subtypes: *substance use/misuse/abuse/dependence*

Of the five individuals who were currently using or, had a history of substance use, three belonged to the AN-BP group (Table 4.6): two with a history of appetite suppressants (stimulants) and alcohol respectively, and one with current heroin and ecstasy abuse (diagnosed on axis I). Two of the substance misusers (6.25%) belonged to the AN-R subtype (Table 4.6): one with current cannabis abuse and one who abused over-the-counter medication. Only poly-substance abuse and heroin dependence was documented as an official axis I diagnosis (Figure 4.2).

4.5 Family psychiatric history

The majority of the total study sample had no family history of an eating disorder (n=50; 84.7%), however, just over half the study group had a positive family history for any other psychiatric disorder (n=31; 52.5%) (Table 4.2). This information was not available for two of the cases as they were adopted (1 AN-R; 1 AN-BP) (Table 4.2).

Subtypes: *Family psychiatric history*

15.6% (n=5) of the AN-R sample had a positive family history of an eating disorder while this was the case in only 7.4% (n=2) of the AN-BP group (Table 4.6). A positive family history for any other psychiatric disorder, other than an ED, was more prevalent in the AN-BP group as compared to the AN-R sample (55.6% (n=15) and 50.0% (n=15) respectively) (Table 4.6). Two (6.3%) AN-R individuals and one (3.7%) AN-BP individual had both a positive family history of an eating disorder and psychiatric disorder history.

4.6 Weight and rate of weight gain (ROW)

The average weight on discharge of the total AN study sample (n=59) was higher than the average weight on admission (Table 4.3), with the lowest weight on admission being 27.1 kg (AN-BP) and the highest admission weight 54.9 kg (AN-R). The lowest discharge weight was 26.8 kg (AN-BP) with the highest discharge weight being 61.3 kg (AN-R).

Of the total sample, 50 individuals (84.7%) gained weight during their admission period and 3 patients (5.1%) lost weight (Table 4.2). Six patients (10.2%) were recorded as having no change in weight as their length of stay was less than seven days (Table 4.2). Patients are only weighed once per week during the admission to this unit.

The median rate of weight gain (of those who did gain weight) for the total AN group was 638.8 g/week (interquartile range 425.9-987.0) (Table 4.3). The greatest amount of weight gained was 18 500 g (18.5k g) during a 78-day admission by an AN-R patient (ROW gain = 1667 g/week). The least amount of weight gained was 300 g over a 28-day period by a member of the AN-BP group (ROW gain = 75 g/week).

Subtypes: *weight and ROW gain*

There was a significant difference between the AN-R and AN-BP groups with regard to average percentage of goal weight on admission (p=0.039) (Table 4.7). The AN-BP group had a higher mean goal weight percentage than the AN-R sample (79.7 % ±1.4 vs 75.0 % ±1.63 respectively), as shown in Table 4.7. At admission, the AN-R group were more underweight than the AN-BP sample (percentage underweight 13.55 % ±12.51 and 8.23% ± 9.87 respectively) (Table 4.7).

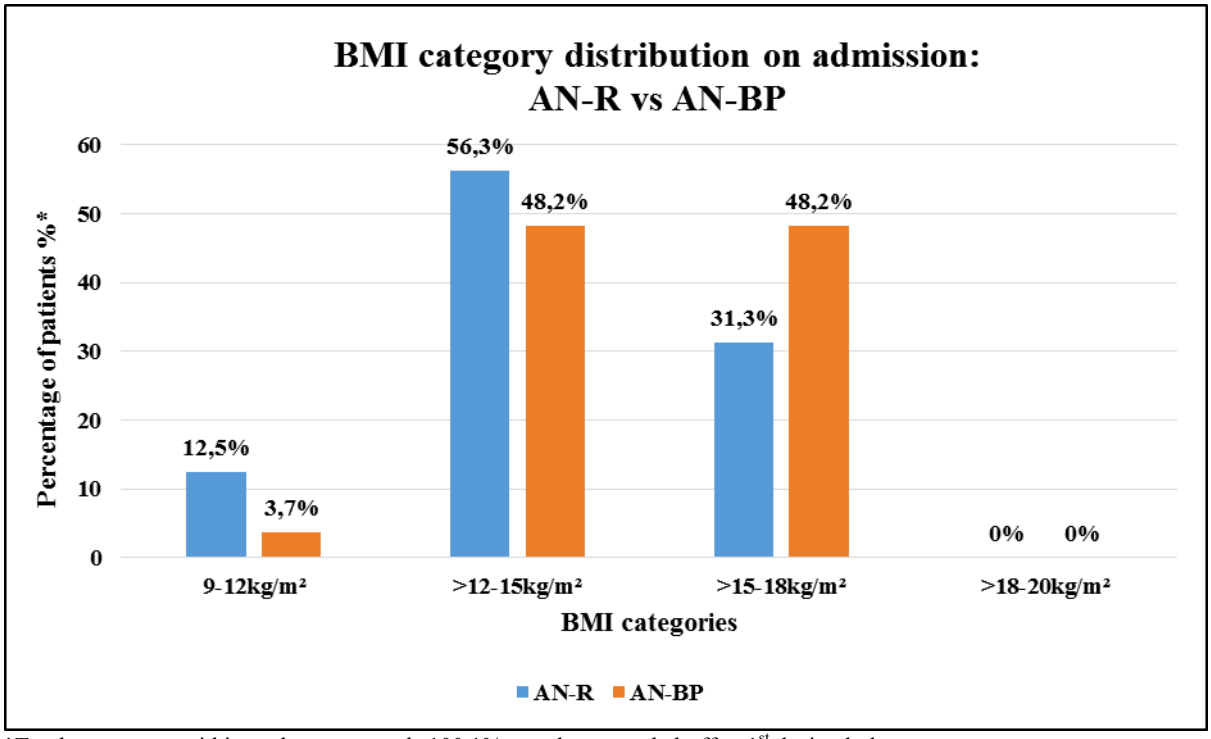
Twenty-seven patients in the AN-R group (84.4%) and twenty-three patients in the ANBP group (85.2%) gained weight during their stay on the ward (Table 4.6). The average rate of weight gain was greater amongst the AN-BP group as compared to the restricting sample (Table 4.6). Only one of the AN-R group was recorded to have lost weight (Table 4.6): 1300 g over a 9-day period. This was also the largest amount of weight lost amongst the total sample. There were two patients who lost weight in the AN-BP group: one patient lost a total of 600 g during a 1-week stay and the other lost a total of 800 g during a 9-day admission (Table 4.6).

TABLE 4. 7 CLINICAL CHARACTERISTICS OF AN-R PATIENTS (N=32) AND AN-BP PATIENTS (N=27) ADMITTED TO THE TARA HOSPITAL EATING DISORDERS UNIT BETWEEN JANUARY 2001 AND DECEMBER 2002

Variables	AN-R	AN-BP	P-value
Mean BMI on admission	Rank sum=842	Rank sum=928	0.073
Mean BMI on discharge	Rank sum=844.5	Rank sum=925.5	0.079
Mean change in BMI	2.11±1.97	2.25±1.82	0.788
Mean weight on admission (kg)	37.8±6.7	39.3±1.2	0.811
Mean weight on discharge (kg)	43.4±1.3	45.04±1.1	0.355
Mean length of stay (days)	64.37±8.38	64.51±8.55	0.991
Mean percentage of goal weight on admission (%)	75.0±1.63	79.7±1.4	**0.039**
Mean percentage of goal weight on discharge (%)	Rank sum=857	Rank sum=913	0.117
Mean percentage underweight on admission (%)	13.55 ± 12.51	8.23 ± 9.87	0.079
Mean percentage underweight on discharge (%)	Rank sum=857	Rank sum=913	0.117
Mean rate of weight gain (of those who gained weight) (g/week)	556.01±94.59	676.93±119.53	0.425

BMI = body mass index
AN-R = anorexia nervosa restricting subtype
AN-BP = anorexia nervosa binge/purge subtype

The two cases found to be the most underweight on admission, were 49.4% underweight (BMI=9.6) and 41.7% underweight (BMI=11.1) and were of the restricting subtype. Both were transferred to general hospitals during their stay for medical reasons.

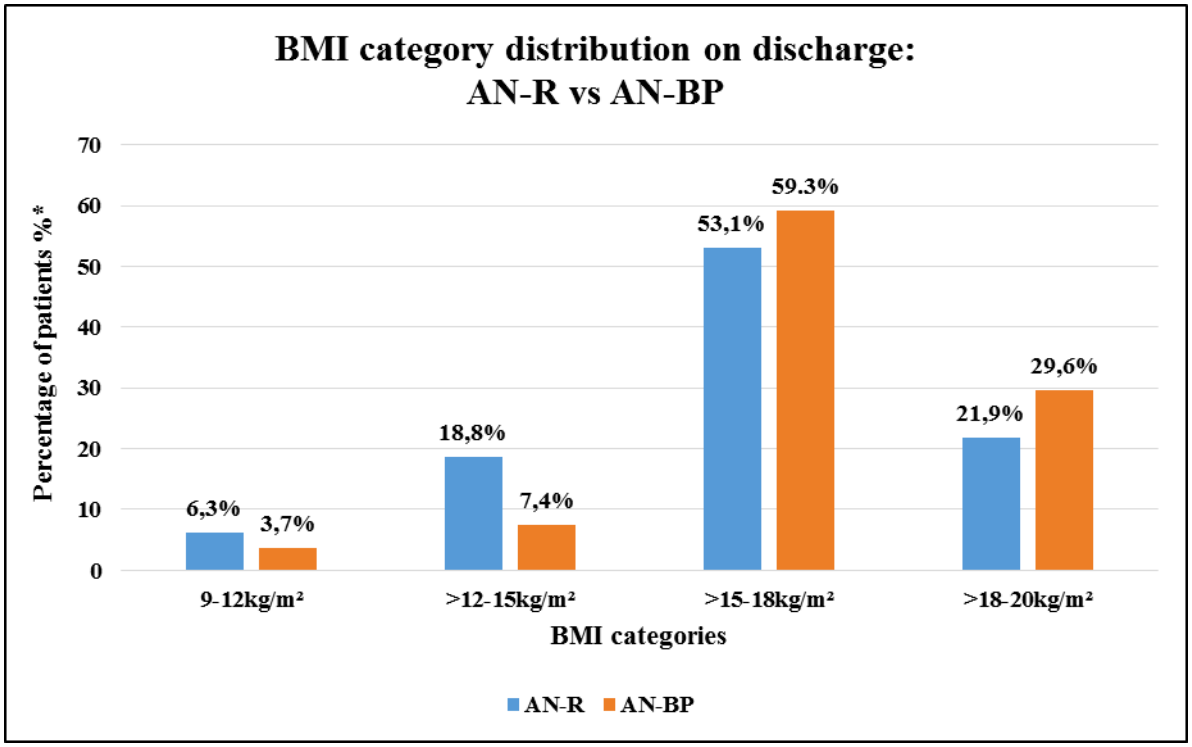


*Total percentage within each group equals 100.1% as values rounded-off to 1st decimal place
BMI = Body mass index
AN-R= anorexia nervosa restricting subtype
AN-BP= anorexia nervosa binge-eating/purging subtype

FIGURE 4. 4 BMI CATEGORY DISTRIBUTION OF AN-R (N=32) AND AN-BP (N=27) PATIENTS ON ADMISSION TO THE TARA HOSPITAL SPECIALISED INPATIENT EATING DISORDERS UNIT BETWEEN JANUARY 2001 AND DECEMBER 2002

4.7 BMI

The majority of the total AN sample (n=59) were admitted with a BMI between 12.01 kg/m^2 and 15 kg/m^2 (n=31; 52.5%) (Table 4.1) with a total mean BMI of 14.5 kg/m^2 ± 1.7 (Table 4.4). The mean BMI was higher on discharge (16.6 kg/m^2 ± 2.21) (Table 4.4) and the majority of the sample were between 15 kg/m^2 and 18.00 kg/m^2 (n=33; 55.93%) (Table 4.1). The lowest individual BMI on admission was 9.6 (AN-R) and the lowest individual BMI on discharge was 10.4 (AN-R). The highest individual BMI on admission was 17.5 (AN-BP) and on discharge was 19.7 (AN-R). The greatest change in BMI was an increase of 6.6 (from 11.7 on admission to 18.3 on discharge) and was by a patient of the binge/purge subtype.

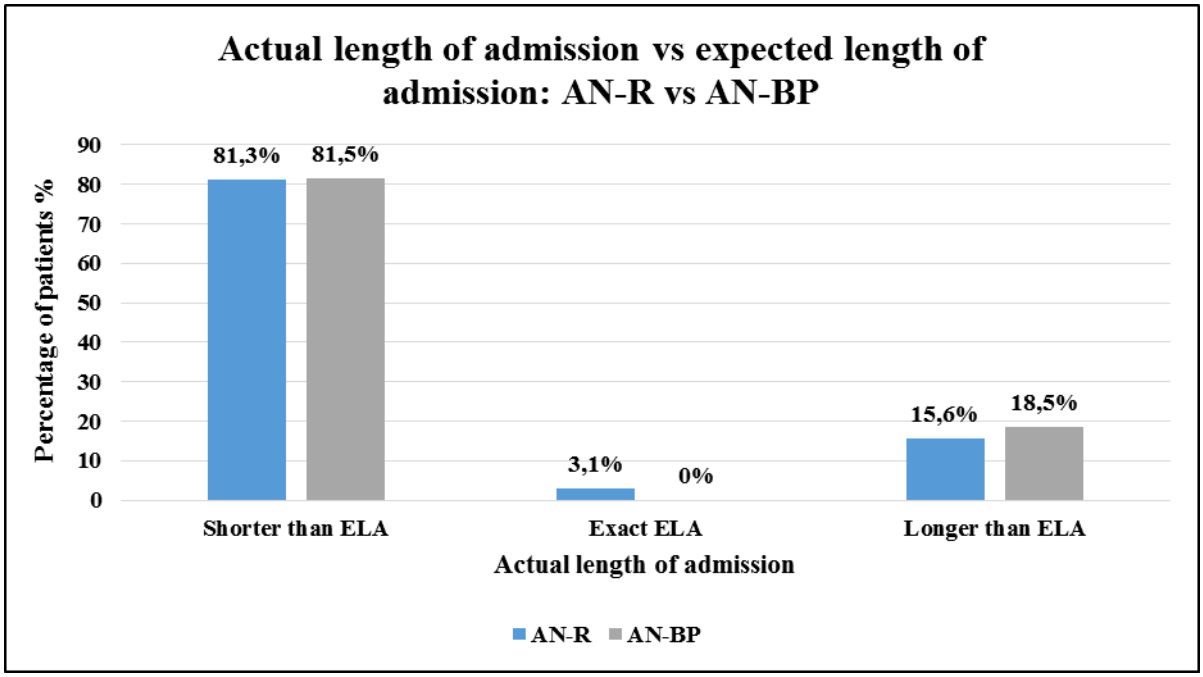


*Total percentage in each group equals 100.1% as values rounded-off to 1st decimal place
BMI = body mass index
AN-R= anorexia nervosa restricting subtype
AN-BP = anorexia nervosa binge-eating/purging subtype

FIGURE 4. 5 BMI CATEGORY DISTRIBUTION OF AN-R (N=32) AND AN-BP (N=27) PATIENTS (ADMITTED BETWEEN JANUARY 2001 AND DECEMBER 2002) ON DISCHARGE FROM THE TARA HOSPITAL EATING DISORDERS UNIT

Subtypes: *BMI*

The mean BMI on admission (p=0.073) was lower than that on discharge (p=0.079) for the AN-R group. However, in the AN-BP sample, the mean BMI was greater on admission as compared to discharge. The mean BMI's on admission and discharge were greater in the AN-BP sample (Table 4.7). A greater proportion of the restricting anorexics had a BMI less than or equal to 15 kg/m^2 on admission as compared to the AN-BP subtype (68.8%; n=22 vs 51.9%; n=14) (Figure 4.4). A larger proportion of the AN-BP group had a BMI over 15 kg/m^2 on discharge (88.9%; n= 24 vs 75%; n= 24 AN-R) (Figure 4.5). The greatest positive change in BMI was 6.6kg/m^2 by an individual with a diagnosis of ANBP. The greatest negative change in BMI was –0.5kg/m^2 by a patient of the AN-R group.



ELA = expected length of admission
AN-R = anorexia nervosa restricting subtype
AN-BP = anorexia nervosa binge-eating/purging subtype

FIGURE 4. 6 ACTUAL VS EXPECTED LENGTH OF ADMISSION OF AN-R PATIENTS (N=32) AND AN-BP PATIENTS (N=32) ADMITTED TO THE TARA HOSPITAL EATING DISORDERS UNIT BETWEEN JANUARY 2001 AND DECEMBER 2002

4.8 Length of admission

The majority of the total sample (n=59) were admitted for a shorter period than their expected length of stay (Table 4.2). The longest admission was 190 days by an AN-R patient, who was eventually discharged due to poor compliance with the program. Eight patients were admitted for seven days or less, with three admissions of one day each. Two of these eight patients were discharged for administrative reasons: one was found using substances on the ward; while the other was transferred to a general hospital for medical reasons and subsequently demised. The remaining six refused hospital treatment (RHT). One patient (1.7%) in the total study sample was admitted for the exact time period estimated for their length of stay and belonged to the AN-R group (Figure 4.6).

Subtypes: *length of admission*

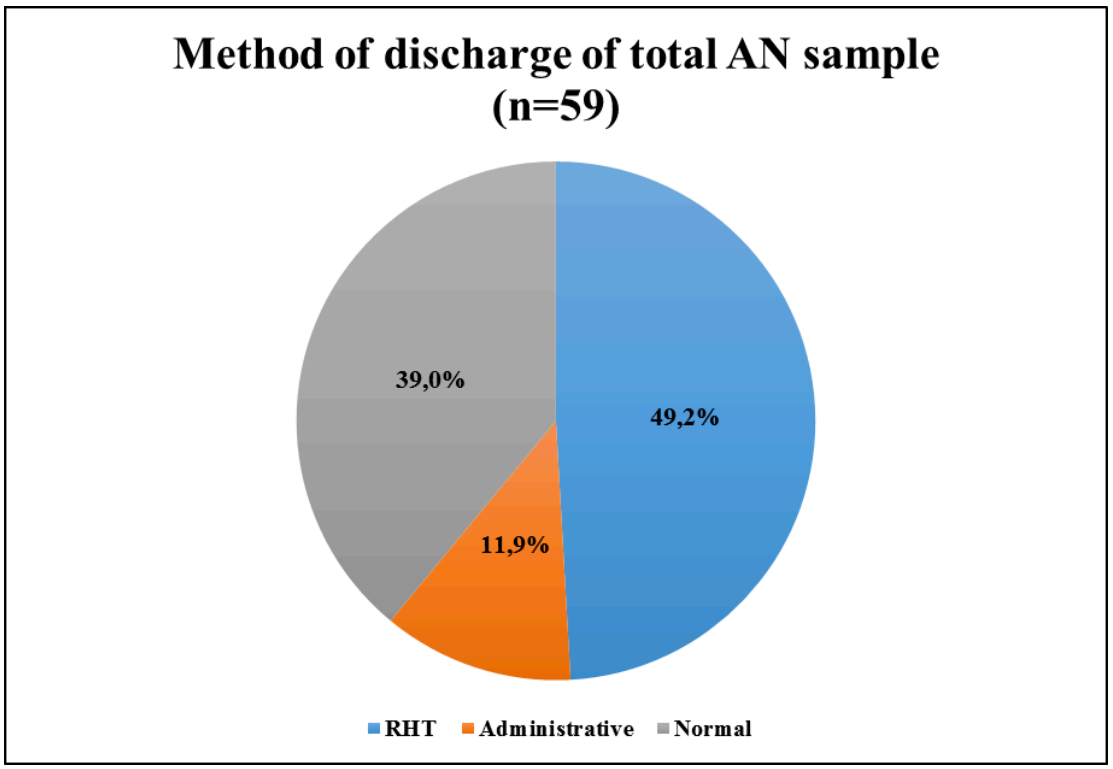
There was no significant difference (p=0.991) between the average length of admission of the AN-R group (64.4±8.38 days) and the AN-BP group (64.5±8.55 days) (Table 4.7). A larger proportion of the AN-BP group were admitted for longer than their expected length of stay (Figure 4.6). There were four (12.5%) patients in the AN-R group and two (7.4%) patients in AN-BP group who were admitted for less than seven days (Table 4.6).

4.9 Goal weight and method of discharge

Only 16.9% (n=10) of the total sample had reached their GW (as calculated), upon leaving the ward (Table 4.2).

Refused hospital treatment

Twenty-nine patients (49.2%) refused hospital treatment (RHT) and left the program against the advice of the treating multidisciplinary team (Figure 4.7). Seventeen (53.1%) of these individuals were of the AN-R subtype. Six of those patients who had refused hospital treatment were signed out by their parents. Other reasons recorded were: non-compliance (n=2); family responsibilities (n=1); financial difficulties (n=1); and one patient refused to return to the eating disorders unit once discharged from a general hospital (where she was transferred for medical reasons). Two of the patients (AN-BP) who had refused hospital treatment had reached their goal weight: one required a longer stay for psychotherapy reasons, and one required one more week on the ward (consolidation phase). There were no specific reasons stated for the remainder.



***Total percentage equals 100.1% as values rounded-off to 1st decimal place**
RHT= refused hospital treatment
AN = anorexia nervosa

FIGURE 4. 7 PROPORTION* OF AN PATIENTS ADMITTED BETWEEN JANUARY 2001 AND DECEMBER 2002 (N=59) WITH REGARDS TO TYPE OF DISCHARGE FROM THE TARA HOSPITAL SPECIALISED INPATIENT EATING DISORDERS UNIT

Administrative reasons

Seven (11.9%) patients were discharged for 'administrative' reasons (Figure 4.7): three patients (2 AN-R; 1 AN-BP) were transferred to general hospitals for medical complications of which two (1 AN-R; 1 AN-BP) subsequently died. The remaining four (2 AN-R; 2 AN-BP) were discharged for non-compliance, one of the patients (AN-BP) found to be using substances on the ward.

'Normal' discharge

The remaining 23 cases (39%) (Figure 4.7) were documented as 'normal' discharges. However, only 8 of these patients had reached their goal weight (as calculated by the formula used in this particular eating disorders unit) at the time of discharge. The majority of the 'normal' discharges 65.2% (n=15) did not reach their GW upon discharge (GW as calculated using the formula used in this eating disorders unit). 3 of the patients had completed the program with regards to time and the multidisciplinary team felt that they were fit for discharge, albeit not at GW. 3 of the patients were felt by the MDT to have made psychological improvements and were fit for discharge. However, 1 of these individuals was recorded as having reached her GW, but had not according to calculation, despite her menses having returned. 1 was discharged 2 weeks early at their family's request and 2 were recorded as being discharged for non-compliance. It is not clear why these were not recorded as 'administrative' discharges. For 6 of these patients there was no documented reason as to why they were discharged. They were 200g, 400g, 800g (n=2), 1200g and 2700g short of their goal weights respectively.

Subtypes: *Goal weight and method of discharge*

Subtypes: Refused hospital treatment

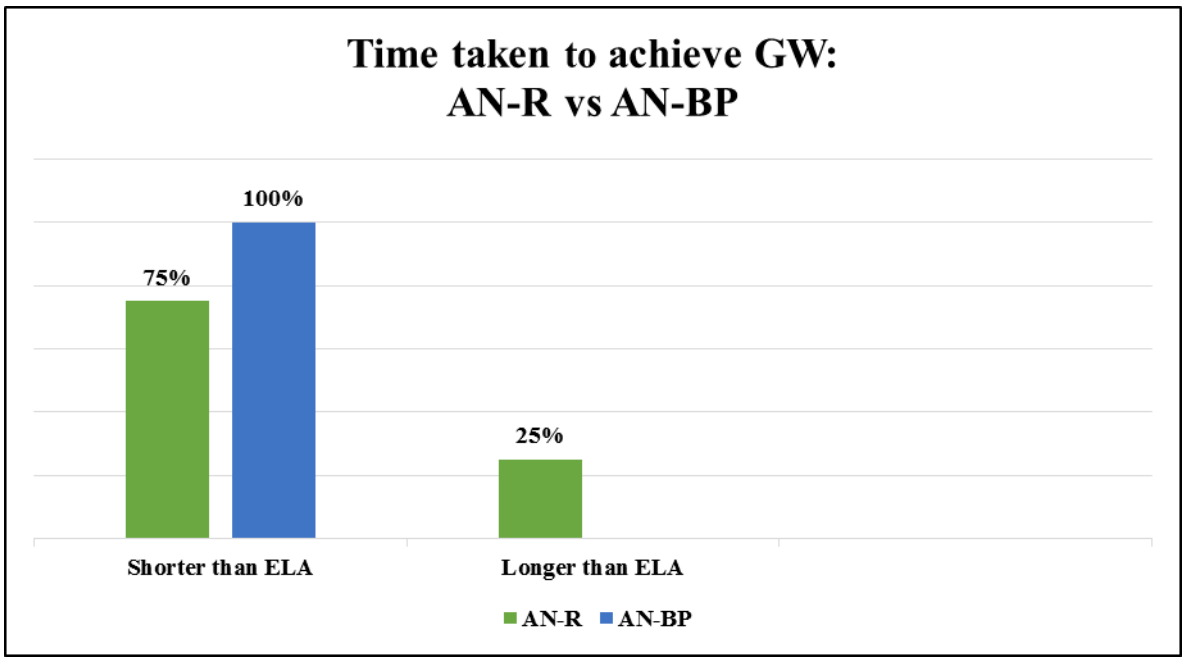
A greater percentage of the AN-R group (53.1%; n=17) as opposed to the AN-BP group (44.4%; n=12) had refused hospital treatment (Table 4.6). However, 2 of these patients had reached their goal weights but required further stay for psychotherapeutic reasons (both of the AN-BP group).

Subtypes: Administrative discharge

3 (11.1%) admissions from the AN-BP group (2 for non-compliance) and 4 (12.5%) from the AN-R group were discharged for administrative reasons (Table 4.6). 1 case from each group respectively subsequently died following transfer to a hospital general hospital.

Subtypes: 'Normal' discharge

A greater percentage of AN-BP patients (44.4%; n=12) as compared to AN-R patients (34.4%; n=11) were classified as 'normal' discharges (Table 4.6). However, not all had achieved their GW at the time of discharge from the ward.



ELA= expected length of admission
GW= goal weight
AN-R= anorexia nervosa restricting subtype
AN-BP= anorexia nervosa binge-eating/purging subtype

FIGURE 4. 8 TIME TAKEN TO ACHIEVE GOAL WEIGHT WITH REGARDS TO LENGTH OF ADMISSION OF THE AN-R (N=32) VS AN-BP (N=27) PATIENTS ADMITTED TO THE TARA HOSPITAL EATING DISORDERS UNIT BETWEEN JANUARY 2001 AND DECEMBER 2002

Subtypes: Goal weight

Only 12.5% (n=4) of the AN-R group (3 'normal' discharges; 1 RHT) and 22.2% (n=6) of the AN-BP group (5 'normal' discharge; 1 RHT) had reached their goal weight upon leaving the ward (Table 4.6). All the AN-BP individuals reached their goal weight in less than the expected duration while 75% (n=3) of the AN-R group did the same. One of the AN-R patients stayed longer than the expected length of stay before reaching goal weight as shown in figure 4.8.

CHAPTER 5: DISCUSSION

The aim of this study was to describe the clinical and demographic profile of a group of inpatients diagnosed with anorexia nervosa, admitted to a specialised eating disorders unit between January 2001 and December 2002, and to review characteristics of the two subtypes: AN-R and AN-BP.

The only statistically significant result found in this study was the difference in average percentage of goal weight on admission between the two groups; that of the AN-R sample being much lower than the AN-BP sample (p=0.039). (See section 5.4) However other findings of this study will also be discussed.

5.1 Gender and race

The racial distribution is in keeping with many studies worldwide.(26, 28, 66, 106, 107, 141, 142) However, research has shown that disordered eating patterns are not exclusively found among white, middle-class females. This stereotype is largely attributed to the fact that this demographic is found mostly in 'westernised' societies. However, as previously mentioned, research provides evidence of an increasing number of non-white individuals presenting with sub-threshold eating disorders (eating disorders which do not meet full DSM criteria), disordered eating patterns and abnormal eating attitudes. This trend has been credited to the increased exposure of non-white ethnic groups to western cultural values and ideals, including this culture's idea of beauty and its glorification of thinness.

The Eating Attitudes Test (EAT), a 40-item questionnaire,(143) and the EAT-26, a 26-item abbreviation of the original EAT,(144) are screening tools used to assess eating disturbances. They do not, however, provide a specific diagnosis of an eating disorder. A 2002 preliminary study of eating attitudes in high school students in the Philippines found, according to the

EAT scores, the incidence of disturbed eating attitudes to be 14.5% (± 3.2%) amongst males and 15.0% (±3.5%) amongst females. The researchers found this comparable to scores seen in western countries (7-22%).(145) A more recent 2010 study conducted in the United Arab Emirates showed that 24% of the 228 sample of female university students scored above the EAT-26 cut-off score (A score of 20 or more is indicative of abnormal eating attitudes and eating patterns). In addition, 74.8% were displeased with their current perceived body shape. The researchers noted that these results were similar and higher than those found in earlier studies conducted in North America and Europe.(146)

Eating disorders amongst black South African females were first described by Szabo et al. in 1995.(147) It is thought that disordered eating amongst black South African adolescent females is on the increase. Caradas et al. (2001) found EAT-26 scores (percentage of patients who scored at or above a score of 20) of 17.9%, 17.1% and 21.2% for black, coloured and white South African schoolgirls respectively.(30) Further research has revealed EAT-26 scores in black South African adolescent females in an urban setting, to be roughly equivalent to their white counterparts (18.7% vs 18.6 %).(33) A study done in the same setting used in this study, over a 4-year period (January 2005-December 2008) showed that 24.5% of the admissions for anorexia nervosa were non-white, more than twice the 10.2% found in this study. Although the sample size used in the aforementioned study was smaller (n=49), it was conducted over a longer period.(141) In addition, it is important to note the socioeconomic and sociocultural changes which had occurred in South Africa between the time period of this study and the aforementioned study. The discrepancy in results may reflect the changing socioeconomic and sociocultural climate in South Africa at that time, which may have resulted in greater access to health and educational facilities by individuals who were previously unable to do so. Likewise, the time period of this study may have had a significant impact on both race and gender results.

Black anorexic patients have been found to be more likely to present with bulimic symptoms as opposed to their white counterparts (33, 34) In this study the majority of the non-white anorexics were diagnosed with AN-BP. Although the number of non-white patients found in this category is very small, it is in keeping with what has been found in the literature.

Studies have shown that the prevalence of anorexia nervosa, and eating disorders as a whole, amongst males is on the increase. Kjelsas et al. (2004) showed a lifetime prevalence of anorexia nervosa in males of 0.2% vs 0.7% among females in the same 14-15 year old age group,(148) while a 2007 study (n=2980), carried out over a period of 3 years, showed the lifetime prevalence of eating disorders in males to be 0.3% (25% of the anorexia nervosa sample in the aforementioned study were male).(21)

Within a South African context, Freeman and Szabo (2005) showed that males accounted for 3.5% (n=13) of all anorexia nervosa admissions to a specialised eating disorders inpatient unit between the years 1993 and 2002.(149) These results are similar to those found in this study (although the results of this study may not be generalizable due to the small sample size).

It is postulated that the incidence of males with eating disorders is underestimated as they may be less likely to seek treatment for eating disorders (150) and possibly due to their atypical presentation. While women are concerned about losing weight in order to be thinner, men's disordered eating patterns and compensatory behaviours are tend to be centred on gaining muscle.(84)

5.2 Marital status and age

The majority of this study sample were single, were completing, or had attained, a secondary level education and were below the age of 20. This is in keeping with the literature regarding the most common age distribution of this illness. (24, 35, 111, 151)

In this study a greater percentage of the AN-R group were single as compared to the binge/purge group (87.5% vs 74.1%) (p=0.093). Although it has been found that bulimic pathology may be more common amongst married individuals,(45) once again, age may influence these results. The result in this study may simply be a reflection of the age distribution of the two subgroups; a larger proportion of the AN-R group were below the age of 20, making it difficult to comment on this finding.

This study found no statistically significant differences between the AN-R and AN-BP groups with regards to average age on admission (p=0.255) (Pryor et al. (1996) showed similar results (107)) or average age of index admissions (p=0.937). This is contrary to several studies which have demonstrated that AN-R individuals are generally younger on intake, when looking at the average age of the two subtypes on admission to an eating disorders program.(9, 10, 41, 44) In addition, a 2004 multisite study, which utilised a sample of 1179 individuals, showed that those diagnosed with AN-BP presented at a younger age in comparison to their restricting counterparts.(66)

It is important to note however that age at intake is not equivocal to age at first presentation. Both Nagata et al. (1997) and Blinder et al. (2006), amongst others, demonstrated similar results.(44, 106, 123) However, there is also data which shows that first diagnosis of AN-R may present later.(101)

5.3 Admission ratios

The admission ratios are in keeping with a number of studies.(8, 9, 142, 152) It has been proposed that AN-R individuals may predominate inpatient admissions in eating disorder units due to the extended and severe weight loss seen in these individuals.(153) A study conducted in this same unit between 2005 and 2008 showed similar results, which may point to some consistency in the presenting population.(141)

A greater percentage of individuals with AN-BP as compared to AN-R were readmissions for an eating disorder. Numerous studies have shown a poorer prognosis in those who display binge/purge symptoms, differentiating them from their restricting counterparts.(99, 100, 126, 127) This may be attributed to the fact that they have been found to have greater psychopathology (42, 93) and are less likely to complete treatment (see below). In addition, lower recovery rates found amongst this group (41) contribute to repeated admissions found amongst individuals that binge/purge.(99) It has been hypothesised that this is an important area of research in assessing the validity of subtyping as it could prove to have important treatment implications. It may indicate that weight restoration alone may not be the most effective strategy in managing AN-BP patients.(100) In addition, the poor compliance found among this subtype may be a focus of clinical attention.(121)

Although Herzog et al. (1996) found that restricting anorexics in their sample were *less* likely to recover, these researchers employed a stricter definition of 'recovery' as compared to other studies. In addition, the study was a prospective naturalistic one, as opposed to the many studies based on single-follow-up data which show lower recovery rates amongst those who binge/purge. As the authors suggest, this may have influenced results.(123)

5.4 Weight and BMI

This study utilised goal weight (as used in this specialised eating disorders unit) as opposed to ideal body weight, as a variable in the clinical description and analysis of anorexia nervosa patients.

The only statistically significant finding of this study was that the average percentage of goal weight on admission of the AN-R group was significantly lower than that of the AN-BP group ($p = 0.039$). There exists a large body of evidence, in support of the subtyping of anorexia nervosa, which shows that the average percentages of IBW and BMI's on presentation (to an inpatient or outpatient eating disorder program) are found to be lower amongst those anorexics who restrict as opposed to those anorexics who binge/purge.

Eddy et al. (2002), Nagata et al. (1997) and Godart et al. (2006), amongst others, have shown that on in-take in their respective studies, the AN-R groups were found to have a lower percentage of IBWs and BMIs as compared to the AN-BP group.(7-10, 44, 66, 93, 106, 121) Keel et al. (2004) suggests that lower levels of characteristics such as persistence, conscientiousness and self-directedness amongst the binge/purge group result in poor self-control, making it more difficult for these individuals to limit their calorie intake to the same extent as their restricting counterparts. In addition, the fact that purging is not an effective method of weight control results in those anorexics who binge/purge having a higher BMI.(66) In a review of 14 studies by DaCosta and Halmi (1992) which looked at the various characteristics of the two subtypes, those with AN-BP were consistently found to weigh more on presentation.(12) However, there are researchers who have demonstrated that these clinical characteristics should not be used to justify the separation of the two AN subtypes. Pryor et al. (1996), including others, have shown no difference between the two subtypes with regard to percentage of IBW or BMI on admission.(107, 123, 154)

5.5 Comorbidity

Although it has been found that 80% of individuals with AN are diagnosed with another psychiatric disorder at some point in their lives (155) the majority of this study sample had no additional axis I or II disorder (74.6% and 62.7% respectively). This may be due to the small sample size of this study. Those AN patients who do have comorbid psychiatric disorders have been shown to present with more severe symptoms and have poorer prognoses than those without.(88, 89, 94, 156, 157) Conversely, North et al. (1999), amongst others, found that comorbidity had little impact on outcome.(123, 158, 159)

In keeping with a large body of research on this topic (41, 44, 93, 94) this study found axis I and II comorbid diagnoses to be more prevalent amongst the AN-BP subtype (66.7% and 59.3% respectively). In addition, the results of this study echo research which has demonstrated that not only are AN-BP individuals more likely to have an axis II disorder, but are more frequently found to have both an axis I (apart from anorexia nervosa) and axis II disorder concurrently.(66, 91, 92)

The incidence and types of comorbid psychiatric conditions found in AN-R and AN-BP sufferers have been considered some of the most salient differences between the two subtypes. These characteristics are used by a number of researchers to justify the subclassification of anorexia nervosa.(12) This study found the incidence of both anxiety and mood disorders to be equal in the AN-R and AN-BP population. This is contrary to evidence to suggest that affective disorders may be found more frequently among those individuals who binge/purge.(42, 44, 91, 123, 160)

Casper et al. (1980) and Laessle et al. (1989) found higher rates of anxiety and depression amongst the AN-BP group,(41, 42) while Speranza et al. (2001) showed that OCD was more prevalent amongst the AN-BP subtype in their study sample.(161) Herzog et al. (1999) and

Iwasaki et al. (2000) found higher incidences of MDD amongst their AN-BP population.(162, 163) The latter study found a 6% prevalence rate of bipolar II disorder within their AN-BP study population as opposed to no individuals with bipolar II disorder within the AN-R group.(163) A study done in 2002 by Eddy et al. likewise found a history of bipolar mood disorder to be more prevalent amongst binge/purge anorexics (6% AN-BP vs. 0% AN-R).(8)

However, there is dispute around this important argument used in favour of the subtyping of AN. There is data which has shown little difference between the two subtypes with regards to rates of psychopathology, supporting claims that there may not be as many clinically relevant differences between the two subtypes as previously thought.(107, 159) Godart et al. (2006) found no difference between anxiety and depression rates between AN-R and AN-BP individuals,(9) while Jordan et al. (2008) found mood disorders just as likely in their AN-R and AN-BP groups, even though bipolar II disorder was found to be more prevalent in their AN-R population.(96)

Despite discrepancies' in psychopathology rates and types within the two groups, it has been demonstrated in several studies that AN-BP individuals are associated with higher rates of mood lability, impulsivity, erratic behaviour, substance abuse and suicidal and self-injurious behaviour; many of the characteristics found among the cluster B group of personality disturbances.(11, 15, 42, 70, 94, 164) These are some of the most important features of the AN-BP group used to suggest that those that binge/purge differ from those anorexics that restrict.

Even though they found not to be statistically significant, this study demonstrated a higher prevalence of cluster B personality disorder/traits amongst the AN-BP subtype, in keeping with many other studies which show a greater frequency of cluster B disorders/traits (particularly the borderline variant) in AN-BP individuals.(94, 96, 165, 166) The high rates of

axis II psychopathology, particularly cluster B, among those with AN-BP is thought to contribute to the greater impairment and poorer outcome seen in these individuals, setting them apart from their calorie-controlling equivalents.(92, 94) However results from Steiger et al. (1991) found no significant difference regarding rates of cluster B or C pathology between AN-R and AN-BP and did not support the separation of AN into two distinct subtypes with regards to prevalence of particular axis II diagnoses.(159)

Further differentiating the two groups, research has emerged which suggests that those with the restricting subtype of anorexia nervosa display specific phenotypic traits such as increased harm avoidance, conscientiousness and perfectionism, anxiety, less danger-seeking and impulsive behaviour and may exhibit rigid and obsessive-compulsive thinking, which distinguish them from those anorexics that binge/purge.(24, 66, 67, 167) In keeping with such data, this study demonstrated a higher prevalence of cluster C axis II pathology amongst the restricting group of AN patients, although the data was not of statistical significance. However, there is evidence both for (94, 97, 165, 166) and against (168) the fact that OCD (obsessive-compulsive disorder), cluster C personality disorders, specifically OCPD (obsessive-compulsive personality disorder), and obsessive-compulsive traits, may be found more frequently in the AN-R population. Research from Piran et al. (1988) showed a larger percentage of cluster C personality pathology amongst their AN-R population as compared to their binge/purge counterparts.(166) On the contrary, Speranza et al. (2001) demonstrated that a significantly larger percentage of their AN-BP sample were found to have a lifetime prevalence of OCD (43% AN-BP vs 16% AN-R).(161) Fornari et al. (1992) found those anorexics who binge/purge more likely to be assigned an obsessive-compulsive disorder diagnosis at some point in their lifetime when comparing the two subtypes.(169) One particular study demonstrated that obsessive-compulsive personality disorder was just as likely in their AN-R and AN-BP samples.(170)

5.6 Substance use/misuse/abuse/dependence

Substance use/misuse is viewed separately from other axis I diagnoses in the majority of studies comparing the two subtypes of anorexia nervosa. This is because it is considered by many pro-subtyping researchers to be an important, potentially distinguishing, characteristic of the AN-BP subgroup.

In this study, a diagnosis of substance abuse on the official discharge summary was found in only one of the case records reviewed. However, there were four other cases where substance use or misuse were documented in their respective records. It is possible that the pattern of use did not meet criteria for an official substance abuse/dependence axis I disorder as defined by the DSM-IV-TR. This makes it difficult to comment on findings regarding substance abuse/dependence in this study. The only case officially recorded as substance abuse in this study (poly-substance abuse and heroin dependence) belonged to the AN-BP subtype. The large majority of studies reviewed have shown substance abuse to be more prevalent amongst the binge/purge subtype, at times associating it with their impulsive nature.(11, 41, 44, 70, 100, 101, 171, 172) In contrast, there is evidence demonstrating that this may not always hold true. Eddy et al. (2002) found no difference in the rates of substance abuse between these two subgroups.(8) In this study the incidence of substance abuse or use (history or current) in the AN-BP group was higher than the AN-R subtype, however the finding of such small numbers of substance misusing individuals makes it difficult to comment on statistical significance.

5.7 Family history

This study found a greater prevalence of a family history of an eating disorder amongst the AN-R group, while a larger percentage of the AN-BP group had a positive family history for other psychiatric disorders.

Some researchers consider studies that show a greater frequency of family psychiatric history amongst those AN-BP individuals as evidence for the subclassification of AN.(54, 70, 173) However it has been suggested that the AN-R subtype are more likely to have a positive family history of an eating disorder (as opposed to other psychiatric disorders).(103)

5.8 Rate of weight gain

This study found the average rate of weight gain during admission to be greater amongst the AN-BP subtype sample compared to the AN-R sample. This is in-line with Neuberger et al. (1995).(7) It has been found that a low rate of weight gain may be a poor prognostic factor in AN.(7, 174)

5.9 Reason for discharge

In this study 49.2% of the total sample refused hospital treatment and left the programme prematurely. Dropout rates in AN treatment programs, both in and outpatient, have shown to range between 20.2% (175) and 51% (125) It is thought that the extreme resistance to treatment seen in those with anorexia nervosa result in the higher dropout rates found in these patients (twice as likely) as opposed to those with other psychiatric diagnoses.(124)

Contrary to earlier studies (102, 121, 124) this study showed that the majority of those classified as having refused hospital treatment were of the restricting subtype. This is an

unexpected result as research has shown that AN-BP individuals are less likely to complete treatment.(121, 124) A South African study, conducted between January 2005 and December 2008, in the same specialised eating disorders unit utilised in this study, showed similar results to those demonstrated here (66.7% AN-R vs 33.3% AN-BP). It is stated, however, that these may not be statistically significant.(141) This may also be the case in this study due to the small sample size.

5.10 Goal weight and length of admission

A very small percentage of the total sample had reached their goal weight on discharge (16.9%) and the majority of the sample were admitted for a shorter period than their expected length of stay. However, 61% of the study group either refused hospital treatment or were discharged for administrative reasons and left the program prematurely, making it difficult to comment on these findings and making some comparisons between the AN-R and AN-BP groups problematic.

There was no significant difference between the proportion of patients in the AN-R and AN-BP groups who gained weight during their stay on the ward (84.4% vs 85.2%). However, a larger percentage of the AN-BP group lost weight during their admission to the eating disorders unit. This is in keeping with research which has shown that those that binge/purge have higher rates of non-compliance in eating disorder programs.(102, 121) This could be linked to the higher rates of impulsivity and mood lability said to be found amongst this group. That being said, in this study, the majority of the small proportion of patients that had reached their goal weight at the time of discharge belonged to the AN-BP subtype. Baran et al. (1995), have shown that those anorexics discharged at a low body weight, as opposed to goal weight, are more likely to have poorer outcomes.(176) Therefore, the finding in this

study that more restricting than binge/purge anorexics did not attain their goal weight, would imply a poorer outcome in this group. This is contrary to studies which have shown poorer prognoses and outcomes to be associated with AN-BP individuals.(17, 121, 122)

The majority of both subtypes were admitted for less than their expected length of stay. The high proportion of these shortened stays could be explained by the large percentage who left the program prematurely and subsequently did not complete the inpatient program. In this eating disorders unit, discharge dates may be adjusted depending on a patients' psychological progress. This could explain both longer and shorter admissions (discussed in results section). The finding that more of the AN-BP group were admitted for a longer period than their expected length of stay could imply higher rates of psychopathology in this group, as supported in the literature,(169) necessitating extended admissions. However, this is not in keeping with the result that all of the AN-BP individuals who achieved goal weight did so during an admission which was shorter than their expected length of stay while only two-thirds of the AN-R patients that had reached their goal weight did the same. It has been found that some patients who reach their goal weight before the predicted discharge date may be eating their way out' of the unit in order to be discharged and resume their maladaptive behaviour.

Only one patient, in the AN-R group, was discharged at her expected date of discharge.

CHAPTER 6: LIMITATIONS AND CONCLUSION

By comparing the characteristics of inpatients of the restricting subtype of anorexia nervosa to those anorexics who binge/purge, the aim of this study was to demonstrate any clinically relevant differences between the two subtypes. The hypothesis was that relevant differences would be found between the two anorexia nervosa subgroups. The subtyping of anorexia nervosa has been retained in the new DSM-5, released in May 2013, indicating that the weight of current evidence is in favour of the subtyping of this eating disorder. However, with only one significant result, this study did not produce sufficient convincing evidence for the justification of the current subclassification.

That being said, there are a number of limitations which may have influenced the results of this study. Given the significant rates of diagnostic crossover that have been found between subtypes, comparing characteristics using these 'static' diagnoses may prove unreliable and misleading.(8, 13, 17, 107)

Further limitations in this study include the small sample size which may suggest that these results are not generalizable. In addition, as this study is a retrospective record review, data and findings are based on information recorded and inaccurate record keeping is a possibility. It is also noted that the time period over which this study was conducted may impact on the results found.

Further research is required in this particular field of anorexia nervosa to provide more insight into the differences, or lack thereof, between the two anorexia subtypes, and how this evidence may contribute to the understanding and management of this debilitating illness.

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APPENDIX I: ABBREVIATIONS

AN	Anorexia nervosa
AN-BP	Anorexia nervosa – binge-eating/purging subtype
AN-R	Anorexia nervosa – restricting subtype
BMD	Bipolar mood disorder
BMI	Body mass index
BN	Bulimia nervosa
DSM-IV-TR	The Diagnostic and Statistical Manual of Mental Disorders, 4th edition, text revision
DSM-5	The Diagnostic and Statistical Manual of Mental Disorders, 5th edition
ED	Eating disorder
EDNOS	Eating disorder not otherwise specified
ELA	Expected length of admission
GW	Goal weight
IBW	Ideal body weight
OCD	Obsessive compulsive disorder
PSA	Poly-substance abuse
PTSD	Posttraumatic stress disorder

ROW	Rate of weight gain
RHT	Refuse hospital treatment
SNP	Single nucleotide polymorphism
USA	United States of America

APPENDIX II: ETHICS CLEARANCE CERTIFICATE

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG
Division of the Deputy Registrar (Research)

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
R14/49 Dr Nadira Vahed

CLEARANCE CERTIFICATE	**M120243**
PROJECT	A Retrospective Review of Anorexia Nervosa Patients Admitted to a Specialised Eating Disorders Inpatient Unit Comparing Clinical and Demographic Characteristics of Subtypes (Revised title)
INVESTIGATORS	Dr Nadira Vahed.
DEPARTMENT	Dept of Neurosciences/Dept of Psychiatry
DATE CONSIDERED	24/02/2012
DECISION OF THE COMMITTEE*	Approved unconditionally

Unless otherwise specified this ethical clearance is valid for 5 years and may be renewed upon application.

DATE 18/03/2013 **CHAIRPERSON** .....
(Professor PE Cleaton-Jones)

*Guidelines for written 'informed consent' attached where applicable
cc: Supervisor : Dr LM Motlana

DECLARATION OF INVESTIGATOR(S)
To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10004, 10th Floor, Senate House, University.
I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. **I agree to a completion of a yearly progress report.**

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES...