Mood, Family Process and Life Experience in Intensively Training Young Athletes

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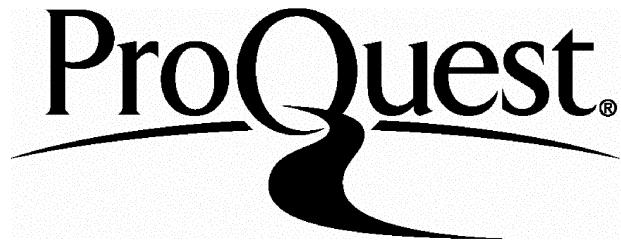
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ABSTRACT

The purpose of this thesis was to examine how participation in intensive sports training affected the risk of depressive disorder in a randomly selected group of young athletes.

The possible adverse effects of intensive training upon the physical and psychological development of the young athlete have become of increasing concern. In general little is known about the psychological effects of early involvement in sport. Despite this paucity of knowledge there has been considerable concern that young athletes are more at risk of emotional problems.

The data for this investigation were part of a general population survey designed to monitor the effect of intensive training on a sample of highly trained young athletes. A country-wide randomly selected group of 453 young athletes aged from 9 to 18 years, from four different sports - football, gymnastics, swimming and tennis - were assessed and then monitored for two consecutive years. In addition a group of children (n = 471) were drawn from the general population for comparative purposes. All completed the Depression Self Rating Scale for Children (DSRS), the Family Adaptability and Cohesion Evaluation Scale (FACES II) and the Great Ormond Street Self Image Profile (GOSSIP).

An empirical analysis revealed young athletes had significantly lower levels of depressive symptomatology, higher levels of self esteem and perceived their families to be closer and more cohesive than children from the comparison population. Further analysis indicated children from the comparison population were over 9 times more likely to have low self esteem and high depression scores than children involved in intensive training. Longitudinal data analysis investigated the stability of these findings over time and showed the best predictors of Time 2 DSRS scores were a combination of baseline DSRS, global and family self esteem, age and cohesion.

In conclusion, strengths and weaknesses of the research design are described in the light of the empirical findings, explanatory models are suggested and implications for future research discussed.

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INTRODUCTION

In this thesis I investigate how the life experience of participation in intensive training affects the risk of depressive disorder in a randomly selected group of young athletes.

The possible adverse effects of intensive training upon the physical, emotional and psychological development of the young athlete have become of increasing concern to those involved in youth sport. With increasing emphasis placed upon excellence in sport there is now a widely held belief that in order to achieve success, particularly at national or international level, training and competition should begin before puberty. As a consequence the training of many young athletes has become more systematic, more sophisticated, and more demanding both in terms of time and effort. Children of younger ages now compete in elite national and international championships and often surpass performances once thought to represent the peak of adult achievement (Thomson & Beavis, 1985). Despite these increasing demands little is known about the effect these types of training routines may have upon the growing child. Even without evidence that it is harmful, the Council of Europe (1982) recommended that specialisation in sport is not advisable while there is a lack of information on the biological consequences for the child's growth and development.

THE TRAINING OF YOUNG ATHLETES STUDY

In November 1984 the Institute of Child Health, London, began a project supported by the Sports Council to determine whether it would be feasible to conduct a large scale study into the effects of intensive training on young athletes.

The Sports Council wished to examine 'the effects of vigorous training in children and adolescents in terms of physical injury, physical development, psychological development, educational and psycho-social development, in order to reduce or abolish the negative effects'. This brief was subsequently widened to include both the positive and negative effects.

The aims of the feasibility study were three-fold:

- to review and evaluate previous work done in the area
- to supplement the information obtained from the literature search by interviewing coaches, parents, young athletes and other experts in the field
- to submit recommendations to the Sports Council as to the need for a longer, more detailed study

Based upon the findings of the feasibility study it became apparent that little was known about the psychological effects of early involvement in sport. Yet, despite this paucity of knowledge there was considerable concern that young athletes were more at risk of avoidable distress. Of particular concern was the possible role of parental pressure as a cause of mood disorder, as well as the physical and emotional strain imposed by the intensity of training itself. It was also considered possible that intensive sports training and competition might be protective against the development of emotional disorders.

On the basis of the findings from the feasibility study the 'Training of Young Athletes' (TOYA) study was commissioned by the Sports Council in 1986. Although it was apparent that there were some shared features in terms of reported adverse effects, there were also reports of unique problems associated with the training and skill demands of different sports. Thus it was important to the success of such a study that a sufficiently diverse range of sports was included in the sample.

The aim of the study was to establish the distribution, frequency and cause of the positive and negative effects of intensive training within four sports - football, gymnastics, swimming and tennis.

The study was to take 5 years to complete although the period of study was ultimately reduced. A randomly selected group of young athletes visited the Institute on three separate occasions at yearly intervals. A linked-longitudinal design was chosen so it would be possible to evaluate the effect intensive training had upon different developmental periods.

The data for this thesis were taken from the repeated psychological measurements administered during the two year assessment period, and from a home interview conducted with both the parent and young athlete.

The following chapter will review the current literature on child and adolescent depressive disorder and summarise the research findings from studies which have investigated the psychological effects of intensive sports participation.

Chapter 2

MOOD, FAMILY FUNCTIONING AND LIFE EXPERIENCE: A REVIEW OF THE RESEARCH LITERATURE

"Depression is a disorder of mood, so mysteriously painful and elusive in the way it becomes known to the self - to the mediating intellect - as to verge close to being beyond description. It thus remains nearly incomprehensible to those who have not experienced it in its extreme mode, although the gloom, "the blues" which people go through occasionally and associate with the general hassles of everyday existence are of such prevalence that they do give many individuals a hint of the illness in its catastrophic form".

William Styron Darkness Visible 1992 p.7

INTRODUCTION

Styron's description of his descent into what he refers to as depressive illness, and professionals would regard as a depressive disorder, remains the nearest any author, or researcher or clinician, has come to making the 'darkness' of depression 'visible' to those who have never experienced it. Yet it is an interesting paradox in that, although the phenomenology of the depressive episode remains elusive, the term depression has become part of our popular lexicon. It is not uncommon to hear adults complain that they feel depressed. What many are referring to is the unhappiness and misery (Gittelman-Klein 1977 cited in Angold 1988) that occasionally afflicts us all and which is part-and-parcel of the human condition. So whilst depression in adults refers colloquially to a 'normal' lowering of mood or an expected emotional response to adversity (Pearce 1977), what of depression as illness in children and young people? Clearly there are fundamental developmental differences between children and adults both in terms of their physical and psychological maturation. Is it possible young people can experience the depression of which Styron writes?

For many years the prevailing wisdom was that children could not and did not fall prey to the disorder. The disorder in young people remained 'incomprehensible' not because it defied description but because it did not fit the

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medical paradigm of the time (see Rie 1966 for an example of an attachment to theory contradicting available evidence). Fortunately times move on and paradigms are challenged and change. It is now widely accepted that children can and do suffer from depressive disorder. In the past 15 years our knowledge of depressive disorder, and its aetiology in childhood and adolescence, has increased rapidly. Burgeoning research interest has resulted in significant advances in the taxonomy, assessment and diagnosis of depression. It is now possible to discriminate between different types of depression with far greater precision. Much of this progress is due not only to the increased availability of measures with which to assess depressive disorder, but the increasing rigour with which researchers in the field are being asked to match the taxonomic paradigm which guides their work with the measurements they select (Compas et al 1993).

Yet many pathways lead to depressive disorder in young people and our 'maps', whilst more accurate, still contain large tracts of largely unexplored terrain. The purpose of this review is to describe some of what is known about depressive disorder in young people. Particular attention will be given to both risk and protective factors as they relate to family functioning and life experience of children and adolescents. The final section will review what we know about the relationship between high achievers in sport and depressive disorder.

DEPRESSIVE DISORDER, CHILDREN AND YOUNG PEOPLE

Despite the recognition that children are at risk of depressive disorder the concept of childhood depression remains the subject of considerable debate. Much concern has focused on the degree to which depressive disorders in childhood follow adult patterns. Other questions also remain such as differentiating between depressive 'states' and the 'normal' lowering of mood which may accompany adverse events (Harrington, 1993); the consequence of not including an assessment of impairment in the criteria for depressive disorders (Rutter, 1986); and the degree to which comorbid depressive syndromes are equivalent in nature to those which do not occur with other psychiatric disorders (Rutter op cit.).

Space does not allow for a full review of what remains a controversial debate and the reader interested in learning more about the discussion should see Harrington (1993) p. 1 - 20, Rutter (1986) p. 491 - 513, or Viesselman et al (1994) p. 58 - 72. However it is important to say something about the current debate, particularly those developmental issues which have considerable implications for how risk factors for depressive disorder may operate in childhood.

CLASSIFICATION OF DEPRESSION

The two current classification systems are the Diagnostic and Statistical Manual (DSM-IV) (American Psychiatric Association, 1994) and the ICD-10 (World Health Organisation, 1992). I focus attention on the DSM-IV, because it has been identified as the most widely used diagnostic system (Maser et al, 1991). As a hierarchical multiaxial system, DSM-IV is used by the clinician to diagnose disorder through a review of the presence, duration, and severity of symptoms (Compas et al 1993). With only a few exceptions, child and adolescent depressive disorder is diagnosed under the same classification system as for adults. Depressive disorders are classified under the broader category of mood disorder. Within the mood disorders, depression is divided into three categories: mood episodes, depressive disorders and bipolar disorders. As my focus is on depressive disorders the reader is advised to refer to DSM-IV (p. 318 - 320) for more information regarding the other two categories. Under depressive disorders, children and adolescents may be diagnosed as experiencing major depressive disorder (MDD), dysthymic disorder or depressive disorder not otherwise specified. To meet the criteria for major depression requires the presence of at least five out of nine symptoms. These include depressed mood, diminished interest or pleasure, significant changes in weight, sleep problems, psychomotor agitation, fatigue or loss of energy, feelings of worthlessness, diminished ability to think or concentrate and recurrent thought of death. At least one of the symptoms has to be either depressed mood or loss of interest or pleasure. Although the criteria stipulate that symptoms must represent change in previous functioning, there is no attempt to assess the degree of impairment. As Harrington (1993) explains, one person with many minor symptoms causing no impairment may be regarded as suffering from major depressive disorder, whilst another, whose few symptoms cause considerable

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impairment, may not be so regarded. There are several kinds of impairment that can be thought to occur in children who show depressive disorder. For example declining school grades and academic performance have been used as indicators of impairment. So too has the child's ability to make and retain friendships.

Despite these problems classification systems such as DSM-IV and ICD-10 remain widely used by clinicians. However one of the main implications of using such systems concerns the fact that they make no distinction between prepubertal, adolescent or adult depression (Harrington, 1993). Although there is evidence to support this view, doubts have been expressed as to the validity of conceptualising child and adult depressive disorder as one and the same. Two main areas of concern have been expressed. Firstly it has been suggested that children differ from adults in their ability to experience some of the cognitive features of depression (Rutter, 1986); and secondly there is the further issue of childrens' ability to report depressive symptoms accurately. Research has indicted that young children have difficulties differentiating emotions such as sadness and anger (Kovacs, 1986). These issues suggest there may be specific dissimilarities between child and adult depression.

It has also been suggested that there are unique features of depressive disorders during adolescence (Compas et al, 1993). There is considerable evidence which show age changes in the frequency and expression of depressive disorder. General population surveys indicate depressive symptomatology is more prevalent in adolescence than childhood (Rutter et al, 1976a), and that changes in the prevalence of depression show an association with puberty (Angold & Rutter, 1992). Moreover, comparisons between children and adolescents diagnosed for major depression indicate they may differ in the symptoms they experience. For example, in a comparative study of 95 children and 92 adolescents who met the diagnostic criteria for MDD, Ryan et al (1987) found that children were rated higher on somatic complaints, psychomotor agitation, and symptoms of phobic and separation anxiety. By comparison adolescents were rated higher on anhedonia, hypersomnia, changes in weight, hopelessness, and lethality of suicide attempts.

An alternative model has been proposed by investigators such as Harrington (1993), and Carlson and Garber (1986). Both suggest a more valid method of assessing depression in children would be to adopt a more developmental approach which

would take into account the child's level of emotional and cognitive functioning. More research is needed on this possibility.

An additional issue concerning the classification of depression in young people, and which is of relevance to this thesis, is whether the researcher or clinician should use a categorical or dimensional classification system. In this field a categorical approach usually involves the categorisation of a disorder as either present or absent: the young person is either normal or has depressive disorder (Harrington & Wood, 1995). Both ICD-10 and DSM-IV adopt a categorical approach. Psychometricians have criticised the reliance on categorical models. They argue that valuable information about the nature of depression is lost by forcing an individual into one category or another, and that the often arbitrary nature of the cut-off, by which the investigator determines caseness, does not take into account the specific characteristics of different populations. As Fombonne (1991) argues in his critical review of the use of questionnaires in child psychiatry research:

> "It remains puzzling for a potential user to determine which cut-off should be used in which context, for what purpose, and at what level of accuracy.... It could be that, if a different cut-off point was chosen, one instrument would be better than another one for some purposes, but worse for alternative applications. (T)here is a need for improving the description and evaluation of the discriminant ability of questionnaires used in psychiatric research." (p. 678)

The inherent draw-backs of the classification system have particular implications for epidemiological studies where rates of child and adolescent depressive disorder depend to a great extent on how caseness has been defined (Harrington, 1993). An alternative approach to the classification of depression is to use a dimensional model. Here depression is defined along a continuum. This method avoids the problem of deciding how severe a depression is to count as a case (Harrington & Wood, 1995). Many investigators who use questionnaires examine their data using both a categorical and dimensional classification system. Clearly using the categorical approach has the advantage that one can determine the rate of depressive disorder in a given population. However, the means of arriving at prevelence figures using a categorical approach is often questionnable. In particular, the categorical method treats childhood depression as an homogeneous construct, regardless of age and gender, and this is open to criticism. Recent advances in statistical techniques, particularly the use of Receiver Operating Characteristics

(ROC) analysis, do seem to offer a partial solution to this problem. Using this technique it is possible to evaluate and compare the discriminant power of different questionnaires used in psychiatric research (see Fombonne, 1991, for a review of ROC analysis and its use in selecting optimal cut-points).

SOURCES OF INFORMATION ABOUT CHILDHOOD DEPRESSION

One of the most fundamental changes to have occurred in the assessment of depression in young people has been the shift away from relying exclusively on parental reports of the child's mood state, to using measures which enable children themselves to describe their experience.

Historically, mothers have tended to be the main source of information about their children's mood (Costello & Angold, 1988). However it has been well demonstrated that children can give accurate and reliable counts of depressive symptoms. Research using both community and clinic samples suggests children and adolescents tend to report more depressive symptoms than their parents (Angold et al, 1987; Barrett et al, 1991). This finding is perhaps not all that surprising when one considers that much of the phenomenology of depression is intrapsychic and by definition difficult for parents to detect. Support for this hypothesis has been provided by Barrett et al (1991) who monitored the level of agreement between parent and child reports of depressive symptoms. Barrett and his colleagues found the six symptoms reported three times as often by children were 'Deja vu, self dislike, general anxiety, obsessions, suicidal ideation and suicide attempts'. The four symptoms reported more often by parents were, with the exception of anhedonia, more observable behavioural symptoms including hypersomnia, increased appetite, and exaggerated illness behaviour.

Several other factors have been identified as having an effect upon child-parent agreement on depressive symptomatology. These include the age, sex and intelligence of the child, and parental mental state.

METHODS OF ASSESSING DEPRESSION IN YOUNG PEOPLE

There are now a number of interview and self report measures available with which to measure depression in young people. The psychometric properties of many of these have been subject to considerable review and it is not proposed to describe this work in detail here. The reader interested in learning more about the relative merits of these instruments should see Harrington (1993), Costello and Angold (1988) or Roberts et al (1989).

(i) Interview assessments of depression

Several standardised interview assessments of depression are available for both children and their parents, such as the Kiddie-SADS (Puig-Antich & Chambers 1978), the Interview Schedule for Children (Kovacs, 1982a), and the Child Assessment Schedule (Hodges et al, 1982). Each can be used with both young children and adolescents and all are administered by clinically sophisticated interviewers. The procedure is essentially the same for all three - the parent is interviewed about their child and then the child is seen on his or her own. The Kiddie-SADS and the ISC both begin with an unstructured interview and then cover a range of core symptoms. The CAS follows a semi-structured format.

Of the three described the Kiddie-SADS is perhaps the most widely used and has particular appeal as it is organised according to DSM-III-R diagnostic categories.

Interview assessments are clearly important in the diagnosis of major depressive disorder. However they are not well-suited to screening in large-scale community surveys. For example the Kiddie-SADS takes between 45' - 120' to complete and has to be administered by a clinician and as such is not a cost-effective method of screening for relatively rare disorders such as childhood depression. For the purposes of screening moderately sized or large populations, self report questionnaires have the advantage of being very cost effective, relatively quick to administer, easy to score and enable the researcher to assess large numbers of children. For clinical validation in large scale studies and small scale treatment studies interviews are better suited.

(ii) Self report measures of depression

A number of self report scales are available. These include the Children's Depression Inventory (CDI), (Kovacs 1982b), the Centre for Epidemiological Studies Depression Scale for Children (CES-D) (Weissman et al, 1980) and the Children's Depression Scale, (CDS) (Lang & Tisher, 1978). Most of the questionnaires available are American in origin although there are a small number of instruments validated on British children - the Depression Self Rating Scale for Children (Birleson 1981; Birleson et al 1987) and the Great Ormond Street Mood Questionnaire (GOSQ) (Monck et al 1994). However, despite the wide range of measures available, the most widely used probably remains the Children's Depression Inventory (CDI), (Kovacs, 1982).

The CDI is a 27 item questionnaire designed for children and adolescents aged 7 to 17 years. In a recent study the CDI was shown to have good test-retest reliability and high internal consistency (Fundudis et al, 1991). Doubts have been expressed as to its ability to select children with depressive disorder from community samples (Costello & Angold, 1988). Data available from clinic studies indicate the CDI has a specificity of 91%, but its sensitivity was only 54% using a cut-off of 15 (Asrnow & Carlson, 1985); a more recent study using the same cut-point established both sensitivity and specificity to be 77%, with a misclassification rate of 23% (Fundudis op cit.).

Concerns have been expressed that the format of the CDI places greater memory constraints on younger children than other instruments, and the wording of certain items is difficult to follow (Costello & Angold, 1988). An alternative measure which seems particularly well suited for young children is the Depression Self Rating Scale for Children (Birleson, 1981). It has been suggested the DSRS has an advantage over the CDI in being shorter and making fewer cognitive demands (Costello & Angold op cit.). It seems particularly well suited therefore for studies which include particularly young children. Although validated on a clinical population (Birlerson, 1981; Birleson et al, 1987) it has been used in several small surveys using children from the general population (Firth & Chaplin, 1987; Yule et al, 1990). For these reasons the DSRS was chosen to measure depression in this study. The psychometric properties of the DSRS are similar to those reported for the

CDI (Fundudis et al 1991) and are described in detail in the chapter on methods and procedure following this review of literature.

EPIDEMIOLOGICAL STUDIES OF DEPRESSION

One of the clearest definitions of epidemiology has been attributed to Gaylord Anderson (in Rothman 1980, p. 23). His concise definition is:

"Epidemiology: the study of occurrence of illness"

An understanding of the epidemiology of depression is important for several reasons (Fleming & Offord 1990). It helps in planning service use; it enables us to generate and test ideas about aetiology, and to launch effective prevention programmes.

The epidemiology of depression depends upon how it is defined and the population studied. A significant proportion of depression in childhood and adolescence remains undetected so current prevalence estimates based on clinical populations provide an inaccurate picture (Costello, 1994). To obtain precise estimates of the prevalence (the proportion of a population affected by the disorder at a given point in time) and incidence (the number of new cases) of depressive disorder in young people, studies of unreferred populations are required.

A number of epidemiological studies have been conducted in the past 15 years. The reliability and validity of many of these have been subject to critical review most notably by Angold (1988), Costello (1994) and Fleming and Offord (1990). The reviewers identify considerable variation in both the methodologies used to estimate the prevalence of depression, and the prevalence estimates themselves. Variations identified include sampling deficiencies - for example small or unrepresentative populations; inconsistencies in the definition of caseness; variation in the diagnostic instruments and different screening procedures; and low response rates with inadequate information for understanding potential biases.

Nevertheless if care is taken in reviewing these recent studies some conclusions regarding prevalence can be drawn. For the purpose of this review I have stratified epidemiological studies into those which have used either a two-stage design, including a clinical interview, or a clinical interview alone, and those which have used self report questionnaires to estimate prevalence. I do not discuss here earlier studies - most notably the Isle of Wight study (Rutter et al 1976a[1]) - which although important in developing our knowledge of depression in young people did not use DSM criteria (American Psychiatric Association, 1994).

EPIDEMIOLOGY OF DSM-IV DEPRESSIVE DISORDER

Prepubertal children (7 to 12 years old)

In a review of recent epidemiological studies (Fleming & Offord, 1990) the prevalence of major depression in pre-pubertal children varied between 0.4 per cent to 2.5 per cent.

In one of the first published studies to use DSM III criteria to diagnose depression in children Kashani and Simonds (1979) interviewed a group of 103, 7 to 12 year olds, half of whom came from families attending a family practice clinic, and half selected from children born at a local hospital. Two children (1.9%) were found to be depressed using DSM-III criteria, although sadness 'as a distinct affect' was found in 17.6%. A larger study (n = 641) conducted by the same author reported a far higher rate of depressive disorder (Kashani et al, 1983). The study was one of the first published accounts of the Dunedin Multidisciplinary study, a longitudinal epidemiological study of a group of children born between 1972 and 1973 in Dunedin, New Zealand. Children were assessed at age 9 using the K-SADS-E clinical interview. Results suggest a point prevalence of depressive disorder of 4.3%. The cohort was re-examined at age 11 (Anderson et al, 1987) and the overall rate of depressive disorder was found to be 1.8% ± 0.9.

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[1] For an interesting update on the Isle of Wight study see Rutter (1989).

In what is regarded as one of the best designed of recent studies Bird and his colleagues (1989) found an overall point prevalence rate of 5.9% ± 1.1 for depression and dysthymia in children aged 4 to 16 years.

Adolescents (13 to 18 year old's)

The prevalence of depressive disorder in adolescence ranges from a low of 0.4% (McGee & Williams, 1988) to 8.3% (Deykin et al, 1987). In a recent study conducted by Garrison and her colleagues (1989) using a large sample of students (n = 677) attending high school, prevalence rates were 8.2% for boys and 8.7% for girls. In a similar study using a far smaller number (n = 150) Kashani and colleagues (1987) identified seven (4.7%) 14 to 16 year old high school students as meeting the diagnostic criteria for major depression.

One of the most recent community studies was conducted in the United Kingdom by Cooper and Goodyer (1993) using a large sample (n = 1072) of teenage girls. Using a two stage design employing the 'Mood and Feelings Questionnaire' (Angold et al, 1988) and a modified version of the Diagnostic Interview Schedule for Children (Costello et al, 1984) the authors found a point prevalence (in the last month) of depressive disorder of 3.6% and period prevalence (in the last year) of 6.0%.

EPIDEMIOLOGICAL STUDIES USING SELF REPORT MEASURES

Generally, epidemiological studies using self report measures report higher prevalence estimates than those found in interview-based studies (Harrington, 1993).

Several early studies used the Beck Depression Inventory (BDI: Beck et al 1961), a self report questionnaire primarily designed for use with adults, to assess the prevalence of depression in general population of adolescents (Albert & Beck, 1975; Teri, 1982; Kaplan et al, 1984). Prevalence estimates varied considerably in these early studies. In the study conducted by Albert and Beck (1975) 39% were found to have 'moderate' or 'severe' depression. Teri (1982) using a much larger sample of

white, middle class adolescents aged 14 - 17 years reports similar results - approximately one third (32%) scored in the range of 'moderate to severe depression'. By contrast much smaller numbers were reported by Kaplan et al (1984), only 8.6% had 'moderate or severe depression'. The prevalence rate for severe depression in this study was 1.3%.

In a more recent study Garrison and her colleagues (1989) used the CES-D scale to assess depression in a large sample of high school students (n = 677). Prevalence of a 'DSM-III like' depressive syndrome was calculated using the CES-D responses. Thirty (4.4%) had symptom profiles which conformed to DSM-III criteria. Prevalence was found to be highest amongst black females (11%) and lowest amongst black males (1.67%) and white females (4.45%). In a recent UK study Monck et al (1994) found the prevalence of self-reported mood disturbance in a community sample of 15 to 20 year old girls to be 20.8%.

SUMMARY OF THE EPIDEMIOLOGY OF DEPRESSION IN YOUNG PEOPLE

In summary the available epidemiological studies of depression in childhood and adolescence provide only general estimates of prevalence. Variation in sample selection, in the measurements used and disagreements over definitions of caseness make comparisons between studies difficult. However, the available data suggests that point prevalence of major depressive disorder among children falls in the range of 0.5% to 2.5%, and for adolescents rates range between 2.0% and 8.0% (Harrington, 1993). It must be noted that the large range in point prevalence is not a reflection of the epidemiological method but points once again to the problems inherent in the categorical approach to classification described above.

RISK FACTORS, PROTECTIVE FACTORS AND RESILIENCE

Recent studies have attempted to extend our understanding of the aetiology of depression by describing individual differences in children's vulnerability to depressive disorder, either by identifying risk factors which may predispose young people to depression, or by examining the mechanisms that protect people against

the psychological risks associated with adversity. The concept of 'protective factors' has become firmly established in the field of psychiatric risk research (Rutter, 1987).

Particular attention is now being focused on the child who 'works well, loves well, and expects well notwithstanding profound life adversity' (Werner & Smith, 1982). These children, who defy the largely deterministic developmental model traditionally used to describe the relationship between risk and psychopathology, are referred to as resilient. Resilience is now recognised as a distinct field of enquiry in its own right (Luthar, 1993) and, despite variation in the definition of resilience across studies, we are now able to describe the specific features of resilient children relative to their vulnerable counterparts with a reasonable degree of accuracy (Fonagy et al, 1994).

Integral to the study of resilient children has been an understanding of the risk factors that increase an individual's vulnerability to depression as well as those factors that ameliorate particular life stress and adversity. This section of the review will focus on resilience, protective factors and risk factors. Parts one and two will describe approaches to defining the two central constructs of resilience research - risk and protective factors respectively; part three will consider research strategies in analysing the association between risk and protective factors; part four will briefly describe the current approach to resilience as an outcome; and the final section will review risk and protective factors as they relate to children involved in intensive training.

Risk factors

Garmezy (1983) defined risk factors as those factors that, if present, increase the likelihood of a child developing an emotional or behavioural disorder in comparison with randomly selected children from the general population. Many such factors have been identified in the literature. These have included biological and genetic attributes of the child - such as psychiatric illness in the parents (Anthony, 1974), sex (Rutter, 1979a) and developmental delays and chronic physical handicap (Werner & Smith, 1982). Family and community factors including marital discord (Rutter, 1979a), low socio-economic status and alcoholism have also been found to increase the likelihood of psychiatric disorder (Jensen et al, 1990).

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The most commonly used strategies to defining and subsequently explaining the effect a particular risk might have upon children has been to use either a life-events or 'daily hassles' approach, or to examine the separate effects of individual life-stresses including natural disasters such as floods and forest fires, socio-economic variables such as economic deprivation, and parental divorce or bereavement (Luthar & Zigler, 1991; Luthar, 1993). The methodological advantages and limitations of this approach have been thoroughly reviewed elsewhere (Luthar & Zigler op cit.) and it is not intended to describe these here.

Within the context of childhood depression there have been few studies which have monitored the effect of life events (Goodyer et al, 1990). In his review of the available research literature Harrington (1993) concluded that there is little specificity in the association between adverse life experience and depression in young people. A major factor in this research has been the influence a parent may have in either moderating the effect of a particular event or increasing risk by exposing children to a higher level of adversity. Goodyer et al (1988) report that some families may be 'life event prone' as a result of lifetime episodes of maternal depression and recent undesirable life events.

An alternative, and relatively recent approach to risk research has been to use multiple indices of risk. The use of multiple familial and socio demographic indices arose out of the recognition that such variables often have a synergistic effect. For example in a study of chronic family adversities (Rutter, 1979a) such as marital discord, parental psychiatric illness and overcrowding, no one of these variables had any effect upon psychiatric risk when it occurred in isolation, but risk went up sharply when several adversities co-existed. Consequently it is argued that the inclusion of individual, family and societal context are necessary to achieve comprehensive definitions of risk (Seifer & Sameroff, 1987).

It is apparent that approaches to defining and studying the effects of risk are many and varied and it is not proposed to review methodological advantages and limitations here. However, an important issue relates to the failure of many of the current conceptualisations of risk to account for the process by which an adverse

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event or experience may predispose a young person to emotional or behaviour problems.

Consequently, although research has provided a useful list of the types of risk factor, in themselves they tell us little about why, or how they predispose children to psychopathology. There has been considerable debate surrounding the relative contributions of these factors to childhood disorder. The high risk nature of some variables cannot be assumed a priori to lead to psychopathology (Luthar, 1993). For example, authoritarian parenting styles may constitute a high-risk variable among some, but not all families. Amongst disadvantaged children living in dangerous environments, good outcomes are associated with restrictive and authoritarian family patterns rather than with democratic ones (Baldwin et al, 1990).

Rutter (1990) has repeatedly argued for a shift of emphasis away from risk factors to negotiating risk situations. Integral to this model is not evasion of the risk but successful engagement and coping with it. It is suggested that the challenge posed by the threat is necessary for healthy development.

Risk mechanisms

This change of emphasis offers an important distinction between factors which potentiate one another and intensify an individual's response to the risk situation (vulnerability), and those which mediate or ameliorate (protection) the reaction (Rutter 1987; 1990). This shift focuses attention away from the risk variable and concentrates instead on the process or mechanism which serves to increase or decrease the risk. Consequently when analysing risk it is important to recognise that more than one pathway may lead to vulnerability or protection. Studies monitoring the effect of parental depression and problems in childhood have identified several mechanisms or pathways which increases a child's vulnerability. These include marital discord, parental criticism or hostility, insecure attachment and exposure to stressful life events.

Using this model the emphasis is upon the interaction between a person and his or her environment. This forms the foundation of a transactional model where

developmental outcomes are determined not by risk per se, but by the interaction of genetic, biological, psychological and sociological factors (Egeland et al, 1993). Such an approach is sensitive to age related vulnerabilities and the impact of different developmental stages.

Social class

Socio-economic status or social class has been one of the most frequently investigated risk factors in childhood psychopathology. A large number of studies have examined the relationship between measures of social disadvantage and deprivation - for example low status occupation and income, low parental education, overcrowding - and mood. However, while it is generally accepted that membership of a disadvantaged family is a risk factor for childhood adversity, the relationship with depression is not a strong one (Fleming & Offord, 1990). By comparison studies using adults have consistently found a greater prevalence of depression in lower socio-economic groups (Brown & Harris, 1978; Craig & Van Natta, 1979).

A review of several recent epidemiological studies of childhood depressive disorder (Fleming & Offord, 1990) found that, in general, low socio- economic status was not significantly associated with depression in children. There are exceptions however. The Puerto Rico study conducted by Bird et al (1989) found that depression was significantly more prevalent in children and adolescents from lower socio-economic groups. Similarly Kaplan et al (1984) found that lower social class adolescents were more depressed than higher social class adolescents. Why should the findings be inconsistent?

A striking feature of much of the previous research has been the variety of methods used to measure social class. For example the longitudinal study conducted by Velez et al (1989) found that depression was the only disorder not predicted by low social class - as measured by parental occupation. However, low maternal education, a risk factor for childhood adversity commonly associated with low socio-economic status, was a significant predictor of depressive disorder in this study.

It would seem important when interpreting the results of previous research which has used social class as a risk factor in depression, to establish what precisely is being measured. Social class, when conceptualised in terms of occupation, has a poor association with depression. However knowledge of an individual's socio-economic status in itself provides no information on the process through which this aspect of the child's environment may affect his or her development (Luthar & Zigler 1991). An alternative approach to the study of social class in risk research has been to focus on the specific pathways through which disadvantage and deprivation may impinge on the child's development. This perspective distinguishes between 'distal' and 'proximal' levels of risk. The Dunedin study found measures of family disadvantage to be significantly associated with risk of psychiatric disorder in both pre- adolescent boys (odds ratio = 3.9) and girls (odds ratio = 3.3) (McGee et al 1992). Unfortunately no data are available to assess the specific association between disadvantage and depressive disorder. More research is needed to establish the nature of the risk associated with economic hardship and social deprivation and ways in which it might result in childhood depressive disorder.

Ethnicity

Research findings describing the association between race and depression have varied (Harrington, 1993). In the epidemiological study conducted by Costello (1989a) there was no difference in the prevalence of depression between white and black children. Other studies report no race effects (Kandel & Davies, 1982; Kashani et al, 1988; Velez et al, 1989). Conversely two studies (Garrison et al, 1989; 1990) using a community sample, found black females to be more depressed than whites after controlling for socio-economic status. It should be noted that all the above studies are North American in origin and most focus on black children. More information is needed on ethnicity as a risk factor both across countries and within different ethnic groups - for example Indian, Pakistani and Caribbean cultures.

Sex and gender

Constitutional factors such as sex and socially defined constructs such as gender have been found to have significant effects upon the risk of depression.

Most research findings indicate that amongst pre-pubertal children depression is just as common in boys as in girls (Angold & Rutter, 1992; Fleming et al, 1989; Kashani et al, 1983; Valez et al, 1989), and indeed some studies have found that before the age of 12 years, depression was more common in boys than girls (Anderson et al, 1987). There is no evidence however that girls are more likely to be depressed before puberty (Angold & Rutter, 1992). By mid-adolescence findings suggest the sex ratio changes, girls being more at risk of depression than boys (McGee et al, 1990; Whitaker et al, 1990). This developmental change marks the beginning of a shift toward the adult pattern for the disorder where women have been found to have higher rates of depression than men - in the order of 2:1. These data indicate that the change in risk takes place between late childhood and mid-adolescence, although it has been difficult to identify the timing of these changes with any precision.

However the data are somewhat variable in terms of the age at which the change in sex ratio takes place. Studies which have monitored developmental changes in the onset of depression between boys and girls provide rather mixed results. The Dunedin longitudinal study established a 5:1 excess of male depressives at age 11 (Anderson et al, 1987), a 4:1 ratio of males to females at age 13 (McGee et al, 1988), whereas by 15 there was a 1.8:1 excess of girls (McGee et al, 1990). These data would suggest the change in sex ratio takes place between 13 and 15 years of age. However a recent study by Angold & Rutter (1992) using a clinic population found differences between boys and girls emerged some 2 to 4 years earlier, at approximately 11 years of age. However age effects were most prominent in older children with girls being approximately twice as likely to be depressed as boys by age 14 - 16 years.

It is important when considering the implications of these findings to note the methodological limitations inherent in both. A frequent criticism of community surveys of depression like the Dunedin study, is that they encompass diverse age groups and yield relatively small numbers of 'cases'. For example in the Dunedin sample, at age 11, 14 children were found to have major depression/dysthymia, and at age 15, rates were based on 25 cases of depression or dysthymia. Such small numbers of cases make precise estimates of the rates of disorder at different

developmental periods difficult. The clinic study of Angold & Rutter (1992), whilst based upon a fairly large number of children, was retrospective and relied upon clinical ratings spanning some 15 years. The authors themselves point to several methodological limitations including variability in clinical ratings of depression and using a clinic sample as representative of the general population (Angold & Rutter op cit.).

Whilst it is generally accepted that girls are more at risk of depression during adolescence and adulthood, what has been less clear is whether the rates of depressive disorder in boys change during adolescence or remain more or less steady. Again the study by Angold & Rutter (op cit.) provides valuable information. The authors report that the probability of being depressed rises with age, regardless of gender, but that it rises faster in girls. Other findings are less clear cut. In the Dunedin studies the rate of depressive disorder in boys was approximately the same across age groups: the rate of depression or dysthymia was 2% in 7-year old males and approximately 1.6% in 15 year olds (Harrington, 1993).

Female gender as a risk factor

Many reasons have been advanced to explain the change in the sex ratio in depression (see Rutter, 1986a). Some of these refer directly to biological changes associated with the female sex, for example hormonal changes which take place during puberty. Other explanations relate to specific aspects of female gender which may predispose adolescent girls and women to depression. These include possible alterations in the frequency of environmental stress facing women because of their gender and developmental variations in the availability of either protective factors or risk factors (Rutter op cit.). Consequently women are more at risk of depression whereas girls are not because, on reaching adulthood, females experience disadvantages that were not operative during childhood - discrimination, fewer job opportunities, fears for personal safety and economic insecurity (Gove & Tudor, 1973 cited in Rutter 1986). The influence of sex role attributes has also been found to influence perceptions of competence and self worth (Wilson & Cairns, 1988).

It is beyond the scope of this thesis to discuss the relative merits of these risk mechanisms in detail. However, the role of puberty and the possible role of

cognitive factors in depressive disorder will be described in greater detail below. The reader interested in reviewing other mechanisms should see Rutter (1986, pp 20 - 23).

Age

Despite methodological shortcomings in the comparability of measures used to assess depression at different age periods, both clinic and general population studies indicate a marked rise in the prevalence of depression during adolescence (Rutter 1988).

For example the Isle of Wight epidemiological study found that at 10 years of age 11% of boys and 13% of girls were reported by parents to 'often appear miserable, unhappy, tearful, or distressed' (Graham, 1986). By 14 years 41.7% of boys and 47.7% of girls reported feelings of misery or depression at interview (Rutter et al, 1976a). In addition depressive disorder showed a marked increase with age. At age 10 years three cases of depressive disorder were identified on the basis of a clinical interview, whereas at 14 years nine cases were identified, plus another 26 with mixed affective disorder involving both anxiety and depression (Rutter et al, 1976b). Subsequent studies which have used samples of children and adolescents report a similar age trend (Bird et al, 1988; Fleming et al, 1989; McGee et al, 1992; Pearce, 1977). An exception to this pattern was found by Kashani et al (1989) who reported that although self reported symptoms of depression increase as a function of age, prevalence of depressive disorder, measured on the basis of DSM-III criteria, did not.

Age related vulnerabilities in depression

It is clear from the results of previous research that the pattern of depression changes during adolescence. The problem lies in the explanation of the nature and extent of risk changes at this particular developmental period. Adolescence is, of course, a time of considerable physical, hormonal and psychological change for both boys and girls. It has particular social significance as a transitional phase from childhood to young adulthood, and has long been associated with inner turmoil and disturbance (for a critical review and relevant data see Rutter et al, 1976b). Much attention has been given to the role of puberty as a risk factor for the rise in

depressive disorder during adolescence and for the change in the sex ratio in depression (Angold & Rutter, 1992; Rutter et al 1976a; 1976b), and for the mechanism involved.

Puberty

Puberty is marked by a rapid increase in body size, a change in body shape and body composition and the development of the reproductive organs and secondary sexual characteristics such as breast development in girls and the growth of auxiliary hair in both boys and girls (Tanner, 1989). Some of these changes are common to both sexes, but most are sex-specific. Changes in the psychological and social context of the adolescent, such as changes in peer relationships, parental relationships and the importance of physical attractiveness, happen at the same time as these biological changes.

Since the seminal findings of the Isle of Wight study, the biological and psycho-social changes associated with puberty have consistently been used to explain the increased prevalence of depression during adolescence. Unfortunately the number of studies which have obtained valid and reliable estimates of pubertal status appear to be inversely proportional to the importance accorded this particular biological marker. Many studies have relied on chronological age as a proxy variable for pubertal status; often because of the difficulty in obtaining physical data on a child's particular stage of pubertal development (Firth & Chaplin, 1987). Whilst age and advancing maturation are highly correlated over the years of pubertal development, age in and of itself tells us little about a child's particular stage of maturation. Other studies have attempted to get round this problem by using self assessed measures of pubertal status (Goodyer et al, 1990).

Studies which have obtained reliable estimates of pubertal status have tended to adopt one of three research stratagems: to assess the relationship between the different stages of pubertal development and changes in the prevalence of depression; to establish the relationship between the biological changes in sex hormones associated with puberty and vulnerability to depression; and to monitor the relationship between pubertal change and psychological functioning. Only data from the first and final research methodologies will be reviewed here. The reader is

advised to see Harrington (p. 145 - 146, 1993) for a review of research into sex hormones, puberty and depression.

Pubertal development and prevalence of depression

One of the most recent and probably most comprehensive study of pubertal status and depression was conducted by Angold & Rutter (1992) using the clinic records of over 3,500 children who attended a child psychiatric department of a hospital situated in South London between 1968 and 1982. Pubertal status was based either on a physical examination of the child or 'it represented a judgement based on superficial observations' (Angold & Rutter op cit. p. 9). Ratings indicated whether a child was prepubertal, pubertal or sexually mature. Data from the study indicted that pubertal status had no significant effect on depression when controlling for the effects of age.

It must be said however that the ratings of puberty in this study were not ideal - indeed the authors point this fact out. It is not possible to determine from the information given how puberty was assessed, and in how many cases pubertal assessments were made on the basis of superficial observations. These limitations, as the authors point out, "increase the noise in the data and make it harder to detect real differences" (Angold & Rutter op cit. p 23). Support for Rutter and Angold's findings using a more robust two-stage longitudinal methodology has been provided by Canals and his colleagues (1995). Using a large community sample comprising 507 Spanish schoolchildren the findings established no significant association between pubertal status and depression. The findings would appear to be more reliable and more appropriate for this study than Angold and Rutter's (op cit.), as the study used clinical evaluations of pubertal status rather than relying on parental reports or the child's own assessment of maturation, and used a community as opposed to a clinic sample.

Puberty and psychological functioning

In her excellent review of adolescent development Petersen (1988) identifies two aspects of pubertal change which may be important to psychological

functioning: 'Pubertal status', defined as the changes a young person experiences as he or she matures physically, and 'pubertal timing' defined as the timing of these changes relative to same-aged peers.

Studies conducted on the psychological sequelae of pubertal change have found that advancing maturation is related to enhanced body image and higher self esteem in boys but decreased feelings of attractiveness for girls (Crockett & Petersen, 1987). It has been suggested (Petersen, 1988) the pubertal changes experienced by girls, particularly weight gain and increased body fat, are in conflict with current cultural norms and values which promote an ideal of the feminine as having a prepubertal body shape. Consequently the experience of puberty may be more stressful for girls and this may increase their vulnerability to depression at this time. However, much of this research has tended to equate puberty with the event of menarche. The onset of the first menstrual period typically appears relatively late in the process of maturation - after the peak of growth but in the midst of the rapid increase in body fat (Tanner 1989). Studies which have monitored the experience of pubertal change at younger ages found breast growth - which occurs some two years before menarche - to have a modest association with positive body image and peer relationships, and superior adjustment as measured by questionnaire (Brooks-Gunn & Warren, 1988).

Young people may also be affected by the timing of their physical development being 'out of step' with that of their peer group. Puberty starts at very different ages in different individuals. As Tanner states when discussing biological maturation:

> "One simply should not talk of '14-year-olds'; the statement that a
> boy is 14 is hopelessly vague, for so much depends on whether he
> is an early or a late maturer" (1986 p.443)

Studies indicate pubertal change is most stressful when it puts the child in a deviant status relative to his or her peers (Simmons et al, 1983). For example girls who reach menarche unusually early, or who are significantly delayed, may be more likely to show poor psychological outcomes (Petersen & Taylor, 1980). In her review of studies which have looked at the impact of puberty Aro (1988) concluded that early maturing girls were less confident and less popular in early adolescence and

had a more negative body image than girls who matured at about the average time. The pattern is somewhat different for boys amongst whom early maturation has been reported to be psychosocially advantageous and late maturation to be disadvantageous (Aro, 1988; Tanner, 1989). It would appear early maturing boys perceive the increased size and strength associated with puberty as socially desirable attributes.

It is important to consider however the familial, social and cultural context within which pubertal development takes place. Because early developing girls are the first in their peer group to experience pubertal changes, they may lack the peer support provided by shared experiences (Aro, 1988). Parental support has been identified as an important factor. Girls who are unprepared for the physical changes associated with puberty have more negative feelings (Brooks Gunn et al, 1985). Quite how children from different ethnic groups perceive the effects of puberty has yet to be determined - most studies being conducted on white, middle class children. It is important to establish whether cultural variations in perceptions of pubertal development may increase or decrease the risk of depression.

However, there may be certain sub-groups for whom puberty may hold particular liabilities and for whom the physical changes associated with advancing maturation may increase their vulnerability to depression. For example adolescents who are involved in activities such as modelling or dance which require a very specific body shape may be distressed when puberty produces changes in body shape which affects their ability to perform effectively (Peterson 1988). More information is needed on this possibility.

Meaning

The cognitive features of depression are a major part of the nosological criteria for the disorder in adults. For example Beck (1976) proposed that depressed people were characterised by a negative cognitive set; having a negative view not only of themselves, but also of the world and of the future - termed the negative cognitive triad. Similarly the DSM-III-R criteria for a major depressive disorder includes the following cognitive symptoms: 'feelings of worthlessness or excessive or inappropriate guilt', 'diminished ability to think or concentrate or

indecisiveness'. Of particular interest to our understanding of vulnerability to depression is to monitor the relationship between earlier and later 'negative cognitive sets' (Cicchetti & Schneider-Rosen 1986). To this end many studies of individual differences in risk for depression in childhood have focused on whether children display the same kind of maladaptive attributional style evident in depressed adults (Nolen-Hoeksema et al 1986; 1992; Seligman & Peterson, 1986), and the nature of depressive cognition's in young people (Kaslow et al, 1984).

Attributional style and depression

Much of the research into the attributional styles of depressed children is based upon the reformulation of helplessness theory (Abramson et al, 1978). Simply put the theory proposes that individuals have characteristic attributional styles which they use to explain the causes of both good and bad events (Seligman & Peterson, 1986). The cause may be stable or unstable, internal or external, and global or specific. It is proposed that children who have an attributional style that leads them to view the causes of a bad event as stable in time, global in effect and internal to themselves will be particularly vulnerable to depression.

Studies which have examined the relationship between depression and attributional style suggest depressed children attribute positive events to external factors and negative events to factors within themselves (Benfield et al, 1988; Kaslow, 1988; Seligman & Peterson, 1986). For example Seligman & Peterson (1986) found a significant correlation between depressive symptoms and attributional style in 96 elementary school children. Similarly Nolen-Hoeksema (1986) showed maladaptive explanatory style was associated with a high level of depressive symptoms in 168 school children aged between 8 - 11 years.

A pertinent criticism of these and several other studies, concerns their reliance upon self report questionnaires which, by definition, use a series of hypothetical situations with which to assess attributional style. This approach has been criticised on two counts. Firstly because it ignores potentially important contextual variables that elicit cognitive processes (Halford & Sanders cited in Dadds et al, 1992), and secondly it does not answer the question as to whether depressed children display a maladaptive attributional style in response to actual events

(Harrington, 1993). Both of these concerns were addressed by Dadds et al (1992) in an observational study using a sample of 30 clinically depressed children and 16 control children. Children and their mothers were videotaped whilst completing a problem solving task. Following completion of the task children were shown segments of the tape and asked to comment on the thoughts or cognition's that were occurring at the time. The results indicated that depressed children displayed significantly more internally focused negative cognition's than the control group. A similar finding was reported by Meyer, Dyck and Petrinack (1989) using a sample of schoolchildren. After completing a problem solving task children completed a measure of causal attribution. The results indicated that depressed children evaluated themselves more negatively than their peers, despite a similar performance on the task.

It is not surprising that depressed children perceive themselves as less competent than non depressed children (Harrington, 1993). In point of fact we might expect a priori, deficiencies in information processing (Costello, 1989b). What the findings described fail to do is to establish causality - are deficiencies in cognitive style a risk factor for depression, a part of depression or a result of depression?

There have been several longitudinal studies which have attempted to examine causality, perhaps the most extensive being conducted by Nolen-Hoeksema and her colleagues (1992). Over 508 children completed the Children's Depression Inventory (Kovacs, 1982b) and the Children's' Attributional Styles Questionnaire (Kaslow et al, 1978) on nine separate occasions at six monthly intervals. A series of correlational analyses indicated that at baseline, when the children were aged 8 years, negative life events predicted vulnerability to depression. As the children grew older there was a weak but significant correlation between explanatory style and later depressive symptomatology. An earlier study conducted by Seligman and Peterson (1986), which monitored causality over a period of six months, found attributional style at baseline to be a stronger predictor of depression at time 2, some 6 months later, than depression scores at baseline were a predictor for attributional style at follow-up. Other studies reviewed by Harrington (1993) found that symptoms at follow-up were best predicted by initial levels of depression and not attributional style. This has led Harrington (op cit.) to propose that negative attributional style may be a transitory or state-like cognitive feature of depression rather than a trait-like predisposition.

In addition it is certainly possible that the depressive episode has a lasting effect upon the value, worth or reward that depressed children associate with themselves, their goals and actions. One way to examine this possibility is to determine whether the depressive episode increases or decreases vulnerability to future depression. The framework in which this has been examined involves identifying the meaning the experience of depression may have for the youngster. Studies which have looked at the 'scarring' or 'steeling' effects of depression are few in number but provide important information as to the ways in which the experience may impair, or strengthen, a child's cognitive set.

The 'steeling' effect of depression in childhood

Some studies using adults indicate their negative cognitive style continues after their depression remits, whereas others report the explanatory styles of depressed adults improve following remission. In her review of decision analysis and the development of depression, Costello (1989b) describes the 'sadder but wiser' phenomenon: the observation that in some situations depressed people appear to be more, rather than less, accurate in their appraisal of their own performance capabilities. Depressed people are, 'less subject than non depressed people to (the) 'warm glow' of optimism' (Costello 1989b, p. 77). It would seem that under certain conditions depression may 'steel' the child against future risk: the experience of depression thus providing a protective function. Rutter (1990) likens this process to immunisation when he writes.

> "Protection is not a matter of pleasant happenings or socially desirable qualities of the individual.... To the contrary, it comprises being exposed to, and successfully coping with, a small (or modified) dose of the noxious infectious agent. Protection in this case resides not in evasion of the risk but in successful engagement with it" (p186).

Studies of the experience of loss have shown poorly resolved bereavement may leave the child more vulnerable to stress in the face of other future bereavements. In contrast, successful coping may strengthen the child's capacity to cope with further losses (Raphael, 1984). Unfortunately this aspect of protection has been little explored up to now with regard to depression in children. It is not known

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why some children are able to reframe the depressive experience as one from which they become more resilient rather than one in which they increase their vulnerability. It is likely some clues can be found in the ability of the child to experience fully the pain associated with the depression without recourse to defence mechanisms. They may also be helped by having a strong attachment with a parent or significant other adult. More research is needed on the mechanisms involved.

The 'scar' hypothesis

An alternative approach to the study of depression in childhood has been to determine whether children are 'scarred' by the experience. A scar is defined as a deficit created by an episode of depression, much like the way in which a cut may leave a physical scar once it has healed (Rohde et al, 1994). Information about these residual effects or scars are important in advancing our understanding of risk.

There have been few studies which have evaluated whether children or adolescents are changed, or scarred, by the experience of their first episode of depression. Puig-Antich et al (1985), using a clinic sample of formerly depressed children and adolescents, found children who had recovered from their first depressive episode continued to display difficulties in relationships with peers, their mothers and siblings, although measures of school behaviour and academic achievement returned to normal upon recovery. Similarly Lewinsohn et al (1984) report a large number of significant differences between formerly depressed adolescents and a control group. A significant limitation of the latter study was its reliance upon a cross sectional methodology. It was not possible therefore to ascertain whether these differences were already evident before the onset of the first depression. However, a recent prospective study by Rohde et al (1994) suggests the experience of depression may have significant and enduring effects. A community sample of 1,507 adolescents was assessed at two time periods, approximately 1 year apart. At baseline the sample was screened for depression using a version of the 'Schedule for Affective Disorders and Schizophrenia for School-Aged Children', (K-SADS), and the Hamilton Depression Rating Scale (Hamilton, 1960). At follow-up subjects were interviewed again. Forty-five adolescents were identified as having developed and recovered from their first episode of major depressive disorder. The results indicated the presence of several psychosocial scars - internalising

behaviour, emotional reliance, stressful life events, cigarette smoking and subsyndromal depressive symptoms. Internalizing behaviour included problems such as fear, bodily complaints, worrying, depression and social withdrawal. Emotional reliance referred to an excessive desire for support and approval from others. It would appear from these data that, certainly short-term, the experience of depression can have residual effects, many of which appear to be internalised as 'problems within the self'. Quite how enduring these 'scars' are has yet to be determined.

Depressive cognitions

Several studies have documented the association between cognitive distortions and depression in children and adolescents. Negative social expectations (Cole 1991), lowered self esteem and a reduced sense of control (Kaslow et al 1984) have been identified as characteristic distortions of depressed peoples' thinking processes. A study by Kaslow et al (1984) using schoolchildren aged 7 - 14 years found a strong inverse relationship between self esteem and depressive symptomatology - as measured by the CDI (Kovacs, 1982b). This research also identified a relationship between other features of cognitive distortion and depression. Using a figure drawing task the results showed that depressed children had significantly lower performance expectations, took longer to complete the task and evaluated their performance more negatively than non-depressed children. Similar findings have been reported using a clinic sample (McCauley et al, 1988). Children with major depressive disorder experienced more hopelessness and perceived themselves to have less control over their environment then non-depressed children, or children whose depression had remitted.

Based upon the available evidence Harrington (1993) suggests depression in young people is associated with a distortion in thinking, not a deficiency in thinking. It would appear therefore that the risk resides in the appraisal process of the child. The appraisal a child has of a particular situation significantly determines whether or not it is perceived as a threat or a challenge (Folkman & Lazarus, 1988). The appraisal process is influenced by personality factors such as patterns of motivation, e.g. values, commitments and goals, beliefs about control, and the

recognition of personal resources for coping such as problem solving skills and access to support from family or friends.

Family factors and depression

There are several ways in which disturbed family interaction may affect the risk, nature and course of childhood depression. Health problems in other family members, marital disharmony, and dysfunctional family process have all been identified as risk factors for depression in childhood. Each is discussed below.

Health problems in other family members

There are, of course, many different parental health problems which can affect the quality of family interaction. Similarly, different families construct different health beliefs about their ability to cope with disability or impairment. For the purpose of this review I intend to focus on studies of parental depressive disorder as a risk factor in childhood psychopathology.

Studies indicate that children of depressed parents are at increased risk of a wide range of problems, including depression (Patterson & Capaldi, 1990). In his review of the available literature Harrington (1993) concludes 'there are strong familial links between depressive disorder in young people and their parents' (p. 104). For example in a prospective family interview study Harrington and colleagues (1993) found that first degree relatives of depressed child probands were nearly twice as likely to be depressed as relatives of a control group (Odds ratio 1.9, 95% CL 1.2 - 3.1 p < 0.01).

In a review of family functioning and depression Keitner and Miller (1994) describe rates of depressive disorder in the children of parents with affective disorder as ranging from between 23% to 38%; this contrasts to ranges of 11 to 24% for control families. Research intended to isolate the mechanisms involved have tended to focus on the genetic and biological causes of intergenerational transmission (see Mullan & Murray, 1989). However, biological models have been found to offer only a partial explanation (Cummings & Davies, 1994). Attention is now being focused on interactional and interpersonal mechanisms as possible

explanations for the transmission of psychopathology from one generation to the next. Many of these studies have tended to focus on maternal depression as a risk factor. The role of the father has been rarely studied (Downey & Coyne, 1990).

Parent-child interaction and depression

Depressed parents have been reported to be more negative, unsupportive and intrusive with their children when compared to both well parents and groups of medically ill controls (Cummings & Davies op cit.). It is proposed this pattern of rejection and hostility results, in time, in an increased risk for childhood depression (Hammen, 1988). The mechanism has been the subject of considerable speculation. Cummings and Cicchetti (1990) suggest that repeated exposure to these negative parental behaviours results in children learning to perceive their parents and the world at large as a threat to their emotional and behavioural well-being. Other studies (Dadds et al, 1992) have shown how the children of depressed parents may withdraw in an effort to escape hostility and criticism. This coping strategy can result in children 'internalising' the problem. Cummings & Davies (1994) propose this style of coping places the child at risk of a number of symptoms associated with depression - fear, worry and social withdrawal. However, it must also be recognised that despite the many risk factors involved children can and do successfully survive parental psychopathology. Several studies have shown that children were able to avoid becoming enmeshed in the parental illness by being able to differentiate between their own experience and that of their parents (see studies by Anthony 1976; Beardslee 1981, 1983; Beardslee & Podorefsky 1988). A crucial factor in this appraisal process was the realisation that they were not the cause of their parents' ill health. Consequently, although these children were compassionate toward and empathetic to their parents condition they were not overwhelmed by it, maintaining an intellectual curiosity in understanding what troubled the ill parent.

Children's contribution to depression in their parents

The relationship between children and their care givers is a dynamic one, involving the participation of the mother, father and the child. It is important therefore to consider how certain characteristics of the child may contribute to the

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parents mood state. The literature which has examined the impact of childrens' behaviour on depressed parents is small, but the available evidence suggests child disturbance helps maintain parental difficulties and parental depression (Coyne et al 1994). The day-to-day management of non-problem children has been shown to result in an increase in negative mood for non-depressed mothers (Dadds 1987). When the child is difficult to manage, the effect is greatly magnified (Patterson 1985). It is important therefore to consider bi-directional effects. For example children of depressed parents have been reported to have more difficult temperaments (Cummings & Davies 1994). They are reported to smile and express happiness less often and are more irritable and fussy (Field et al 1988). This may lead to further depression in the mother. However whether this is actually the case or a function of the parental illness is not yet clear as much of this research has used maternal reports of childrens' behaviour. What is also unclear are the precise origins of this negative interactional style. What is generally accepted however is that children with difficult temperamental styles are less sensitive to positive features of the family environment and more susceptible to negative familial characteristics (Graham et al, 1973). Difficult temperaments may well be a vulnerability factor for the child and indirectly contribute to childrens' effects by increasing family discord, parenting impairments and disturbances in the quality of parent-child attachments (Hammen, 1992).

Depression and attachment

Disturbances in parent-child attachment have long been considered a risk factor for depression in young people (Bowlby, 1980). Much of this research has been based upon the work of John Bowlby. Bowlby proposed that the quality of intimate relationships in early life, particularly between mother and child, can exert a powerful influence on subsequent vulnerability to psychopathology. Secure attachments between children and their parents exert a protective effect in the face of later adversity. Conversely, insecure attachments - whether anxious, ambivalent, or disorganised- place the child at increased risk of a wide range of problems including depression.

Initially research into the relationship between early adverse life experience and vulnerability to depression later in life tended to focus, almost exclusively, on the belief as to the importance of early exit events such as parental death, divorce or separation. The fruits of this research however have tended to suggest separation from parents is not an important factor per se in the development of later depression. For example the study conducted by Brown, Harris and Bifulco (1986) found that the relationship between early loss and vulnerability to later depression was mediated by the quality of parenting provided by the surviving parent. This research and others which have monitored the effects of early loss (Bifulco et al, 1987; Rodgers, 1990) have led to the belief that it is the circumstances surrounding the loss that are crucial - particularly whether or not there was an early lack of care (Parker, 1992).

An alternative approach to the study of attachment as a risk factor for depression in children has been to focus on the quality of the relationship between young children and the attachment figure - usually the mother. As has been noted parental warmth and responsiveness facilitate the development of secure attachments. Conversely parental emotional unavailability and insensitivity foster insecure parent-child attachments. Parental depression has often been linked with insecure parent-child attachments. There is also evidence that the severity of the mother's depression increases the probability of deficiencies in attachment relationships. Radke-Yarrow et al ((1985) cited in Cummings & Davies (1994)) found that insecure attachment was positively associated with the length, severity and treatment history of the mother. Data available from several recent studies indicate children of depressed mothers show distortions in their cognitions about themselves and their abilities. For example they have been found to be more self-critical than other children (Hammen et al, 1988), and have difficulties regulating emotion and social interaction (Zahn-Waxler et al, 1990). Harrington (1993) proposes such feelings of low self worth may lead to major depression directly, or indirectly by creating vulnerability through impairments in social relationships.

Unfortunately, as there have been no prospective studies of the relationship between the quality of early attachment and vulnerability to major depressive disorder in young people, the role of attachment remains speculative (Harrington, 1993). Although several longitudinal studies which have examined the sequelae of

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the quality of attachment in early childhood have shown that attachment status predicts peer relations, affect regulation, and cognitive resourcefulness. It may well be therefore that attachment is a more distal risk factor for depression in that it affects the competence of the child across a number of domains (Cicchetti & Schneider-Ross, 1986).

Marital disharmony

One particular aspect of family functioning that has received considerable attention as a risk factor for childhood psychopathology has been marital disharmony. In studies using clinic and non-clinic samples marital disharmony has been found to be a risk factor for a variety of emotional and behaviour problems across a wide range of ages (Jenkins & Smith, 1990). The risk for depression seems to be greatest when parental anger, hostility and criticism is directed at the child (Harrington, 1993), although it has also been suggested that children are affected by their observations of parental conflict (Cummings & El-Sheikh, 1991), particularly when there is no satisfactory resolution (Cummings & Davies, 1994).

Research indicates a considerable link between marital conflict and parental depression. An early study by Weissman and Paykel (1974) found that the marriages of a sample of depressed women were characterised by friction, hostility, poor communication, dependency, and diminished sexual satisfaction. More recent studies have also found the marriages of depressed people to be problematic (Coyne, 1990). The depressed parent is likely to experience considerable impairment in the ability to develop an intimate, supportive relationship with their spouse and this in itself can cause problems in the marriage (see Rush, 1980). Alternatively, recent research suggests that spouses may precipitate many of the difficulties of the depressed parent (Coyne et al, 1994). However, as yet, little is known about the processes linking marital conflict, parental depression, parenting and childhood adversity.

Family process and childhood depression

A number of findings describing the ways in which disturbed family interaction may affect the risk, nature and course of childhood depression have been

reviewed. What is apparent is that 'rather than one single path, many lead from parental pathology to childhood problems' (Patterson & Capaldi, 1990 p. 146). They do so however within the context of the whole family system. As Harrington points out, theories used to explain family based transmission of depression do so through a linear series of cause and effect chains (Harrington 1993, p. 134). However the available evidence would appear to suggest that it is the pattern of relationships between all family members which provides the risk mechanism for childhood psychopathology. It is therefore important to consider the way in which family process may influence childhood depressive disorder. Theoretical and empirical support for a family process perspective has been provided by the different schools of family therapy, for example the structural models derived from the work of Minuchin and his colleagues in Philadelphia (1974), the theories of Murray Bowen and his associates (1978; Kerr & Bowen 1988) and Systems Theory (Jackson 1977). It is not proposed to review the relative merits of each particular school or their contribution to the study of childhood psychopathology, rather to highlight the research which has looked at family process as a risk factor for child and adolescent depression. (The reader interested in learning more about the different schools should see Walsh 1993 or Oster & Caro 1990 for accessible reviews). However the theoretical difference between systemic thinking and the more traditional paradigms used to explain cause and effect in family psychopathology will be briefly described.

Systemic thinking employs the concept of 'circular causality'. The notion of circular causality was developed as an alternative to the accepted paradigm based upon a linear concept of cause and effect. Consequently rather than 'A' causing 'B', using systems theory it is rather that 'A' and 'B' are the cause of each other. The implications for the way in which we view the family are profound as, rather than seeing pathology as residing in the individual, using systems theory it is perceived to reside in the whole family. In their review of family models of adolescent depression Oster and Caro (1990, p 26) cite the following example of a dysfunctional family system:

> "In families with enmeshed boundaries, family members are over involved with each other, leaving little room for the development of privacy and autonomy... The underlying threat in these families is that any moves toward independence can cause a dissolution of the family structure. This is most common in families where the marital unit is estranged"

The authors contend that in these circumstances the child's normative move toward independence poses a considerable risk to the stability of the system as it brings into figure for the parents their own problems such as marital discord, a lack of intimacy, or depression. The child's development of depressive symptoms maintains the "myth" of family unity.

In their review of the family context of children's depression Coyne et al (1994) note that there are often deficiencies both in structure and function. Depressed children characterise their families as being emotionally distant, lacking in warmth, and poor in conflict resolution. Families have also been identified as having significant dysfunction in communication, problem solving, discipline and boundary management (Keitner et al, 1990).

A significant feature of many of the families of depressed children appears to be ineffective boundary management. For example a study conducted by Stark et al (1990) which investigated the family environments of children with psychopathology - including depressive disorder - found that they perceived their family environments to be less supportive and more "enmeshed" than a comparable group of control children. Boundaries have been identified as both a protective and risk factor for childhood depressive disorder. Minuchin (1991) has defined two extremes of boundary functioning - enmeshment and disengagement - which have been linked with childhood adversity. He states 'all families can be conceived of as falling somewhere along a continuum whose poles are the two extremes of diffuse (enmeshed) boundaries and overly rigid boundaries' (Minuchin, op cit. p. 54). Measurement of boundaries has been operationalised by describing the level of cohesion which exists in the family (for example Olsen et al, 1982). Indeed measures of cohesion have become a central feature of much risk research. However the results, although promising, remain equivocal. For example, a recent study by Garrison et al (1990) found that far from being a risk factor for depression, high levels of cohesion appeared to exert a protective function in young male and female adolescents. Using a questionnaire based methodology Garrison and her colleagues found that the best predictor of cross-sectional depressive symptom scores - as measured by CES-D - was family cohesion which explained between 19% and 24% of the variance in symptomatology in any given year. The observed association ran counter to conventional wisdom in that higher levels of depressive

symptomatology were significantly associated with lower levels of cohesion and did not support the hypothesis in which either extreme of family functioning is associated with depressive symptomatology.

Measures of family functioning and childhood depression

One of the major findings to emerge from a review of studies of family functioning and childhood depression is the range of instruments used to measure family process, adjustment and function. In a critical review of methodology Keitner and Miller (1994) identify several problems with measures of family functioning used in studies of childhood depression. They propose that there are considerable inconsistencies in the psychometric qualities of the measures used - some are well validated and psychometrically tested whilst others lack validation. The instruments also vary in the breadth versus specificity of the family dynamics they measure - some are designed to assess general satisfaction within the family unit whilst others measure specific aspects of family life - for example adaptability or cohesion (Beavers & Hampson, 1990; Olsen et al 1982). Because of these problems Keitner and Miller (1994) conclude 'the relative validity of the results reported is very difficult to assess' (p 20). They comment:

> "It is unclear whether the same or similar family processes are being measured in these studies and to what extent the findings from the different studies can be merged."

Interestingly however they state:

> "It is all the more striking therefore to note the remarkable uniformity of findings in different studies using widely different measures." (p. 20 op cit.)

A further criticism has been the reliance on the perceptions of one subject when the research has adopted a systemic approach to conceptualising family interaction. Consequently although the focus of this type of research is bidirectional, the procedure used is essentially unidirectional (Harrington, 1993). A basic tenet of systems theory is the 'composition' law (Constantine, 1986). This states 'the whole is more than the sum of its parts'. Consequently in order to obtain a complete picture of the family system it is important to include the perceptions of all family

members. However it is important to consider how the orthodoxy of systems theory may result in confusion between theory, procedure and method. In his thoughtful review of measures of family functioning Jenkins (1994) proposes:

> "It is not the number of people present that transforms an individual interview. The difference is how the clinician thinks about the nature of the problem, how it evolved, how its presence is maintained in a particular context and the implications for change in the wider social context." (p. 65)

Clearly multiple-response measures of family process, which include the views of both parents and children, allow the clinician or researcher to 'triangulate' the problem as a function of whole family process. It is important to note however, that a systemic approach is a function of the measures chosen and the way in which these data are interpreted, rather than the number of family members tested. This way emphasis is placed upon the measurements used rather than the number and status of the family members involved.

Measuring family functioning

It is clear from previous research that despite methodological shortcomings measures of family functioning offer a promising avenue of research in assessing the relationship between family process and risk of depressive disorder in children. In the final part of this section I will briefly review some of the more widely used approaches to measuring family process and say a little more about methodological limitations.

A recent review of measures of family functioning identified nearly 1,000 instruments that have been developed over the last 50 years (Touliatos et al, 1990). A major factor in the development of many of these instruments concerned which elements of family process it was most important to measure, how this could best be achieved, and how to classify health in family terms. For example Beavers and Hampson (1990) conceptualise family functioning as essentially linear - health or dysfunction being at opposite extremes of a hypothetical continuum; conversely the circumplex model of Olsen et al (1982) is based upon the assumption of a curvilinear distribution of family health or dysfunction. Optimal family functioning is achieved when families reach a balance, or mid-point, between two dysfunctional

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extremes. The relative merits of both approaches have been the focus of much debate (Walsh, 1993). In addition to questions of theory there are also questions regarding the generalisability of some of these instruments. Many of these measures were validated on white, intact, middle class American families, most in the life-cycle stage of adolescence (Walsh, 1993). Despite the considerable variation in developmental stage, economic and ethnic context, families still tend to be evaluated in comparison to this standard (Walsh, op cit.). There are therefore inherent problems of cultural bias and social desirability in some family assessment measures such as the Family Environment Scale (Moos & Moos, 1976, 1986, cited in Walsh op cit.) which clearly affect validity.

It should be made clear however that despite methodological problems there are available measures of family functioning with proven psychometric properties. Some of these are interview based assessments (Brown and Rutter 1966); there are also a small number of observational rating scales available (see Beavers and Hampson, 1990), self report (Olsen et al, 1982) and projective techniques (Gehring et al 1993)[2]. However because of inherent limitations in many of these methods, for example cost, the time a family has to make available (the interview developed by Brown & Rutter typically takes between 2.5 and 4 hours) and the small number of families that can be surveyed, most attention has been given to developing self report measures of family functioning.

Self report measures of family process

There are now a number of 'pencil and paper' questionnaires available based upon differing models of family health (Beavers & Hampson 1990; Epstein et al 1982, 1993; Lewis et al 1976; Moos & Moos, 1976, 1986; and Olsen et al, 1982). Of these models two have gained particular prominence. The Beavers-Timberlawn 'Self Report Family Inventory' (SFI) (Lewis et al 1976; Beavers & Hampson 1990), and the 'Family Adaptability and Cohesion Evaluation Scale' - FACES (Olsen et al 1982; 1994). Both measures have been widely used in both clinical and community

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[2]A number of qualitative methods are also available . For example drawings or sculptures of the family system and family tasks and role plays. See Constantine (1986) pp 209 - 241 for a review of these different methods.

settings (Lewis et al 1976; Sprenkle & Olsen 1978; Russell 1979). Since their development a number of studies have compared the relative merits of the two (Beavers & Olsen 1983; Beavers & Voeller 1983; Beavers et al, 1985; Green et al, 1985) as well as their respective reliability and validity (Anderson & Gavazzi, 1990; Bloom, 1985a). In the light of these studies the instruments have been revised and at the time of writing there is now available FACES III (Olsen et al, 1994) and a second version of the SFI (Beavers & Hampson, 1990).

The 'Self Report Family Inventory' (SFI) (Beavers & Hampson, 1990) is a 36 item questionnaire designed to assess a family member's view of five dimensions of family functioning: health/competence; conflict; cohesion; leadership; and emotional expressiveness. Reliability of the dimensions over a three month period ranged from .44 for the dimension of leadership to .85 for health/competence (Beavers & Hampson 1990). The ability of the SFI to discriminate clinical from non-clinical families is reported to be reasonably high (R = .62) (Beavers & Hampson op cit.).

An alternative measure is the 'Family Adaptability and Cohesion Evaluation Scale' - FACES (Olsen et al, 1982; 1994). The FACES scale is slightly shorter than the SFI (28 items) and measures two aspects of family process - adaptability and cohesion. The reported alpha reliabilities of the scale are .87 (cohesion) and .78 (adaptability) (Olsen et al, 1982). Despite being widely used in both clinic and general population studies the scale remains the subject of considerable controversy. Debate has focused upon Olsen et al's (1982) curvilinear interpretation of family health. The family literature now contains a number of studies that qualify or refute the curvilinear relationship between adaptability, cohesion and effective family process (for an excellent historical review of the debate see Cluff et al, 1994). Many of these studies have used the SFI for comparative purposes although other family measures have also been used. Despite the considerable research interest the findings remain equivocal although Burr and Lowe (1987) assert that there is a curvilinear relationship between cohesion, adaptability and effective family process, but that the relationship assumes a different shape than that proposed by Olsen and his colleagues (1982). Their resolution of the debate is to combine aspects of both sides of the argument. They propose that the relationship is linear up to the uppermost limits of both the cohesion and adaptability dimensions, where it then begins to

adopt a curvilinear form. Investigation of their proposal necessitates finding samples representative of extreme, symptomatic families.

The decision facing the researcher or clinician is which of the two to choose. Both have been demonstrated to provide a reliable and valid picture of particular aspects of family process. The major points of departure between the two concern firstly the model of family health upon which they are based and secondly the particular features of family process they purport to measure. As described above the SFI is derived from a linear model of normal family process - the FACES scale a curvi-linear model. Although both measure the cohesion of the family, the SFI provides a 'Competence' score for each member, whereas the FACES scale assesses the adaptability of the family to change to differing life circumstances. The choice of instrument would appear to depend therefore on what particular aspect of family process an individual wishes to measure. Certainly, despite the debate concerning extreme types, the FACES scale seems particularly well suited to research designed to measure the relationship between the ability of 'normal' families to adapt to childrens' different life experiences, and how this in turn might increase or decrease the risk of psychological sequelae.

School factors

Whilst it is generally accepted that school can be a stressful experience for some young people, there have been few studies which have looked at the educational experience as a risk factor for depression. Research has instead focused mainly on the relationship between academic performance and mood (see Puig-Antich et al, 1985). There are however several good reasons to turn our attention away from a primarily academic focus and instead consider factors, inherent in the school experience, which may predispose some children and adolescents to depression. Clearly school is a major part of childrens' lives. Findings suggest the characteristics of schools themselves can act as a force for good or bad (Rutter et al, 1979b). It is where young people interact with significant other adults who are not their parents; many childrens' friendships are formed in school; school provides boundaries regarding discipline which may not be enforced at home; and following the transition from primary to secondary school it is where a child's work is evaluated and compared to other students. Finally the transitions within the school

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life cycle challenge not only the coping skills of the child but the adaptability and flexibility of the whole family. For example when a child goes to school for the first time this can be a turning point in the life of the whole family. Findings from research on dual-earning families have described the challenges to family functioning when children enter school and need care before and after formal school hours (Piotrkowski & Hughes 1993). Studies indicate this situation can increase marital disharmony and increase stress within the family.

There would appear to be three main areas of vulnerability for a child regarding their school experience: transitions within the school life cycle; specific factors associated with the school experience such as bullying as well as the school environment itself; and academic achievement.

Transitions

School-aged children and their families have three transition periods to contend with: entrance into school; the transition from primary to secondary school; and leaving school. Research which has monitored the effect of these transitions has shown some children experience a variety of problems (Hughes et al, 1979). For most these disappear after a 'settling-in' period. There are some however who continue to experience difficulties which may endure throughout their schooling (Elizur, 1986). These difficulties are not confined to the very young. Several studies have shown that transition to secondary school is accompanied by a drop in some children's self-esteem (Wigfield et al, 1991). Research has also shown that final examinations can be a considerable source of stress for some adolescents (Cairns et al, 1991).

It is probably true to say that most young people negotiate these transition periods with little or no difficulty - aided and abetted both by the school and their parents. However it is also likely that a small but significant number do experience considerable difficulty adapting to the psycho- social and performance demands of school. For these children the transition periods described may represent 'sensitive' phases when they are at risk of a number of problems including depression. More work needs to be done on this possibility.

Characteristics of the school

In older children the characteristics of the school they attend have been shown to have important effects, not only in terms of academic results, but also in terms of adverse behaviours such as delinquency and behaviour problems (Rutter et al, 1979). Schools which provide strong organisation in terms of goals and discipline, and whose teachers model good behaviour, have been found to make a positive difference. However perhaps the most important factor concerns the relationships between pupils and teacher. A report about at-risk students in the United States (Brooks, 1994) suggested:

> "Possibly the most critical element to success within school is a student developing a close and nurturing relationship with at least one caring adult. Students need to feel that there is someone within school whom they know, to whom they can turn, and who will act as an advocate for them." (p. 17)

It is likely such a relationship would enhance self esteem and competence, reinforcing resilience, and possibly ameliorating the effect of other risk factors which may increase the likelihood of psychiatric problems such as depression. This possibility is discussed in more detail in the section on protective factors below.

Bullying and teasing

A significant factor affecting the child's school experience is bullying and teasing. Bullying and persistent teasing in schools have become topics of considerable concern in recent years (Smith, 1991). A recent study (Smith op cit.) identified that 27% of junior/middle school children and 10% of secondary school children were bullied 'sometimes' or 'more often'.

Bullying has been defined as 'intentionally causing hurt' (Smith, 1991). This hurt can be physical or psychological, and can be carried out by one child or by a group of children. Studies suggest that most of the young children or young people who report being bullied say that it takes the form of teasing, but about a third report

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other forms such as hitting and kicking (Olweus, 1994). Boys and girls report being bullied about equally although studies indicate girls are subject to more indirect and subtle forms of bullying (Olweus, op cit.).

Clearly bullying and persistent teasing can have a devastating effect on the lives of young people. Studies indicate that victims have significant distortions in their appraisals of themselves and their abilities. These children are characterised by low self esteem, having a low opinion of themselves and their situation, and tend to judge themselves as failures. Several studies have documented the association between these types of cognitive distortions and depression in children and adolescents (Cole, 1991; Kaslow et al, 1984). Indeed in the most severe cases victims have committed suicide in order to escape their tormentors (Bowers et al, 1992).

Academic achievement

A high level of expectation for task achievement by parents has been found to be associated with depression in adolescents (Rubin et al, 1992). Fear of failure or the threat of failure was cited as contributing to depressive feelings through the child's experience or anticipation of shame, ridicule and humiliation. Conversely McClelland (1955) pointed out that children themselves can develop unrealistic expectations of their ability. The accompanying sense of failure may, over time, result in depressed mood.

PROTECTIVE FACTORS

Rutter (1985) defined protective factors as "those factors that modify, ameliorate or alter a person's response to some environmental hazard that predisposes to a maladaptive outcome". Garmezy (1983, p 74) identified three broad groups of factors that 'modify or ameliorate' against stress: positive personality disposition of the child; a supportive family milieu which emphasises cohesion and warmth; and the availability of external agencies that function as a support system for strengthening and reinforcing the child's and/or parents' coping efforts.

However, this is not to say that protective factors are synonymous with positive or beneficial experience (Rutter, 1985; 1987; 1990). This raises two important points. The first concerns the nature of the interaction between a person and a particular stressor. In certain situations unpleasant or potentially hazardous events may toughen an individual. This process has been termed the 'steeling' effect (Rutter, 1985). Gradual exposure to stress has become a useful tool in cognitive-behaviour modification. Both adults and children have been desensitised to a wide range of threatening situations using graded exposure to the threat (Meichenbaum, 1979).

A further distinction between protective factors and positive experiences concerns the interactional component of protection (Rutter, 1985). Rutter (op cit. p. 600) comments that:

> "Positive experiences are those that generally predispose an adaptive
> outcome. In contrast, protective factors may have no detectable effect
> in the absence of any subsequent stressor"

The implications of the interaction effect between risk and protective factors will be discussed at greater length below.

Protective factors identified by research are as follows:

Personality factors of the child

Some of the characteristics of childrens' psychological functioning which have been identified as protecting them against stress include high IQ (Kandel et al, 1988) and good problem solving ability (Masten, 1989); a higher sense of self worth (Garmezy 1985); and positive temperament (Rutter, 1985). Measures of competence including academic achievement and participation and competence in activities have also been identified as protective (Rae-Grant et al, 1988).

Intelligence as a protective factor

Previous research indicates a modest but consistent tendency for children and adolescents of above average intelligence to have lower rates of psychiatric disorder

including depression (Rutter et al, 1970; Luthar et al, 1992). There is also evidence to suggest that high intelligence and academic attainment may provide a protective function in the presence of chronic psychosocial adversity (Rutter 1979a).

There has been considerable speculation as to the mechanisms involved. Rutter (1981) has proposed that high self esteem and achievement provide a protective influence - intellectual achievement often leads to high status and success in the peer group, school and family (Kohlberg & Zigler, 1967). He also cites the greater problem solving skills of children of above average intelligence. Recent studies which have monitored intellectually gifted adolescents have proposed cognitive maturity might exert a protective influence. Given that the intellectually able are often more developmentally advanced it has been suggested they have a wider repertoire for handling adverse experience (Zigler & Glick, 1986). The greater flexibility of their coping strategies could explain why intellectually able children show better psychosocial adjustment (Luthar et al, 1992). Alternatively it might be that these children are constitutionally more resilient.

A small number of studies have challenged the role of intelligence as a protective factor (Luthar 1991; Masten, 1982; Zigler & Farber 1985). A recent study by Luthar (op cit.) found intelligence was involved as a vulnerability factor during periods of high stress. At low stress levels she reports intelligence was positively related to competence for school grades. When stress was high, intelligent children appeared to lose their advantage and demonstrated competence levels similar to those for less intellectually able children. It has been suggested more intelligent children may be more sensitive to changes in their environment. This greater sensitivity could account for their higher susceptibility to stress.

Intelligence, academic competence and depression

Studies which have examined the relationship between intelligence and depression have usually operationalised intellectual ability in terms of academic achievement or competence. Examples of the former include school grades and examination results, while information on the latter is provided by teacher, parent or peer ratings.

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A recent study of the functional impairment of 62 adolescents with major depressive disorder (Puig-Antich et al, 1993) found that when compared to normal adolescents these depressed youngsters had lower academic achievement ratings, and were more likely to have difficulties with reading, spelling and mathematics. The study also indicated teachers made more complaints about the children and had a less favourable attitude toward them. In a series of recent studies Cole (1990; 1991) proposed that it is not academic attainment per se which acts as a protective factor against depression, rather it is the recognition from significant other people - parents, teachers and peers - of the child's achievement. He suggests academic competence, defined as ability or performance, may not be as closely linked to depression as is competence, defined as positive feedback from significant others (Cole, 1990). In a community survey of 750 randomly selected school children, of mean age 9.8 years, Cole found depressive symptoms strongly correlated with social and academic competence. Similar findings have been reported by Patterson and Capaldi (1990). In this study, analysing a mediational model for boys' depressed mood, the authors found that peer rejection explained the variance in low self esteem, low academic skills and depression. The implications of the interaction between achievement, peer relationships and depression has been studied by Goodyer et al (1990). His findings indicated that recent achievement did not exert a protective influence against adversity. However the probability of being a case rather than a control was best explained by an interaction between achievement and quality of friendships. Goodyer's study defined achievement as any event that had social and personal connotations of desirability and would be seen by others (peers, teachers and relatives) as expressing a degree of personal competence. His definition therefore extended the achievement domain beyond school to include physical achievement (sport) and achievements in art, craft or technology, and the community. His is one of the few studies to examine the protective function of a broad range of achievement domains. What is not known is whether certain domains are more salient for children of differing ages. It is possible sport is a more important achievement domain for young people than for example arts or crafts, because of its high status among the young. More information is needed on this possibility. In addition level of achievement may also be a significant factor.

Positive recognition as a protective factor

Support for the importance of positive recognition, either by peers or adults, has been provided by several recent studies. In a study of factors protecting children living in disharmonious homes (Jenkins & Smith, 1990), the authors found that involvement in an achievement domain or activity was not protective. Receiving recognition for the activity was however, found to be protective. Jenkins & Smith (op cit.) also cite the work of Quinton et al (1984) which found that women who had been in care as children were protected in adult life if they had had a good experience at school. Similarly Segal (1988, (p.2)) in describing resilient children, noted:

> "From studies conducted round the world, researchers have distilled a number of factors that enable such children of misfortune to beat the heavy odds against them. One factor turns out to be the presence in their lives of a charismatic adult .... And in a surprising number of cases, that person turns out to be a teacher".

Family protective factors

Resilient children are more likely to come from supportive home environments (Brooks, 1994). Specific family factors include competent parenting (Masten et al, 1988); clear-cut and reasonable discipline and limit setting (Rutter, 1985) which encourges self-discipline (Brooks, 1994; and a good relationship with at least one parent (Werner & Smith, 1982). Good relationships with other family members such as grandparents have also been found to be protective in situations of social deprivation (Sandler, 1980) and marital disharmony (Jenkins & Smith, 1990).

Yet although research has identified certain family configurations as protective, it has done so in the context of an essentially pathologically based view of family functioning. Attention has been focused almost exclusively on identifying family influences in the aetiology of childhood disorders, or on relationships or alliances within the family which ameliorate the effect of adversity caused by discordant marriages, divorce and separation, or parental illness. In a review of the

stressors of childhood Garmezy (1983, p 65) states:

> "In recent years debate has arisen over a cultural transition taking place in which some have argued that strong radical changes are threatening traditional family structure, posing strong threats to the well-being of children".

These changes include a rise in the number of single parent families; and in the number of working mothers; and a lack of adequate child care provision. These changes, it is argued, are having a detrimental effect on childrens' social, emotional and cognitive development. Others have vigorously opposed this view (Walsh, 1993; Hetherington et al, 1993).

Whilst it is not the purpose of this thesis to investigate the relative merits of either view, what seems important is to extend our knowledge of family functioning outside the confines of what is, at present a disease based paradigm. Some family researchers have suggested that there has been a tendency to equate normality with the absence of symptoms. Yet as Minuchin (1974) emphasised, no families are problem free. This situation has been confounded in clinical studies where there has been a tendency to use labels indiscriminately which define family relationships as pathological. For example the label "enmeshed family" is too readily misapplied to families showing high cohesion despite the fact that research has indicated that cohesive family relationships are associated with lower rates of depression (Garrison et al, 1990) or promote resilience (Garmezy, 1983). Important as research has been and will continue to be in identifying family patterns in the development and maintenance of child psychiatric disorder, it has obscured the positive attributes of healthy family functioning.

An alternative approach has been proposed by Walsh (1993) who suggests adopting a family resilience framework. She argues that it is important to understand the strengths and weaknesses of families as they confront inevitable life challenges. One such method is to examine the inter-relationship between childhood protective mechanisms and family functioning.

Life experiences as protective factors

Three groups of childhood life experiences have been identified as having a protective influence against childhood psychiatric disorder (Rutter, 1990): personal relationships; task accomplishment; and turning points in childrens' lives.

The first, personal relationships, focuses on the quality of the parent-child relationship, and upon the quality of attachment in early childhood as protective factors against the deleterious effects of a number of stressors. The second type of life experience concerns benefits which stem from successful task accomplishment. "Tasks" in this concept can be defined very broadly although it has usually been linked to academic attainment (see section on intelligence, academic achievement and depression above). Success in other non-academic domains - sports, crafts, music or drama - whilst seemingly important within this age group, has received little attention. The third and final class of life experiences concerns turning points in a child's life. A turning point is described as an event which shapes the course of future life experience. Turning points, it is argued, can have either a positive or negative trajectory. For example, when moving to a new school a child is faced with negotiating a series of new relationships, both with the peer group and teachers. Successfully coping with these challenges may be particularly protective in children from disadvantaged homes. Interestingly, it has also been proposed that becoming involved in a hobby, pastime, or sport might also create a similar turning point. The idea of involvement in clubs or sports groups as a possible protective factor has received little attention despite offering a potentially fruitful area of research.

Much of the research into child and adolescent life experiences has studied children who are at significant risk of emotional or behaviour problems. For example children facing adversities caused by: living in deprived homes; teenage pregnancies; and maternal loss. Each class of life experience may well have a considerable influence upon a child's resilience through increasing his or her self-esteem, competence or mastery. However, consideration needs to be given to the effects life experience might have on children, and their families, in general, and the implications this might have for protection against depressed mood. Such an

approach raises two additional points which remain unexplored within this field of study. The first concerns the relationship between the different classes of life experience. For example, it is not yet known if a particular turning point may enhance the parent-child relationship, or whether an achievement domain may highlight areas of dissatisfaction which already exist within the family system and so weaken alliances between parents and their children. The second point concerns the inter-relationship between specific life experiences and family functioning. For example when a child goes to school for the first time this can be a turning point in the life of the whole family. Research on dual-earning families has described the challenges to family functioning when children enter school and need care before and after formal school hours (Piotrkowski & Hughes, 1993). Studies indicate this situation can increase marital disharmony and increase stress within the family.

Little is known about how different life experiences affect family functioning and how this in turn might increase or decrease the risk of psychological sequelae. A research emphasis which focuses solely on the child ignores the effect life experiences amongst the young may have upon the whole family. Does the family potentiate the positive influence of task accomplishment by improving love relationships, or weaken the effect by parents becoming over-involved or critical of their children's success? A high level of expectation for task achievement by parents has been found to be associated with depression in adolescents (Rubin et al, 1992). In this study, fear of failure or the threat of failure was cited as contributing to depressive feelings through the child's experience or anticipation of shame, ridicule and humiliation. Such life experiences mark only the beginning of a process and more information is needed as to how the child and his or her family cope with the transitions caused by particular achievements or turning points.

RESEARCH STRATEGIES IN ANALYSING THE ASSOCIATION BETWEEN RISK AND PROTECTIVE FACTORS

There have been two complementary approaches to understanding the processes through which different factors moderate the effect of risk. Garmezy et al (1984) and Rutter (1985; 1987;1990) both emphasise the need to distinguish between those factors which are *compensatory* and those which act as *protective* or vulnerability factors. Compensatory factors act additively to enhance or improve

competence in the presence of a stressor. Protective and vulnerability factors, on the other hand, interact with the stress.

A range of different methodologies have been used to examine protective factors (Jenkins and Smith, 1990; Luthar & Zigler, 1991). However, in general two broad strategies have been adopted (Luthar, 1993). The first involves the search for interaction or buffering effects. For example, some factors combine interactively, with one factor acting to multiply or divide the impact of the other. The second, alternative strategy has been to use a "main effects" or compensatory model. For example in a study of stress and competence in school-aged children (Garmezy et al, 1984) socio-economic status was used as a "compensatory" environmental attribute. The authors hypothesised that, given equal stress levels, children from higher socio-economic backgrounds would be less affected by the stress. Consequently main effects models analyse the question "do high-risk individuals with a particular attribute do better than those without it"? The implications of both of these approaches is described below.

Interactions of risk and protective factors

In an attempt to clarify his position on the role of protective factors Rutter (1991) proposed:

> "The concept of a protective factor implies a modification of the stress factor, and that means that there must be a statistical interaction between the stress and the putative protective factor and not simply a main effect".

However, the way in which a particular variable interacts has a significant effect upon whether or not a factor acts to multiply or divide the impact of the other. Factors which *potentiate* one another increase the risk of disturbance; whereas those which mediate or buffer the effects of the other act to decrease the risk of disturbance.

Main effects or compensatory models

Recently there has been considerable debate as to the utility of using a main effects model in resilience research. Luthar (1993) suggests that in weighing the

relative merits of main effect models and interaction models the issue is that the analysis complements the question which guides their work. She argues:

> "There is no reason to assume that main effect models are any less informative than are interaction models............. If, for example, intelligence were found to be related to competence among high risk children, and was also related to competence among low-risk controls, two main effects, and no interaction effect would be found. The absence of an interaction effect should not detract in any way from the protective functions of intelligence among children in the high-risk situation". (Luthar op cit. p. 448)

A logical approach would therefore be to utilise both models so as to provide the most complete understanding of the role of specific mechanisms in childhood resilience (Luthar and Zigler, 1991).

Outcome measures in resilience research

There have been two approaches to determining resilient outcomes. The first has focused on the absence of symptomatology or psychopathology as an indicator of resilience. Studies have assessed the frequency and severity of behavioural and emotional problems of the child using interviews with the parent, most often the mother (Jenkins and Smith, 1990). Alternatively a combination of self report measures have been used, completed by both children and their parents (Jensen et al, 1990) to assess child symptomatology.

The second approach has been to define resilience in terms of the child's competence in specific, socially desirable domains (Luthar & Zigler, 1991). Much of this research has tended to operationalise competence in terms of the child's functioning in the school context (Garmezy et al, 1984; Luthar, 1991; Masten et al, 1988; Pelligrini et al, 1987). It is argued school is an important area for assessing children's competence because of its importance for adaptation in our culture (Masten et al 1988). Several domains of childhood competence have been studied including academic achievement, classroom behaviour and friendships and popularity. Success or achievement in one or more of these domains has been used as a marker to indicate a child's resilience. The assumption made when using such criteria is that competence reflects good underlying coping skills (Luthar and & Zigler, 1991).

The distinction between a focus on symptomatology and studies which focus instead on the functioning of the child is an important one. The practice of equating illness with complaint, and therefore health with the absence of complaint can lead to spurious conclusions about the general health of the child population under study. Kendell (1975) summarises the problem with the current emphasis upon the medical model of illness when he comments:-

> "Equating illness with a complaint allows the individual to be the
> sole arbiter of whether he is ill or not, and is unsatisfactory because
> some people who should be complaining don't do so and others who do
> so repeatedly don't seem to have adequate reasons for doing so".

For children this situation is exacerbated as the symptom or complaint is usually done by proxy. Reporting bias might influence the results of some research. For example mothers who have less satisfactory relationships with their children may report them as as having more emotional and behavioural problems (Jenkins & Smith, 1990). In addition the current conceptulisation of competence used by many investigators has tended to mask the emotional cost that may exist between successful adaptation and the struggles associated with this process (Cicchetti & Garmezy, 1993; Luthar, 1991). The emphasis on functioning does however assess the degree of impairment or disability that the disorder causes the child and his or her family; the notion of impairment being central to the diagnosis of psychiatric disorder (World Health Organisation, 1992).

Conceptualising resilience as a social construct takes account of individual variability both between and within different social groups in the population being studied. For example, Murray (1985) suggests an athlete is likely to regard any impairment of mobility as a major disruption of his normal functioning, while a retired man with a sedentary life-style might accept a decrease in his range of movement as normal for his age. However, a runner with a hand injury is less likely to suffer functional impairment when compared to a cricketer.

Limitations in research into resilience

Based on my review of research on childhood resilience, several important methodological limitations are apparent. One of the first and most important concerns

the definition of resilience itself. So far research has tended to focus on outcomes as indicators of resilience rather than characteristics or attributes of the child which make them resilient. A recent review by Fonagy et al (1994) looking at transgenerational processes in resilience proposed that:

"Resilience could not be thought of as an attribute born into children or even acquired during development. It is the indication of a process which characterises a complex social system at a moment in time............. Resilience is normal development under difficult circumstances". (p. 233)

Yet such an approach characterises the child as lacking any ability to learn, or to acquire knowledge and use their experience to cope in different developmental periods. Studies by Luthar (1991), Pelligrini et al (1987) and Masten et al (1988) have indicated resilient children do have specific attributes which assist them in coping with a wide range of adversities. These include an internal locus of control, a sense of humour and an ability to manage and direct social interaction. It seems likely then that resilience reflects a cluster of attributes including persistence, reality sense, flexibility and optimism, divergent thinking and a belief that events are under the child's control.

Emphasis must be upon the interaction between the child and the environment. Appraisal is crucial to the phenomenon of resilience and adversity (Garmezy and Masten, 1994). Young children may be protected from psychosocial adversity by limitations in their cognitive development. Infants are buffered from many psychosocial adversities by their lack of comprehension. These children might be labelled 'resilient' although in truth they are not at risk due to limitations in their cognitive capacities. What is important is to monitor these children to learn how they cope with adversity as the meaning of their situation becomes better understood. Little research has been done to examine the meaning children may ascribe to certain situations or to examine systematically the role of appraisal in chronic adversity (Garmezy op cit.).

RESILIENCE AND DOMAINS OF DEVELOPMENT

Resilience is the outcome of a complex appraisal process dependent upon the meaning the situation has for the child and the resources at his or her disposal for

coping with the perceived threat or challenge. There is now considerable research evidence which attests to the importance of people's concepts and feelings about themselves, and their ability to cope with life's challenges and to control what happens to them (Rutter, 1990). In the past, much resilience research has focussed on the child's performance in academic work at school. This largely procrustean approach to resilience research excludes many achievement domains which are as important if not more important to young children such as games and sports and other hobbies or interests. Harter's (1984) research in perceived competence has particular relevance here. She identified three major competency domains - cognitive competence, social competence and physical competence. Children vary in their perceived competence across these domains. It has subsequently been suggested that notions of 'overall' resilience may have questionable utility (Luthar, 1993): what is important is to examine functioning across domains of development (Cicchetti and Garmezy, 1993).

Resilience and development

Related to our understanding of resilience is the recognition that resilience is not a static trait but a process marked by a child's continuing interaction with the environment. As children develop and mature they encounter a wide range of stressful situations and diversities. New vulnerabilities and/or strengths may emerge during developmental transitions, such as moving to a new school. It does seem reasonable to assume that childrens ability to negotiate risk situations competently and confidently, whilst not guaranteeing resilience at later developmental stages, will assist them in their appraisal of later perceived risk. Longitudinal studies are needed to determine the long term course of resilience. Do resilient children become resilient adolescents or are a new 'set' of personal attributes required? The reliance on cross sectional methodologies also affects the ability to draw conclusions about the direction of causality between protective factors and children's adjustment (Jenkins & Smith, 1990). For example the absence of protective factors may be the result of the child's disturbance rather than a contributing cause of it.

Invulnerable or resilient?

Invulnerability and resilience have often been used interchangeably yet they have quite different and distinct meanings and implications. It has been assumed that

children who are 'invulnerable' in their resistance to stress are unmarked by their experience (Cicchetti & Garmezy, 1993). This approach has masked the emotional cost that may exist between successful adaptation and the struggles associated with this process (Cicchetti & Garmezy op cit.; Luthar, 1991). A recent study (Luthar, 1991) revealed that children labelled as resilient, who were able to function successfully in terms of "societal expectations", were significantly more depressed and anxious than were competent children from low stress backgrounds.

This finding highlights the 'cost-benefit' of resilience, and identifies that even resilient children need continuing support. Further research is also needed to establish the cost early adaptation may have at later stages of these children's life cycle.

MENTAL HEALTH IN INTENSIVELY TRAINING YOUNG ATHLETES

The final section of this review of literature will consider what is known about the effect of intensive training upon the psychological and psycho-social development of young athletes. In order to interpret these data it is important to make a distinction between general or recreational sports participation and intensive training. Much of the available literature has focused on the effects of ordinary exercise on the young. Yet there are significant differences between recreational sports involvement and intensive training, both in terms of the process and purpose of participation, and it is by no means clear whether the health related benefits of ordinary exercise are the same for children with a more intensive involvement. For the purpose of the research reported in this thesis the basic criteria for inclusion in the present study were that:

- the athletes trained for a specific number of hours per week, and/or:

- they had performance success to a specified level in the past or had the potential to do so in the future.

It seems sensible therefore for the purpose of this review of the literature to use the same definition of intensive training.

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To highlight the difference between the effects of ordinary exercise and intensive training the review begins with a brief description of the epidemiology of exercise patterns in the young. The relationship between mood and exercise is also described. The epidemiology of intensive sports participation is then summarised. Current concerns are also reviewed before describing in some detail specific age related vulnerabilities and risk factors associated with intensive sports participation. The review concludes with an overview of the relationship between mood and intensive training.

EPIDEMIOLOGICAL ACCOUNTS OF ACTIVITY PATTERNS IN THE YOUNG

General population studies

Interest in children's activity levels has grown following concerns as to the long term consequences of a sedentary lifestyle. Data from a number of epidemiological studies suggest that lifestyle risk factors for cardio-pulmonary disease can be identified in children (Berenson et al, 1980; Gilliam et al, 1977; Morrison et al, 1980), and that many of the risk factors continue into adult life (Riddoch et al, 1991). A recent review (Simons-Morton et al, 1988) suggested that to provide protection against heart disease children should undertake physical exercise entailing large muscle groups moving dynamically for periods of 20 minutes or longer, three or more times a week, at an intensity that elicits heart rates equal to, or in excess of, 140 beats/minute.

Using Simons-Morton et al's recommendations as a bench mark recent research using British children suggests that, as a population, they have generally low levels of physical activity (Armstrong et al, 1990a; 1990b). Furthermore the indications are that girls are less physically active than boys and that activity patterns amongst female adolescents decrease whilst at secondary school (Riddoch et al, 1991). Studies conducted by Armstrong and his colleagues in Exeter (1990a; 1990b; 1991) using children and adolescents found that very few spent daily periods of 20 minutes or longer with their heart rates above the recommended thresholds. Consequently the data available on British children's activity patterns suggests generally low levels which decrease with age. Not surprisingly these findings have placed children's fitness and physical activity on the medical, educational and

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political agenda in the United Kingdom (Education, Science & Arts Committee, 1991; Kirby, 1992).

Mood and exercise in the young

In addition to the well established physical health benefits of exercise there is now available a considerable body of work documenting the positive effects of exercise on mood. In recent years physical activity has been advocated as a means to maintain and enhance mental health and well-being (Morgan & Goldston, 1987). There is now a considerable body of work describing the mental health benefits of exercise (Dishman, 1985; Folkins & Sime, 1981; Morgan & Goldston, 1987; Steptoe, 1989)).

Some of the early studies were heavily criticised for a lack of scientific rigour (Weinstein & Meyers, 1983). Problems included the failure to recruit a control or placebo group, small sample size and the potential bias of group involvement or socialisation. Despite these methodological deficiencies results suggested that exercise had mood-elevating properties (Greist, 1987). Further, more recent research using quasi-experimental or experimental designs have supported these early findings in both clinically depressed and community populations (Steptoe, 1989; Veale et al, 1992).

However, care needs to be taken in interpreting a number of these findings. Many studies have used depression as a generic term covering a wide range of mood disorders of varying severity. Most have used a dimensional approach to the measurement of mood, few have used DSM-III criteria to diagnose depressive disorder or 'caseness'. Different populations have been used for these investigations and sometimes inappropriate comparisons between studies using different definitions of 'mood disorder' and different populations have been made. For example athletes have been used as representative of a 'normal' population.

In an attempt to impose some order upon these research findings a state-of-the-art review was conducted at the National Institute of Mental Health (NIMH) in

the United States (Morgan & Goldston, 1987). The NIMH working party concluded:

1. exercise is associated with reduced state anxiety;

2. exercise has been associated with a decreased level of mild to moderate depression;

3. long term exercise is usually associated with reductions in traits such as neuroticism and anxiety;

4. exercise may be an adjunct to the professional treatment of severe depression;

5. exercise results in the reduction of various stress indices;

6. exercise has beneficial emotional effects across all ages and in both sexes (Morgan & Goldston 1987. p 156)

Despite the contention that exercise has 'beneficial emotional effects across all ages' - point 6 above - few studies have looked at the mental health benefits of exercise in children. In addition many of the studies supporting the relationship between exercise and mood have been conducted on clinical samples. It is important therefore to distinguish between exercise as a possible *protective* factor in community samples, and physical activity as an additional *treatment modality* in people with depressive disorder. The studies reviewed here have been classified on the basis of the population studied. These include clinical population studies of both children and adults; general population studies; and finally research using athletes.

(i) Clinical studies of the therapeutic value of exercise in depressive disorder in adults

In the last 15 years there has been growing interest in the therapeutic value of exercise as a treatment intervention for psychiatric disorders in adults. There are now a considerable number of studies documenting the efficacy of using long-term or chronic exercise programmes as an adjunct to, or replacement of, traditional psychotherapeutic modalities. In most of these studies depression is the mental disorder most commonly studied, and aerobic exercise - either running or walking - the most commonly used form of exercise intervention (Martinsen, 1990).

In a critical review of current research Martinsen (1990) identified ten intervention studies on clinically depressed patients with at least quasi experimental

design. The first experimental exercise intervention study was conducted by Greist et al (1979) who studied 28 out patients whose chief complaint was depression. All scored at or above the 65th percentile on the depression cluster of the Symptom Checklist 90 (SCL-90) (Derogatis et al, 1973). Patients were randomly assigned to either running or walking (1 hour 3 to 4 times per week) or to one of two kinds of psychotherapy (1 session per week); these sessions were either ten behaviourally focused sessions or dynamic insight-oriented psychotherapy. The study showed that there were no statistically significant differences between the three groups. Significant reductions in depression scores were obtained in all groups. This could mean that all the treatment groups were equally effective, or that none of the treatments was effective and that improvement was due to the natural history of the disorder.

However, subsequent studies conducted mainly in the United States and Norway all report aerobic exercise to be as effective as psychotherapy, and superior to an inactive control group, in the treatment of unipolar depressive disorder of mild to moderate severity (Reuter et al, 1982; McCann & Holmes, 1984; Klien et al, 1985; Martinsen, 1985; and Freemont & Craighead, 1987). No study has addressed the value of exercise intervention in patients with melancholia or psychotic depression, or in the treatment of bipolar disorders (Martinsen, 1990).

(ii) Clinical studies of the effects of exercise on children with psychiatric disorders

There have been few studies which have examined the relationship between exercise and mood in children and adolescents (Johnson et al, 1968; MacMahon, 1990; Shipman, 1984; Solomon and Bumpas, 1978). Most of our knowledge as to the psychological benefits of exercise amongst the young is either anecdotal, and therefore unsubstantiated, or based upon case studies.

Findings using a sample of hyperactive children (Solomon and Bumpas, 1978) and children with conduct disorder (Johnson et al, 1968) suggested running programmes improve, among other things, self concept and social adjustment, as well as a greater response to psychotherapy. Shipman (1984) describes the results of five case studies with children and adolescents who had a variety of emotional and behaviour problems on admission to a residential treatment centre. Unfortunately

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it is only possible to infer the outcome measures from these studies as Shipman used a variety of indicators to establish the efficacy of the exercise intervention. He reported that participation in organised running programmes of more than 30 minutes duration improved social interaction with the peer group and resulted in changes in medication.

There appears to be only one case controlled study investigating the psychological benefits of exercise. MacMahon and Gross (1988) compared two exercise programmes of differing aerobic intensity among a sample of delinquent males aged 14 to 18 years. One of the psychological associations of delinquency is a tendency toward depression and low self-esteem (MacMahon, 1990). In this study 39 male delinquents were assigned to an intensive distance running programme three times per week for three months. A comparison group was involved in a similar programme but with less intense activity. The study reported that, using the Beck Depression Inventory as an outcome measure of depression, the subjects involved in the intensive exercise programme had significantly lower scores on the BDI than a comparison group.

(iii) Studies of the effect of exercise on mood using selected community samples

There have been a number of experimental studies that report improved mood among subjects who have participated in exercise programmes over a period of weeks or months (Folkins et al 1972; Moses et al 1989; Reuter et al 1984; Steptoe et al 1989) and some studies that fail to find this effect (Morgan et al 1970). One reason for these mixed findings has been that with the exception of Moses et al (op cit.) and Steptoe et al (op cit.), all had significant methodological limitations. The studies by Moses and Steptoe are particularly interesting as they attempted to determine not only whether exercise was significantly associated with changes in mood but also the dose-response relationship between the intensity of exercise and changes in mood state. The sample for these studies comprised 94 sedentary volunteers who were randomly assigned to one of four 'treatment' groups. Two aerobic programmes, high exercise and moderate exercise, were based on walking or jogging with one supervised and three unsupervised session per week. A third group acted as an attention-placebo and were involved in a programme of mobility and stretching exercises. The remainder were assigned to a waiting list group. Mood, anxiety and

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depression, were measured using the Hospital Anxiety and Depression scale (Zigmond & Snaith, 1983). When the psychological data were analysed, it turned out that only the moderate aerobic exercise group showed any positive effects. These data have important implications for this thesis as they suggest there is a dose-response relationship between exercise and elevations in mood.

(iv) Epidemiological studies

There have been few epidemiological studies examining the association between exercise and mental health. Some have reported strong evidence for a link between exercise and mood. These studies have been criticised because of their cross sectional research design which has allowed for the interpretation that depression leads to a lack of exercise, rather than the reverse (Camacho et al, 1991; Farmer, 1988).

Only two prospective epidemiological studies appear to have studied the relationship between activity levels and risk of depression: the National Health and Nutrition Examination Study NHANES (Farmer et al, op cit.) and the Alameda County study (Camacho et al op cit.). Both were large scale prospective studies. In both, physical activity and the number of depressive symptoms were measured using self report questionnaires. The results, although somewhat equivocal, suggest physical activity is a protective factor in depression. The NHANES study recruited 1,900 healthy subjects aged between 25 and 77 years. The results indicated that baseline physical activity was an independent predictor of depression levels 8 years later for white women who were not depressed at baseline, with adjustment for age, education, employment and income. For women with little or no physical activity the adjusted odds ratio of depressive symptoms at follow-up was approximately two. There was no significant effect for the non depressed white males in the sample.

A subsequent study by Camacho et al (1991) using 6,928 subjects aged over 20 years reported more far reaching results. The sample was followed up over a period of 18 years. At baseline (1965) respondents with low activity levels were approximately four times more likely to be depressed than individuals reporting high levels of physical activity (odds ratio of 4.22). A longitudinal analysis of the relative risks of depression at follow-up 9 years later, adjusted for age, social class,

lifestyle, health and social support, identified the risk of depression associated with low activity levels to be 1.76 (95 per cent confidence interval 1.06 - 2.92) for men and 1.70 (95 per cent confidence interval 1.06 - 2.70) for women. Both these results were statistically significant (p = .003). A final series of statistics reported the results of a change in activity level between baseline and follow-up in 1974, as a predictor of depression between 1974 and the final data collection point in 1983. Individuals with chronically low activity levels and those who had decreased from high to low were both at considerably greater risk of subsequent depression compared with those who had high levels of activity at both time periods. However, the risk for individuals who had increased their activity levels between baseline and follow-up in 1974 was not significantly different from that of the high activity group. These data suggest that changing activity level can alter the risk of subsequent depression.

There are many limitations with both of the above studies particularly concerning the assessment of activity levels. Self assessed physical activity is notoriously imprecise as different people have very different interpretations as to what constitutes exercise. Moreover the authors admit that the reliability and validity of their measures are unknown. However despite these problems they do provide some evidence that there is a positive mental health benefit associated with increased levels of physical exercise.

Community studies with children and adolescents

There have been no comparable studies using samples of children or adolescents from the general population. There are however several investigations which provide indirect evidence to support the protective influence of participation in sport and exercise (Goodyer, 1990; Jenkins and Smith, 1990; Mechanic and Hansell, 1987).

An investigation into factors which were protective to children living in disharmonious homes found that whilst participating in a hobby did not protect them, receiving positive recognition for the activity was protective (Jenkins and Smith 1990). Domains of positive recognition included winning a sports competition and being chosen for the school football team. Similarly Goodyer (1990) reported evidence for an indirect effect of a lack of social achievement - including

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success in sport - on depression in children. One of the few studies to monitor the effect of sports and exercise on mood directly was conducted by Mechanic and Hansell (1987) using a sample of over 1,000 adolescents. Using the CES-D as their measure of depression the study established that scores on the CES-D were inversely related with participation in sport ($r = -.19$; $p < .05$). Higher levels of achievement was also associated with less depressed mood ($-.17$; $p < .05$).

EPIDEMIOLOGY OF INTENSIVE TRAINING

The intensity of an athlete's training regime is usually determined by the number of hours he or she trains per week. This figure varies depending upon the child's age, stage of biological maturity and the training requirements of the particular activity. For example, an 8-year old gymnast aiming to compete at either national or international level would be expected to train for between 10 and 15 hours per week - a swimmer or tennis player would not reach these levels until between 10 - 12 years of age. These figures then rise dramatically during early adolescence when athletes will spend up to 28 hours a week training (Rowley, 1987). (These figures do not include the time spent travelling to and from the training facility).

Precise estimates as to the numbers of children taking part in these intensive training routines are difficult to establish, as there are no reliable statistical records. Interpolations based upon figures collected in the mid-1980's (Campbell, 1984) suggest that about 80% of all children between the ages of 5 and 15 years were likely to have participated in some type of organised youth sport . Of this estimate only about 11% would have been involved in intensive training routines, the majority of children having a more recreational or casual involvement.

Since this time it is likely the numbers of children who devote many hours to intensive training will have increased. Evidence for this increased participation is based upon the greater availablity of facilities and the higher standards of coaching, training and competition for the young.

Demographic variables and intensive training

Despite the availability of higher standards of coaching, training and competition for the young, the opportunity to participate in intensive training is still determined by a number of social and environmental factors. These include the gender of a child, social class background, race, and the geographical location of the home (McPherson, 1982). These variables explain to some degree why children who may be physically and psychologically similar do or do not become involved in intensive sports training.

Gender

Because of socially bound behavioural expectations, intensive sports participation remains positively associated with the male sex role (Duquin, 1978). Consequently, although the male's involvement in competitive sport is associated with masculinity and conformity with gender role, the female who is physically talented may be seen as losing her femininity through her sports involvement and manifesting gender abnormality (Anthrop & Allison, 1983). Female participation is still channelled into certain 'feminine' sports such as gymnastics and figure skating which display the body in graceful balletic movements. The swimmer or tennis player may be faced with the dilemma that she must satisfy her achievement needs in high level sport whilst meeting the societal expectations of the feminine role. The mutual contradiction of these dual roles can be a cause of emotional strain (Del Ray, 1978), particularly when, as Anthrop & Allison (1983) have suggested, there is a lack of emotional support, recognition or reward for the female's persistence or success. This situation can be made more difficult for very young athletes when the incentives and social supports present before puberty are withdrawn in adolescence. Because of these constraints many women in sport remain under-achievers or drop out of sports altogether during early adolescence or young adulthood.

Social Class

Many studies have shown that social class has a considerable effect upon participation in intensive training (Macintosh, 1982). Most conclude that lower social

classes are under-represented. Unfortunately, many of these studies have only examined the class background of successful adult athletes. However, Luschen's (1969) study of youth sports clubs and Macintosh's (1982) analysis of successful Canadian school athletes found that participants more often came from professional than from lower social class families. It has been suggested that working class children are less likely to make 'constructive' use of available leisure time since there is less encouragement at home to do so (Scarlett, 1975). This may affect the opportunity for physically able youngsters from lower social classes to take part in intensive sports participation.

Geographical Area

Studies by Knopp (1972) and Sofranko and Nolan (1972) suggest that an individual's place of residence has a significant influence on intensive sports participation. If the child lives in an isolated rural area, certain activities may be precluded either because of the lack of facilities or the problems caused by having to travel long distances to train. Consequently despite their natural ability children born in a particular geographical location may never have the opportunity to develop their sports potential.

Race and religion

Social categories such as race and religion may also influence participation in intensive training routines by virtue of the behaviour, values, beliefs and norms found within specific subcultures (McPherson 1982). No systematic analysis of the sports participation of selected ethnic, religious or racial groups has been undertaken. There is some evidence to suggest that specific racial groups gravitate towards specific sports. Eitzen and Sanford (1975); Loy (1969) and Scully (1974) have all reported that blacks are under-represented in certain sports and that in these sports they do not receive the same opportunities or encouragement to participate.

CURRENT CONCERNS

There is a widely held, although unsubstantiated belief, that in order to achieve performance success at senior level, training and competition should begin before puberty. As a consequence intensive training of pre-pubertal and pubescent children has become more systematised, more sophisticated, and more demanding both in terms of time and effort (Rowley 1987).

The possible adverse effects of intensive training upon the physical and psychological development of the young athlete have become of increasing concern to those involved in youth sport. Anecdotal reports of overuse injuries to bones and joints, impaired growth, and physical as well as psychological 'burn-out' have alerted many parents, coaches and sports scientists to the possible detrimental effects which prolonged intensive training may have upon a child's health. Equally, concern has been expressed that if parents discourage their children from participating in some form of sport, a sedentary lifestyle may lead to its own form of health problem in the future. However, intensive sports participation and success in competitive sports may well be protective against the development of later physical illness as well as emotional and behavioural disorders. Further information is needed on this possibility.

It is only recently that research has addressed these issues and in so doing has begun to document the extent of any adverse effects. Although many findings have proved inconclusive because of conceptual and methodological problems, many investigators still express a "gut feeling" that the current emphasis upon intensive involvement in youth sport is in some way harmful to the young athlete. The Council of Europe (1982) recommended that specialisation in sport before 12 years of age was not advisable whilst there is a lack of information on the biological consequences for the child's growth and development.

A review of the research literature indicates particular areas of physical and emotional vulnerability for the young athlete (Rowley, 1986). These include sports related health problems, injuries and emotional disorders.

Sports related health and injury problems

Concern has been expressed that participation in intensive training may increase the risk of injury. Because of the vulnerability of the young athlete's immature skeleton, sports injuries tend to affect the growing skeleton as well as soft tissue (Williams, 1981). Investigators have suggested that this could result in permanent damage to bones and joints (Larson & McMahon, 1966). The main cause of this type of injury has been attributed to overuse.

Little is known about the effects of intensive training on the young athlete's general health status. Much of the current concern is based on specific problems such as the incidence of ear, nose and throat infections in swimmers, and low back pain and muscular stiffness in gymnasts (Rowley, 1986). Studies have suggested that physical fatigue caused by training and competition may temporarily reduce the athlete's resistance to disease (Linde, 1987). Acute illnesses which may be caused by sports participation include fever, upper and lower respiratory tract infections, infectious mononucleosis (glandular fever) and skin disorders. It has been suggested that loss of form frequently ascribed to either over-training or psychological factors, could be due to viral illnesses that are subclinical in the normal population but may affect the maximum performance of athletes (Roberts, 1985).

The recent increase in the number of female participants has stimulated considerable interest in the effect of intensive training on the onset of menstruation (menarche). These studies suggest that for many sports menarche occurs later in intensively training athletes than the general population (Malina, 1983). Concern is now being expressed as to the psychological implications that delay in menarche and menstrual dysfunction could have upon the athlete's body image and notions of femininity.

Psychological and psycho social effects

Little empirical work has been done to determine the effect intensive training may have upon the psychological and psycho-social development of the young athlete. Most of the available literature has concentrated upon establishing either the

psychological determinants of competitive success, or the effect of competition on the developing child. The most frequent concerns have centred upon the effect prolonged competitive stress and anxiety may have upon the athlete's emotional well-being (Martens & Simon 1976; Smith & Smoll 1982); the influence of the over-zealous or intrusive parent (Ogilvie, 1979); the possible role of youth sport in increasing rates of aggressive behaviour (Sherif & Sherif 1953); and the effect intensive training has on educational attainment (Rowley, 1987).

Concern has also been expressed (Rowley, 1986) that the time spent training and competing may prevent the child from either making or retaining lasting friendships as they are unable to share in the common activities of the peer group; a factor which could influence popularity and status. More recent studies have monitored the effect sports participation has on the family (Telama & Vanhalakka-Ruoho, 1981). These suggest fundamental changes in family life - changes in mealtimes, financial sacrifices, and increasing commitment of time.

PREVIOUS RESEARCH ON PSYCHOLOGICAL EFFECTS ON CHILDREN OF INTENSE SPORTS TRAINING

In general little is known about the psychological effect of early involvement in sport as it is only recently that psychological researchers have begun to take the study of childrens' sport seriously. Much of the early work has been criticised for its emphasis upon laboratory experimentation (Martens, 1978); failing to take developmental processes into account (Weiss & Bredemeir, 1983); and treating the child as a mini-adult (Gould, 1982).

In addition many studies have proved inconclusive because of problems with the design of the research. These include the use of selected samples, failure to investigate concerns of practical significance; difficulties defining 'intensive training'; using samples too small to draw any general conclusions; and reliance on single event, or cross-sectional research methodology where it is not possible to separate the effects of training from those of advancing maturation. Many investigators have failed to discriminate between the training demands of different sports, or account for either developmental or sex differences. It is difficult, therefore, to determine the

sports-specific nature of any positive or negative effect, or whether males or females are more vulnerable or resilient.

However, perhaps the most fundamental problem regarding previous research into youth sport has been the concentration upon effects of competition, rather than the process (training) that enables the young athlete to compete. It seems unwise to ignore the effects of training when, because of its frequency and duration, it is more likely that an athlete will be harmed by training than competition. It is rare for an athlete to be injured during a competitive event, particularly in non-contact sports (Garrick and Requa 1978). Similarly, the training situation has a considerable influence upon both the young athlete and his or her parents as they are exposed to a modelling and learning environment which shapes behaviour in both sporting and non-sporting situations.

Age related vulnerabilities

Because of the nature of their involvement in youth sport both male and female athletes are exposed to particular age related vulnerabilities which may increase the risk of experiencing depression. Those with unusual physical talent share with other gifted children the need for early identification and continual development and support if potential is to be reached. What does differentiate the physically able from children with abilities more commonly associated with giftedness, such as musical or intellectual excellence, is the relatively small window of opportunity available to achieve their potential. In many sports, athletes have to cram a lifetime's achievement into a relatively short period of time. It is not surprising, therefore, that in sports such as gymnastics, swimming or tennis, youngsters of 12 or 13 years may have already trained and competed for five or six years. Generally speaking these athletes can expect a further two or three years at the top before reduction in motivation, injury and of course the ageing process cause a decline in their ability. For these children the consequences of retirement may be considerable.

Retirement

Until recently, research aimed at increasing our understanding of the reasons why young people give up or retire from sport has been relatively sparse. Although

the last decade has seen an increase in the amount of research directed towards athletes' experiences of retirement, the focus has tended towards the transition from professional sport to a second career, or concentrates on those who have competed at international level. There is less information available on young athletes' experience of retirement.

Concern in the United States over high attrition rates from youth sports programmes prompted studies into why so many young people were dropping out of sport (Weiss & Petlichkoff, 1989). These early studies report that the majority of children cited negative experiences such as an emphasis on competition or an over-emphasis on winning as reasons why they discontinued their involvement (Orlick, 1973). More recent studies have found different reasons. *"Having other things to do"*, *"boredom"*, and *"conflict of interests"* have been the predominant reasons given (McPherson et al, 1980). These results do not support the more popular belief that many young athletes decide to discontinue their involvement due to excessive pressure. Other studies have concentrated on the outcome of retirement suggesting that retired athletes feel neglected and abandoned and that their new status has lowered their self esteem (Hill & Lowe, 1974).

An important issue which may influence the reasons for withdrawal is the level of intensity of sports involvement. Little research has addressed possible differences in participation and attrition motives amongst children and adolescents involved in elite, competitive and recreational sport (Weiss & Petlichkoff, 1983).

To date studies have concentrated more on the reasons for joining and leaving youth sport. They have not looked in any detail at the period of transition young athletes must negotiate after having made the decision to withdraw. Whilst the transition period has been central to research for the professional athlete, it does not seem to have attracted very much attention with respect to the younger competitor. Because of the emphasis upon understanding the motives for participation and attrition, it is difficult to evaluate how realistic current concerns about the problems associated with withdrawal actually are.

Menarche is the term applied to the beginning of menstrual function. There has been a secular trend in Western Europe in the mean age at which girls attain menarche, from approximately 16 - 17 years in the 1800's to the contemporary figure of between 12 years. 6 months and 13 years of age (Cagas and Riley, 1970; Ellison, 1981; Tanner, 1975). Studies of twins (monozygotic and dizygotic), and of mothers and daughters indicate a significant genetic component in the timing of menarche (Malina et al, 1993), although demographic and environmental sources of variation in the timing of this maturational event are also significant. Such influences include nutritional status, family size (Roberts et al, 1967;1971), socio-economic class (Bojlen et al 1971), emotional states (Dalton, 1968) and seasonal differences (Billewicz et al, 1981). In recent years intensive training has also become an accepted addition to defined causes of delayed menarche (Frisch et al, 1981; Malina, 1983; Malina et al, 1973). High levels of athletic performance have also been found to arrest the normal menstrual cycle in older female athletes (secondary amenorrhea), and impair luteal functioning (Jacobs, 1982; Shangold et al, 1979).

Menarche in the young athlete

On the basis of his comprehensive review of the available research literature, Malina (1983) concludes that on average menarche occurs later in athletes than in the general population. Sports studied included track, field and long distance running (Feicht and Johnson, 1978; Foster et al, 1982; Malina et al, 1973), gymnastics (Novak et al, 1973; 1976; Sprynarova & Parizkova, 1969) and volleyball (Sidhu & Grewal, 1980). With few exceptions the findings are consistent across several countries. Only swimmers have been found to be an exception to the tendency toward later menarche (Astrand et al, 1963; Malina, 1983). The data also suggest an association between menarche and performance, such that athletes at the more advanced competitive levels have a later menarcheal age than those at lower levels.

However, research which has analysed the relationship between intensive training and delayed menarche is limited, and in general investigators have not

controlled for other demographic or environmental factors which could have a significant effect upon the age at which menstruation begins. Suggestions as to the role of intensive training are based upon observations that menarche occurs later in athletes, and later in those who began training prior to menarche than in those who began training after menarche (Malina, 1983). However, the relationship between later menarche and pre-pubescent training is largely speculative. It is unclear whether late puberty in athletes is due to some aspect of intensive training and exercise, or whether there is a selection factor operating, which means that children who enter intensive training are selectively likely to mature later (Stager et al, 1990). A recent UK study by Baxter-Jones et al (1994) using 222 intensively trained gymnasts, swimmers and tennis players from the sample that forms the subject of this thesis, found evidence to suggest menarche was intrinsically late rather than delayed by training. The authors suggest that rather than being a consequence of intensive training, late maturation is a selection factor associated with performance success at least in some sports such as gymnastics. More information is needed on this possibility.

The delay in menarche, although having no significant deleterious effect upon the child's health, could have an adverse influence upon the athlete's perceptions of her sexual development and feelings of personal adequacy. It is not known how female athletes perceive their delay in menstruation in regard to their femininity, or whether this is a significant risk factor for emotional problems such as depression. Similarly, as menarche is significantly associated with other maturational factors such as breast development and the beginning of a more 'feminine' body shape, how does the retention of pre-pubescent physique influence peer group status and acceptance? Brooks-Gunn & Ruble (1983) argue that reaching menarche later than most peers can result in feelings of unattractiveness and low self worth because of the insecurity about being 'out-of-step' with the peer group, and makes the experience of the onset of menstruation more negative than it is for the average maturing girl. Whether the rewards associated with success in sport compensate for the delay in biological maturity has yet to be established.

Family process and sports participation

It has been suggested that the most important influence on a young person's capacity to be successful in sport is the home environment (Ericsson et al, 1990).

Parents with an active interest in sport will naturally expose their children to various activities at an early age as part of family leisure time (Bloom, 1985b). It has been suggested that at least one of the parents of elite performers is often interested and active in the same or a similar area (Bloom op cit.; Fowler 1969). Further studies have shown that the family provides the main motivation for a child's participation in some sports (Carl 1984; Rowley 1992).

Generally psychologists have paid little attention to the effect intensive training may have upon family process (Rowley 1987). Yet training involves considerable investment of time and commitment not only from the young athlete but from the whole family, as parents become involved in various supporting roles. These include changes in mealtimes, transportation to and from the training facility and supplying financial assistance to the extent that it may affect the availability of money for other domestic needs. Such is the extent of the parents' involvement that it may have implications for marital disharmony - frequent absences from the home and a cessation of social life can magnify areas of dissatisfaction and increase the number of arguments between partners. (Rowley, 1987).

Family process and emotional problems in youth sport

Critics of youth sport have proposed that children are not developmentally prepared to cope with the emotional pressures of the sports environment (Brower 1978; Roberts 1975). However as Freeman (1983) suggests, this is not a matter for children to cope with on their own, since expectations are largely social in origin, coming from the parent, coach or peer group. Research has yet to examine however, the effects of parental behaviours on the incidence of mood disorders. Anecdotal evidence suggests such a relationship but questions still remain (Passer 1982).

It is proposed that when adults become involved in youth sport they have a tendency to place unreasonable demands on the young athlete, pursuing ambitions of their own and placing an excessive emphasis on winning (Ogilvie, 1979; Sage, 1978). This can result in some young athletes developing unrealistic aspirations and commitment to training as feelings of personal worth become equated with performance success (Rowley 1987). The emotional stress associated with this situation has been reported to cause psychosomatic complaints (Lask 1986), loss of

appetite (Smith & Smoll 1982) and nervous exhaustion (Cratty 1978). In its extreme form this may result in some children developing injuries where no physical basis can be found. This allows them a socially acceptable form of retreat from physical activities that are construed as socially, psychologically or physically threatening (Yaffe 1983). The stability of the family may also affect the health and well being of the young athlete. Previous research indicates that young players who had experienced life events or long-term difficulties - such as family instability due to parental illness, separation, divorce or death - were more likely to sustain a significant injury (Coddington & Troxell, 1980). However it is possible that when a child is under stress in competitive sport, either through routine of intensive training or competition, the experience may well be protective against the development of emotional and behavioural disorders. Further information is needed on this possibility.

Sport and the family life cycle

Sport has a dynamic, continuing effect on family life. The main challenge to the family system comes from having to adapt to the increasing financial, physical and emotional demands of the child's increasing sports participation. It is unlikely that the level of commitment required from parents will be the same for an 8 year old as it is for an adolescent athlete training 20 hours a week. For example, when a child first starts sport the demands upon parents are modest. However, as the child increases his or her involvement, parents have to give up more and more of their time, effort and money. This transition has been reported as having a significant effect upon family life as parents have to go without holidays, or forgo home improvements in order to support the young athletes sports involvement (Rowley, 1992a). It is at this stage that success or failure can affect the whole family. As children mature, parents may begin to disengage as their children take on more responsibility for directing their own sports involvement. More mature children can take themselves to the training facility, so freeing the parents from this considerable supporting role. The final stage of the life cycle concerns the period when a young athlete wishes to retire or change his or her involvement.

How the family copes with the transition period associated with each stage may have a significant effect upon family functioning and the psychological well-being of the child.

The relationship between sports participation and educational attainment has been of considerable interest to social scientists and educators (Macintosh, 1982). Most studies have concentrated upon the effects of children's participation in school sports, rather than those involved in training and competition outside the educational environment. It is only possible to speculate, therefore, as to the effect intensive training may have upon educational attainment. For example, anecdotally young swimmers and gymnasts engaged in intensive training routines have described difficulty concentrating at school due to tiredness, with homework being completed late at night or early in the morning (Rowley, 1987). Whether this routine has any adverse effect upon examination results has yet to be established. It is generally accepted that participants in school sports tend to produce better academic results than non-participants, and have higher educational aspirations (Schaffer & Armer, 1968; Schaffer & Renberg, 1970; Spreitzer & Pugh, 1973). However, some investigators have reported that although school athletes had higher educational aspirations they did not attain higher academic results (Macintosh, 1982).

The research evidence so far is questionable as most studies have failed to take into account the effect of variables such as social class and sex. This is important as a number of researchers have shown the influence of social class and the sex of the child on pupils' attitudes to school and educational attainment (Deem, 1978; Hendry & McKenzie (1978); Ryrie (1981); Whyld 1983).

Where research has attempted to control for the effect of social class, the results indicate that higher levels of educational achievement associated with sports participation are more marked in working class, than in middle or upper class children (Bend, 1968; Schaffer & Armer, 1968). The Trois Rivieres Canadian study monitored the contribution of added physical activity to the academic achievement of children throughout primary school (Shephard, 1984). The results indicated that active students received significantly higher marks than children not exposed to extra physical activity, although it has been suggested that, as the marks were assigned by the classroom teachers, the higher grades could be due to favouritism.

It is possible the young athlete may perceive educational attainment as another achievement domain and be highly motivated to succeed in this, as well as in competitive sport. Although there appears to be some evidence to suggest a positive relationship between sports participation and educational attainment, few studies have attempted to determine why this should be so. On the basis of the findings, it is only possible to speculate about the effect intensive training may have upon educational attainment. Previously published data from the present study suggests that the pressures of schoolwork may be a significant factor in why young athletes retire or change their involvement (Rowley, 1992c). Some sporting organisations, like the Lawn Tennis Association and the Football Association, have made considerable efforts to withdraw their elite young athletes from the state school system by providing tennis and football schools, so that training complements rather than antagonises the educational process.

Depression, high achievement and intensive training

Despite the popular stereotype of the intellectually gifted or high achieving child as being moody, temperamental or generally unhappy, most studies have found them to be more emotionally robust than their non-gifted contemporaries (Freeman, 1995; Janos & Robinson, 1985; Luthar, Zigler & Goldstein, 1992). For example, in a comparative study Knepper et al (1983) found gifted 11 year olds to have significantly better interpersonal and intrapersonal skills than a group of age matched 'average' children. Similarly Khoury and Appel (1977) concluded from a review of the available research literature that gifted adolescents were more emotionally resilient.

Most of these studies have been conducted with children and adolescents who excelled in 'traditional' areas of achievement, such as mathematics or academic studies generally, art and music. There is much less information on the physically talented. Despite this paucity of knowledge there has been considerable concern that young athletes are more at risk of depressive disorder.

Gifted athletes probably share some of the same or similar areas of vulnerability - educational pressures, stress from over-zealous and intrusive

parents, as well as possible isolation from peers. But there are also significant differences between the two. The first difference concerns the window of opportunity within which to actualise talent. Peak sports performance is most frequently observed between the age of 18 and 24, whereas major scientific discoveries and artistic creations, other than mathematical and musical achievement most frequently occur at a much later age - usually at or around the age of 40 years (Ericsson, 1990). In order for young athletes to actualise their talents within this relatively short time frame the intensity of sports training is often greatest during the early developmental periods - for example during puberty or mid to late adolescence. Secondly young athletes engage in intensive training for a specific purpose - performance success - rather than for educational, recreational or artistic purposes. Consequently, considerable pressure may be experienced due to the social comparison process of competition. Finally, the practice or training demand of youth sport differs from other areas of high achievement in terms of the considerable physical stress caused by prolonged bouts of intensive training, which may act as a risk factor for depression in this group.

Given these differences it might be that gifted sports children are less emotionally resilient. Alternatively, the pattern of training and frequent competition may increase resilience through enhancing the young athletes coping skills by a process of stress inoculation or desensitisation (Meichenbaum, 1979). It is possible that physical activity per se may exert a protective function in this group as found in the community studies described above. Unfortunately studies of depression and intensive training in children are very limited. What research does exist can be divided into two broad categories. The first concerns studies which have looked at the dose-response relationship between intensive training and depression; the second, studies which have attempted to establish whether athletes are more or less vulnerable to depressive disorder.

Studies of intensive training

Studies using older competitors in swimming, speed skating, rowing and long distance running have indicated that mood states are sensitive to alterations in physical training (O'Conner, Morgan et al, 1989; Morgan, Costill et al, 1988). However, unlike research using clinical or community based samples, studies using

intensively training athletes have found that high levels of physical activity are associated with depressed mood (Morgan et al 1987; 1988; Raglin et al 1991). The negative shift in mood has been found to exhibit a dose-response relationship.

The most comprehensive series of studies to examine this relationship was conducted by Morgan et al (1987) who monitored the effects of intensive training on the mood states of 200 male and 200 female college swimmers over a ten year period. Morgan and his colleagues used the Profile of Mood States (POMS) (McNair et al, 1971) to measure fluctuations in mood over the competitive swimming season. The average training load for male and female swimmers taking part in the study was 2,600 yards and 3,500 yards respectively at the start of the season in September. This reached a maximum of 10,750 for males and 11,000 yards for female swimmers during the peak of the season in January, before dropping to approximately 5,000 for both sexes in February, the close of the competitive season. A comparison of mood states taken in September, at the start of the season, with those obtained during the January training period revealed a significant increase in depression as measured by POMS ($p > 0.01$). Many of these swimmers were involved in overtraining, a period characterised by prolonged periods of particularly intense bouts of exercise. Previous studies have also identified depression to be a product of overtraining and many of the symptoms of athletes monitored during this period have been found to be similar to those seen in primary or endogenous depression (Akiskal & McKinney, 1975), such as physiological and psychomotor retardation, chronic fatigue, depressed appetite, insomnia and elevated depression and tension. Morgan and his colleagues reported that mood disturbances fell to baseline levels with the reduction of the training load. A more recent study conducted by Raglin et al (1991), again using college swimmers, found similar results. As the distance swum increased, a corresponding elevation in mood disturbance occurred - as measured by POMS - the mood scores improved when the volume of training was reduced. Unfortunately, no comparable studies of this kind have been conducted with younger athletes (Morgan, 1994).

In an attempt to explain the mechanism responsible for this dose-response relationship O'Conner et al (1989) measured levels of salivary cortisol in intensively training swimmers. He found that swimmers exposed to intensive training exhibited significant elevations in depression and cortisol when compared to a group of active controls who did not train. O'Conner (op cit.) proposed that mood disturbance due to

over training may be a consequence of hypothalamic-pituitary-adrenal (HPA) dysregulation.

Depressive disorder amongst talented young athletes

There are very few studies of depressive disorder amongst young athletes which have used interview or self test measures based upon DSM-IIIR criteria. One particularly interesting study was conducted by Luthar, Zigler and Goldstein (1992). The authors were interested to determine the role of cognitive-developmental and experiential factors in 51 intellectually gifted adolescents aged between 12 and 15 years. These students were compared with three other groups: a group of older adolescents (mean age 19 years) matched on cognitive maturity, and two additional groups matched on chronological age. One consisted of 39 talented athletes and the other a group of 'normal' children.

All participants completed the 'Children's Depression Inventory' (Kovacs, 1982b). The results indicated the athlete group had significantly lower depression scores than any of the other groups, including the gifted group ($F = 5.22$, $p > .05$). Moreover female athletes had lower depression scores than male athletes - mean = 5.50 SD 3.24 for females and 6.00 SD 5.38 for males. Unfortunately the authors do not report the full distribution of scores so it is not possible to determine how many adolescents from each of the four groups may have been a 'case'. In addition no information is given on the intensity of training or level of achievement in the sports group, both factors which may have explained, at least partially, why the athletes appeared to be less at risk of depressive disorder.

It was to fill some of the knowledge gaps revealed by this review of the literature that the present study was undertaken, and the aims and objectives of the study and the research methodology will now be described.

Chapter 3

AIMS AND HYPOTHESES OF THE THESIS

INTRODUCTION

The objectives of the thesis have been sub-divided into population based research questions, which consider differences between the athlete and non-athlete groups, and sports specific questions, which address the life experience of the young athletes only.

AIMS AND HYPOTHESES

Population based research questions

The first aim was to determine whether there were significant differences between the athlete and comparison populations in depressive symptomatology, self esteem and family process when the following methodological conditions were met: (a) the samples comprised representative groups of athletes and non-athletes (b) ratings of depression, family functioning and self esteem were based on existing valid measures, and (c) potentially confounding factors could be controlled for.

Based upon this area of enquiry it was hypothesised that there would be no significant difference overall between the young athletes and comparison populations in depressive symptomatology - lower depression scores in those training rather little, being balanced by higher depression scores among those training more intensively. Related to this expectation were a number of subsidiary expectations based upon previous findings in the research literature:

i. that male athletes and males from the comparison population would have lower depression scores than their female counterparts.
ii. that there would be a significant positive association between depression and age for both groups.

The second aim was to identify factors which may protect children from depressive disorder. I aimed to examine the role family process variables and self worth may have in the development of depressive disorder.

The third aim of the study was to determine the short-term stability of the cross-sectional findings.

Sports specific questions

Sports specific questions first involved the relationship between intensive training and mood. It was hypothesised that athletes involved in excessive training routines would be more at risk of depression than those with a more modest involvement. The second area of interest focused on the emotional sequelae of parental involvement in sport. It was anticipated that there would be a significant relationship between the level of parental expectation and depressive symptomatology. The third area of investigation related to establishing whether retirement from intensive training would be associated with changes in depressive symptomatology.

Chapter 4

DESCRIPTION OF THE RESEARCH METHOD

INTRODUCTION

This chapter reviews the research methods. The first section describes the reasons for sample selection and the importance of the longitudinal method in evaluating the effect intensive training has upon different developmental periods. The second section reviews the procedure for recruiting the sample and describes the number of children recruited; the third provides an overview of the survey timetable; and the final section discusses the measurements used and the reasons for their selection.

DESIGN

As described in the introduction to the thesis, the data for this investigation are part of a general population survey designed to monitor the effect of intensive training on a sample of highly trained young athletes. The Training of Young Athletes (TOYA) Study was commissioned by the Sports Council in 1986 following growing concern about the negative effects of intensive training on children. Anecdotal reports of overuse injuries to bones and joints, impaired growth, and physical and emotional problems alerted many parents, coaches and sports scientists to the possible detrimental effects which prolonged intensive training may have upon a child's health, though little scientific evidence was available to validate these impressions. Although it was apparent that there were some shared features in terms of reported adverse effects, there were also reports of unique problems associated with the training and skill demands of different sports. Thus it was important to the success of such a study that a sufficiently diverse range of sports was included in the sample.

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The broad aim of the study was to establish the distribution, frequency and cause of the positive and negative effects of intensive training within four sports - football, gymnastics, swimming and tennis. The reasons for this selection of sports were that:

(i) They were all sports where training begins before puberty.

(ii) They were mostly sports which attract children of both sexes (although girl's soccer was not included).

(iii) Some baseline data and research literature already existed as to the type of adverse effect associated with each sport.

(iv) All had a large number of young athletes participating.

(v) They all had organised systems of intensive training and standardised age-groups for competition.

(vi) They were all sports in which concern had been expressed about the possible negative effects of intensive training.

More specifically the selection includes examples of a racquet sport (tennis), a contact team sport (football), a sport requiring local muscular endurance and stamina (swimming), and one characterised by flexibility and explosive strength (gymnastics). These distinctions are important, firstly because they represent different approaches to the training of young athletes which may have an effect upon their physical and psychological development. Secondly it was hoped that the generic nature of each sport - for example a racquet or contact team sport - would ensure that the results could be generalised to a wider population of young participants training for similar sports such as squash or rugby union football.

It was estimated that the research would take four and a half years to complete. This timetable included an initial six month period when parents and children were contacted. This was followed by a two year assessment period during

which the growth, health and psychological status of athletes and controls was monitored. The final year was used to analyse the data and write up reports.

The longitudinal method

The longitudinal method consists of measuring the same individuals at different intervals over a period of time (Janson 1981). The basic unit of analysis is the cohort, a sub population sharing common characteristics. In the case of the TOYA study this was exposure to intensive training. A longitudinal study may use one or several cohorts and monitor change occurring within this population over the research period.

In this study a linked longitudinal design was used to assess training effects. This included five birth cohorts aged approximately eight, ten, twelve, fourteen and sixteen years respectively at the time of the first visit in 1988. Using a linked design where children enter and leave the study at different ages it was possible to evaluate the effect intensive training has upon different developmental periods. This method has the following advantages:

1. It is possible to evaluate the effect intensive training has upon the different developmental periods using the shortest, and therefore most economical period of time.

2. When compared to single cohort studies this methodology is less affected by the problem of diminishing sample size caused by attrition. As each developmental period is represented by its own cohort the study does not have to rely on just one group passing through each successive stage of pubertal development. The linked design used by TOYA meant that after two of the three annual assessments children would cross into the age band of the cohort immediately older in age and so contribute to the sample size. Even with attrition each cohort should provide a large enough sample for statistical analysis.

3. In theory, the linked longitudinal design also makes it possible to examine cohort effects. In some longitudinal studies members of different cohorts are

exposed to different conditions which might affect their vulnerability to certain psychiatric disorders. In practice, the relatively short time-period of this study meant that examining cohort effects was unlikely to be fruitful.

Recruitment of Subjects

Initially the aim of the study was to recruit athletes based in the South East of England and drawn from within a 100 mile radius of London. National Coaches from the four sports pointed out that such a small catchment area would omit many potentially gifted youngsters attending centres of excellence throughout the Midlands and the North of England. There were questions, therefore, as to the representativeness of a sample of intensively trained young athletes drawn from the South East only. To avoid this problem the catchment area was expanded to enable the study to draw young athletes from within a 300 mile radius of London. The feasibility of this change was successfully piloted over several days by inviting parents and their children who attended a secondary school in Leeds to visit the Institute. The ensuing expansion of the catchment area avoided criticism of regional bias and improved the representativeness of the sample of children taking part.

The basic criteria for inclusion in the study were that:

- the athletes trained for a specific number of hours per week, and/or:

- they had performance success to a specified level or were regarded as having the potential to do so in the future.

Sampling

The age at which young children begin intensively training varies depending upon the requirements of each sport, and therefore the design of the study had to be sensitive to these sports-specific differences. Consequently, for the sample of gymnasts the youngest (born in 1979) entered the study at eight years of age, and the remainder were spaced at two year intervals up to, and including, 16 years of age. The sample of tennis players ranged from 8 to 16 years; swimming 10 to 16 years;

football 12 to 16 years. The proposed numbers of young athletes in each cohort is illustrated below.

Table 1: Proposed age distribution of TOYA sample

Birth Year	Football	Gymnastics	Swimming	Tennis	Controls
1971	30	30	30	40	40
1973	30	30	30	40	40
1975	30	30	30	40	40
1977		30	30	40	40
1979		30		20	40
Total	90	150	120	180	200

With the exception of football and gymnastics the sampling of the young athletes would be evenly distributed across gender. Many more girls than boys take part in gymnastics and the sample of $2/3$ girls and $1/3$ boys was thought to provide a better reflection of participation rates.

Classroom controls

Classroom controls were to be drawn by matching for age, sex, social class and ethnic group with those athletes living in the Greater London area, a sufficiently diverse area to avoid sampling bias. The total sample was to have equalled 740 children, 540 athletes and 200 controls.

PROCEDURE

As it was very important to the success of the study that the athletes chosen were representative of the young athlete population as a whole, much time was spent with the national and regional coaches from each of the four sports to obtain their co-operation. In some cases this involved lecturing at National Conferences, or

visiting clubs around the country to explain the purpose of the study in more detail. It was anticipated this would raise the profile of the study, improve the coaches willingness to participate, and educate coaches on the need for a representative sample of young athletes.

The first phase in recruiting young athletes was to get National coaches from the four sports to identify sports clubs which were either centres of excellence or which emphasised intensive training rather than recreational participation. The second phase consisted of head coaches at these clubs being contacted by letter. The letter described the study and selection criteria and, in addition, emphasised that to be eligible the children had to have the correct year of birth; 1971, 1973, 1975, 1977, or 1979[3]. The coaches were instructed to nominate all children who fulfilled these criteria. In many cases a follow-up telephone call was made to describe the study in more detail and answer queries about selection. During the third and final phase the parents of children selected were contacted by letter and invited to take part in the study. The consent form included details about parental occupation, the name and address of the child's school and the name and address of the child's current sports coach.

Sampling method:

To avoid any systematic or personal bias by coaches in their nominations of children affecting the validity of the study, samples for each sport, birth year and gender group were randomly selected. This was possible as, after receiving all the lists of eligible children for the study, there was a surplus over the planned group sizes. Since some of the children declined the invitation to take part in the study, the surplus could also be used to reselect more candidates.

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[3] Despite the insistence on specific year of birth many coaches would still include gifted athletes whose birth date did not correspond with the five age cohorts. These children were not included in the sample.

Acceptance rates:

The acceptance rates, based on 576 initial approaches, for each of the sports were:

Table 2: Acceptance rates for each of the four sports (%)

Football	Gymnastics	Swimming	Tennis
69	88	83	75

Reasons given by parents for not agreeing to their children taking part in the study were many and varied. Some of the most common included:

a. No time because of sport or school work. It was discovered that many of these children attended private schools and parents were unwilling for them to miss even one day.
b. Some parents, particularly of young children, declined our invitation as being "Too far to travel".
c. The child had given up sport or started work and therefore failed to fulfil the selection criteria.

A short questionnaire was sent to the children and parents who refused to take part asking for estimates of hours trained and parental occupation. It was proposed that comparing these data with data from families who had agreed to participate would determine whether there were any significant differences between the two populations. Unfortunately too few families responded to make a statistical comparison reliable.

Exclusion criteria:

Some athletes whose names had been supplied by coaches were found to be boarders living away from home. These were excluded from selection. There were several reasons for this. When other important variables such as age, gender and

sport were taken into account there were insufficient numbers in each residential subgroup for a meaningful statistical analysis; it was also felt that such a group was, by definition, exempt from many of the family-related hypotheses under question in the study by virtue of their prolonged absences away from home.

A summary of the procedure followed in recruiting children for the study is illustrated in the schedule chart overleaf.

THE TOYA SAMPLE: OBSERVED VERSUS EXPECTED NUMBERS

Despite the efforts of TOYA personnel and members of the Sports Council Research Unit to obtain lists of intensively training athletes from coaches throughout the country, the study was unable to recruit sufficient numbers of children for all the cohort groups in each sport. There were a number of reasons why this shortfall occurred. Part of the difficulty was caused by an apparent lack of time on the part of the coaches and administrators to provide names of eligible children - hastily prepared lists often contained insufficient information about the children, or provided the details of children whose date of birth fell in the wrong cohort years. Secondly, participation rates in some sports appeared very age-specific. For example there appeared to be few 16 year old swimmers or gymnasts competing at a high level; in addition the number of 16 year olds signed as apprentices by football clubs was a fraction of the numbers of 12 year olds participating in the sport. Based upon these age specific distributions there were probably not as many children taking part in intensive training as had first been thought. Until up-to-date registration is kept on participation rates it is not possible to establish with any degree of certainty the numbers of children taking part in most sports. Nevertheless it is thought that a reasonably representative sample of intensively training children was obtained for each sport.

A breakdown of the actual number of children recruited for the study by sport, cohort and gender group is illustrated in Table 3.

Schedule Chart for Recruitment of Sample

104
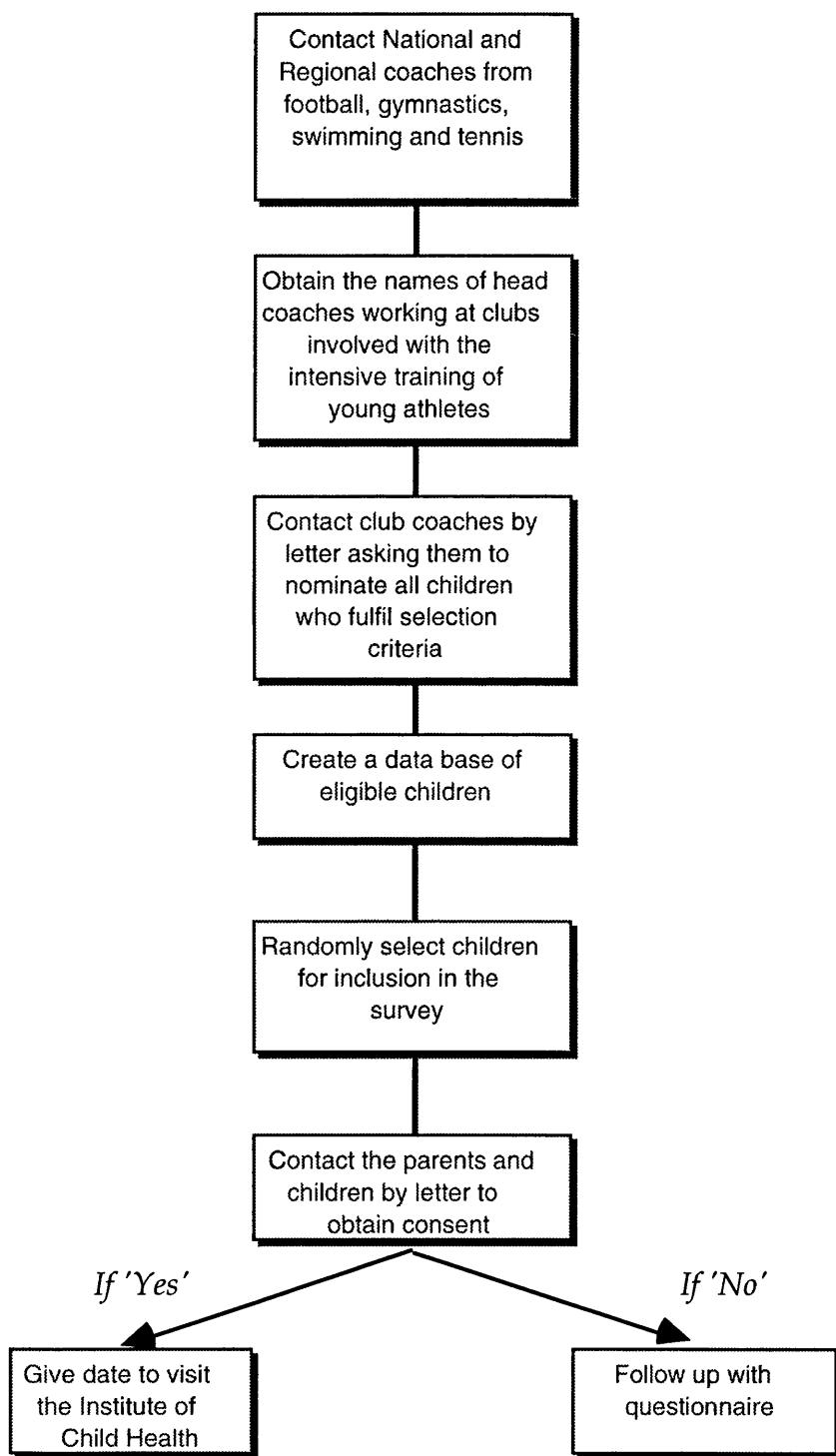
Table 3: Actual versus proposed numbers of young athletes by sport

Birth Year	Football Male	Gymnastics Male	Gymnastics Female	Swimming Male	Swimming Female	Tennis Male	Tennis Female
1971	12	7	13	10	14	12	14
1973	25	10	18	14	16	15	17
1975	28	10	18	15	15	18	19
1977		6	15	15	15	19	20
1979		5	17			10	11
Actual Total	65	38	81	54	60	74	81
Proposed Total	90	50	100	60	60	90	90

Total sample size **453** children

Discrepancies in the actual versus proposed sample size reduced the study population from 540 to 453.

Control group:

Several problems surrounded the recruitment of controls. These arose because of a failure to recruit classroom controls and the over-representation of the higher socio-economic groups amongst the athlete population (this finding is described in a later section).

In an attempt to recruit classroom controls, head teachers were contacted and asked to nominate children to take part in a separate study called 'Into Action'. This was described as a study of the health and fitness of young people. This failed because head teachers were generally unwilling to cooperate with the study. Concern was expressed that children would miss valuable school time when they made their annual visit to the Institute in London. The response rate was in the region of 32%. An alternative method, peer nomination was attempted. The children taking part in the study were contacted by letter and asked to nominate up to four friends who did not take part in sport. Reservations were expressed about this method as it was

suspected that friends of young athletes would tend to be involved in sport themselves, thus invalidating them as controls. Despite much time and effort following up this method, it too proved unsuccessful with a response rate of 38%.

The failure of these two approaches meant that it just was not possible to use a case-matched design. Next, I considered using a group-matched design containing children matched on certain salient characteristics to act as a criterion group from which certain comparisons can be made. The children in the control group would be representative across sex, type of school - primary, middle and secondary, state and private - and geographical location - rural and metropolitan/urban. Given the skewed distribution of social class - biased towards the higher socio-economic groups, the control population would reflect this trend.

It was decided that matching on these particular demographic characteristics would raise the problem of using as a control population a group which, because of its small size and socio-economic profile, could not be representative of the wider child population. This problem of not being able to generalise the findings to a wider population, together with the difficulties recruiting a control group, would have made it difficult to meet the original aims of the study. It was decided that in order to obtain the widest possible application of the results the study would include a comparison group which reflected the characteristics of the general population of children and their families.

Three schools were contacted and invited to take part in the study. All were situated in the North of England. One, Carleton High School, was an 11 - 16 year co-educational comprehensive school situated to the south of Wakefield. The others were a junior school - Manston St James' and a large comprehensive - John Smeaton High School. Both schools were situated in Leeds. All schools were chosen because of the large catchment area, thought by the head teachers to approximate a normal distribution of social class. Children attending these schools were targeted on the basis of specific academic year bands, and not the actual calendar year of birth.

Consequently children were included in the survey who were not born in the same cohort years as the athlete groups. I visited each school and distributed questionnaires to children in their classroom. This was done on only one occasion - there were no follow-up visits. The age and gender distribution of the comparison population is described in Table 4.

Table 4: Age and gender distribution of comparison population

Age group	Male	Female	Total
8 - 10	27	30	57
11 - 12	24	30	54
13 - 14	91	72	163
15 - 16	42	61	104
17 - 18	59	60	119
Total	**244**	**253**	**497**

Age distribution of the sample by visit

The mean age of the children at the start of the study in September 1988, and at each of their subsequent visits, is described in Table 5 and Table 6. The comparison group was measured on only one occasion so their value in the tables remains constant.

Table 5: mean age and standard deviation (S.D.) for male subjects by visit

	Visit 1		Visit 2		Visit 3	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Football	14.4	± 1.6	15.4	± 1.55	16.1	± 1.38
Gymnastics	13.6	± 2.6	14.6	± 2.59	15.5	± 2.48
Swimming	13.7	± 2.1	14.7	± 2.24	15.7	± 2.3
Tennis	13.1	± 2.4	13.9	± 2.44	14.8	± 2.25
Comparison group	14.2	± 2.4				

Table 6: mean age and standard deviation (S.D.) for female subjects by visit

	Visit 1		Visit 2		Visit 3	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Gymnastics	13.4	± 2.7	13.8	± 2.7	14.1	± 2.5
Swimming	14.0	± 2.2	14.9	± 2.2	15.9	± 2.1
Tennis	13.1	± 2.5	14.1	± 2.6	15.1	± 2.5
Comparison group	14.2	± 2.4				

Attrition

One of the major problems associated with the longitudinal method is attrition (Schulsinger et al, 1981; Kemper et al, 1983). A review of multidisciplinary longitudinal studies conducted since 1900 found attrition ranged between 14% and 82% (Kemper et al, op cit.). In the TOYA study there were three sources of attrition: those children who retired from sport, those who withdrew from the study, and those who were excluded because they were no longer intensively training. There were no children who missed one visit but attended the following year. Table 7 illustrates the status of the children over the three years of the study.

Table 7: Status of children at the end of the TOYA study

Retired	Withdrew	Excluded	Remained in Sample	Total
70	78	34	271	453
15.4%	17.2%	7.5%	59.8%	100

The total rate of attrition for each sport group is illustrated in Table 8.

Table 8: Attrition by sport (1 person missing)

	Football	Gymnastics	Swimming	Tennis
%	50.7	49.6	32	34.2
N	33	59	37	53

The numbers of children left at the end of year two, the completion of the assessment phase is illustrated in Table 9.

Table 9: Number of children who completed year three of the study

| | Football | Gymnastics | | Swimming | | Tennis | | |
| | Male | Male | Female | Male | Female | Male | Female | |
Birth Year	Male	Male	Female	Male	Female	Male	Female	Total
1971	2	4	3	5	8	7	6	35
1973	14	3	4	9	10	11	10	61
1975	16	5	12	11	11	15	12	82
1977		4	11	13	10	17	11	66
1979		2	12			7	6	27
Total	32	18	42	38	39	57	45	271
% of initial sample	(49%)	(47%)	(52%)	(70%)	(65%)	(77%)	(56%)	(60%)

Total 271

TIMETABLE

Children and their parents were invited to visit the Institute of Child Health, London, on three separate occasions, at yearly intervals. The visits took place between February 1988 and July 1991. A pilot study provided the opportunity to assess several different daily timetables. It was important that the children did not become bored or too tired during their visit as it was feared this might reduce future co-operation and increase attrition. The timetable had to balance economy of time whilst maintaining the reliability of each assessment. It was decided a maximum of six children would be seen each day for a period of four working days making a total of 24 children a week. The first two children would arrive at the Institute of Child Health at 9:30 am, followed by two more at 11:00 am, the final pair began their assessment at 2:00 pm. Parents were encouraged to accompany their children as they were to be included in some of the assessment procedures.

MEASUREMENTS

Several different measurements were taken during the children's visit. These included an anthropometric assessment of growth and maturation; a medical examination recording both the child's and family's medical histories and current health status; measurements of cardio-respiratory functioning using spirometry and a graded exercise protocol; muscular strength and flexibility. The psychological assessment consisted of a number of self report questionnaires completed by the child and parent separately, and an IQ test. These measurements were the final stage of a procedure lasting an average of 3 hours. This stage took place in the administrative centre of the study, several minutes walk from the Institute. Here the children and their parents could relax before completing the psychological assessment. Subsequent descriptions of the methods used will be limited to those relevant to this thesis.

Overview of procedure and the measures used

The questionnaires chosen for the study were designed to measure the psychological status of the children and their parents and to evaluate family functioning. The rate of depressive symptomatology was measured using the 'Children Depression Self Rating Scale' (DSRS; Birleson, 1981, Birleson et al, 1987). This was completed by all children. Those over the age of 15 also completed the 'General Health Questionnaire' (GHQ; Goldberg, 1978). Children aged 12 years and over completed the 'Family Adaptability and Cohesion Evaluation Scale' (FACES II; Olsen et al, 1978). All children completed the 'Great Ormond Street Self-Image profile' (GOSSIP; Dobbs et al, 1986). Children aged between 8 and 16 years 11 months completed the short form of the 'Weschler Intelligence Scale for Children- Revised' (WISC-R; Weschler, 1976). Every child completed a 'training diary' during their visit. The diary recorded the frequency and duration of a child's training over an average week. Parents completed the 'General Health Questionnaire' (GHQ; Goldberg op cit.), the 'Family Adaptability and Cohesion Evaluation Scale' (FACES II; Olsen et al op cit.) and the 'Golombok Rust Inventory of Marital State' (GRIMS; Rust et al, 1988; 1990).

To avoid the possibility of parents biasing their own child's responses, children were separated from their parents when completing the questionnaires. Each child was accompanied by the parent of one of the other young athletes visiting the unit. Both completed their questionnaires in separate booths and were supervised by a psychologist who could also assist if a child had problems with reading or comprehension. Subjects were asked to complete the questionnaires as quickly as possible and not to spend too much time on any one item.

Table 10 describes the questionnaires completed by both the athlete and comparison groups by age group during the first of the annual assessments[4] . Table 11 summarises the questionnaires completed by parents.

Table 10: Self report questionnaires by age group

Age of child	WISC-R*	DSRS	GOSSIP	GHQ	FACES	Training Diary
16	✓	✓	✓	✓	✓	✓
14	✓	✓	✓		✓	✓
12	✓	✓	✓		✓	✓
10	✓	✓	✓			✓
8	✓	✓	✓			✓

* The WISC-R was not completed by children from the comparison population.

Key:

WISC-R - Weschler Intelligence Scale - Revised.
DSRS - Depression self rating scale for children.
GOSSIP - Great Ormond Street Self-Image Profile.
GHQ - 28-item General Health Questionnaire.
FACES - Family Adaptability and Cohesion Evaluation Scale.

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4 The questionnaires are reproduced in full in Appendix I.

Table 11: Self report questionnaires completed by parents

Age of child	GRIMS	GHQ	FACES
16	✓	✓	✓
14	✓	✓	✓
12	✓	✓	✓
10	✓	✓	
8	✓	✓	

Key:

GRIMS - Golombok Rust Inventory of Marital Satisfaction.
GHQ - 28-item General Health Questionnaire.
FACES - Family Adaptability and Cohesion Evaluation Scale.

Demographic measurements

Chronological age

The age of each child was recorded to the nearest 0.01 years by subtracting the decimal year of the subject's date of birth from the decimal year of the date of the child's visit to the Institute of Child Health (Tanner & Whitehouse, 1976).

Age groups

Since the athletes taking part in the study were selected by year of birth their age could vary by up to 11 months at each visit. To create standardised age groups, children were classified into age-bands at the time of each visit. For example all children who were aged between 13 years and 6 months and 14 years and 6 months at the time of visit were classified as being 14 years of age.

Social class

Social class was measured by reference to the occupation of the head of household (OPCS 1987) and was defined as the father's current or previous occupation if not currently employed or, in the absence of a father figure, the mother's current or previous occupation.

Training diary of intensive training

One of the major problems encountered by many previous studies which have looked at the relationship between health and activity in children's sport has been the establishment of an adequate definition of 'intensive training'. In an effort to overcome this problem most studies usually choose a small number of successful athletes and the scale of their training is accepted as a necessary concomitant of performance success. However, using this method means that it is not possible to determine the frequency, duration, or intensity of the training associated with any positive or negative effect.

A recent review of the methods used to quantify training in competitive sports revealed that training data can be obtained using four methods (Hopkins 1991): retrospective questionnaires, diaries, physiological monitoring and direct observation. For the TOYA study the most practical way of monitoring training was by using the questionnaire method. During each visit the athletes were given a questionnaire to determine the frequency and duration of training. Intensity was defined as the number of hours spent training a week. This figure included any sports related activity but excluded competition. The questionnaire consisted of a retrospective weekly diary. The child was asked to write next to each day of the week the times they usually started and finished training. Because the intensity of training may fluctuate depending upon the time of year and proximity to competition the children were asked to describe their average weekly totals. Although daily training records were completed, only the weekly totals will be used in the analysis.

These data were used to stratify the children in each sport and cohort group into high and low intensive trainers. These groups were used to determine whether training intensity is a significant factor in mood and family functioning.

Psychological measurements

Weschler Intelligence Scale - Revised (WISC-R)

High IQ has been identified as a protective factor against stress and adversity. Research also indicates a modest but consistent tendency for children and adolescents of a negative correlation between intelligence and psychiatric disorder including depression (Rutter, 1979). Given the nature of this study it was important to obtain a measure of IQ to determine whether as a population the young athletes had different mean levels of intelligence from the general population.

Intelligence has been defined as the sum of those cognitive abilities that underlie a person's adaptation to the environment. The intelligence quotient or 'IQ' score reflects a child's genetic endowment and experience (Rutter, 1975), though the relative contribution of each has been the subject of controversy (Eysenck & Kamer, 1981). The IQ is not a test of potential, it is a test of current performance. IQ is not a very stable measure, and children's IQ's often vary by as much as 10 - 15 points over a 12 month period.

A number of tests of intelligence are available. Because of the shortage of time for psychological testing on the TOYA study it was decided to use a 'short-form' of the Weschler Intelligence Scale for Children - Revised (WISC-R (Wechsler, 1976)), which only takes between 20 and 25 minutes to complete[5]. The short-form WISC-R provides three separate IQ scores: A verbal IQ, which reflects a child's range of general information, understanding and use of language; a performance IQ, which measures visuo-motor co-ordination and perceptual organisational skills; and a full scale IQ. All young athletes between the ages of 8 and 16 years 11 months completed the test.

When designed, each of the three separate IQ's was standardised about an average of 100. Recent reviews indicate that there has been a consistent

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[5] Several versions of 'short-form's' are available. The one selected for the TOYA study contained tests on information, block design, vocabulary and object assembly.

and widespread rise in IQ scores in both children and adults over the past five decades (1987). It has been estimated that between 1932 and 1978 the rate of increase was approximately 0.3 IQ points per year. Taking into account the year when the WISC-R was standardised this secular rise in IQ raises the population average for the WISC-R to 103.6[6] at the time of testing.

Scoring the WISC-R

Previous studies using WISC-R have noted a significant rate of error in the calculation of IQ scores from raw data (Sherrets et al, 1979; Conner & Woodall, 1983). A study by Beasley et al (1988) found that 24% of 457 consecutive IQ assessments computed by trained psychometrists contained errors. In 2% of the cases the error was large enough to cause a difference in full IQ score of more than 5 points. The authors suggest one way of reducing this type of error would be to automate the procedure using a computer programme. Given the large scale of the TOYA study it was decided to calculate verbal, performance and full IQ scores using bespoke computer software. The procedure was quite simple. After completing the IQ assessment a psychologist entered the child's date of birth, visit date and the score of each item on the four sub-scales of the WISC-R. The programme then calculated raw scores, scaled scores and sums of scaled scores for verbal, performance and full IQ. Whilst this method is not fool-proof and errors can still be made during data entry, errors due to calculation of IQ scores are eliminated.

Great Ormond Street Self-Image Profile (GOSSIP)

Clinical literature suggests that low self esteem may be an important risk factor for depressive disorder (Kandel & Davies, 1986; Patterson & Capaldi, 1990). Cognitive features of depression such as low self worth and self deprecatory ideation are now regarded as criteria for major depressive disorder in DSM-IV (American Psychiatric Association, 1994). A recent study by Fine et al (1993) found that self image was a significant predictor of depressive symptoms at both three months and 1 year in a population of referred adolescents. Given the importance of self esteem

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[6] The new average is calculated by subtracting the year when the test was standardised from the year when the children were tested and multiplying the product by 0.3.

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in many models of depressive disorder it was important to measure the self image of the young athletes and controls.

There are many self report measurements of self esteem available. Some of these such as the Coopersmith Self Esteem Inventory (Coopersmith, 1959, 1967) and the Piers Harris Self Concept Scale (Piers & Harris, 1969) have been widely used in child psychiatric research. However, despite their apparent popularity, both have significant limitations which affect their usefulness with young children (Harter, 1983; Hoare et al 1993). An alternative to the more traditional measures of self esteem is the 'Self-Perception Profile for Children' (Harter, 1985). Work by Harter in the early 1980's (Harter, 1982, 1983, 1984) conceptualised self esteem as having several components or dimensions. She subsequently developed a questionnaire for use with children and adolescents which measured the self esteem of young people across five specific domains - school, friends, sport, physical appearance and behaviour. At the time of the study the Harter scale seemed the logical choice. However careful analysis of the instrument revealed two fundamental problems. The first concerned the lack of normative data for a British population[7]. The second problem concerned the scale structure of the instrument, specifically the range of domains identified by Harter as salient in children's development. Although some domains were particularly well suited for the study - for example sport, physical appearance and school - the omission of a sub-scale tapping the importance of the family to the child's developing self system seemed particularly significant. Because of these problems it was decided to develop our own scale. A small team of researchers, including myself, working in the Behavioural Science Unit, Institute of Child Health developed a questionnaire closely aligned to Harter's but extending the range of domains to include family items. One of these researchers was to use the instrument in a study taking place in the clinical department looking at sexually abused children. The plan was to validate the instrument on both a clinical and general population but unfortunately lack of resources and a cutting back of the time-scale meant the validation exercise could not take place.

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[7] This has since been remedied with a standardisation on Scottish schoolchildren (Hoare et al, 1993).

The 'Great Ormond Street Self-Image Profile' (GOSSIP) is a 45 item questionnaire which contains eight separate subscales tapping seven specific domains, as well as global self worth. The domains are listed in the adjacent figure.

Specific domains
1. School
2. Sport
3. Body image
4. Peer group
5. Family
6. Mother
7. Father
8. Global self worth

In addition to information on the above domains children were also asked to rate the importance of certain domains. These data provide important information on the salience of each domain to the child's sense of self worth.

Contents of each domain

1. *School.* Items measure the ability of the child in school. Questions ask the child to judge whether they feel important and happy at school. Questions also relate to scholastic competence - for example 'I am proud of my school work' and 'I am not doing as well at school as I would like'.

2. *Sport.* All items relate to participation in sports and games. Some items relate to ability - 'I am good at sports', 'I am better than other children my age at sport'. Others refer to judgements about how sports participation make the child feel - 'I feel good when I'm doing sports'.

3. *Body image.* Items in this sub-scale tap the degree to which the child is happy with the way she or he looks. It includes questions about attractiveness and satisfaction with physical appearance.

4. *Peer group.* This sub-scale contains items which ask the child to rate their popularity with peers. The scale includes items which relate to acceptance, popularity and teasing.

5. *Family.* These items tap the extent to which the child feels valued at home and to what degree the child perceives his or her parents to have unrealistic expectations of them.

6. *Mother/Father.* These items ask the child to judge the extent to which they are valued and accepted by their mother/father.

7. *Global self worth.* These items measure the extent to which the child likes him or herself as a person, is confident and competent.

Specific scale structure

With the exception of 'Global self esteem' each of the seven sub-scales contains five items. Global self esteem contains 10 items. To answer the questionnaire children are asked to rate how true each item is for them. They are given four response categories - 'very true for me', 'quite true for me', not very true for me' and 'not at all true for me'. Items are scored 0-1-2-3, where 3 represents the most adequate self judgement and 0 the least adequate. Scores are then summed giving a maximum score for each of the seven sub-scales of 15, and for global self esteem a maximum of 30. The five items which refer to the importance of each domain are scored from 0 to 3, where 3 indicates the domain is very important to the child and 0 that it is not at all important to the child. Separate questionnaires were developed for boys and girls, the aim being to align the gender of the items contained in the questionnaire with that of the child.

Measurements of depressive disorder and well-being

Depression self rating scale for children (DSRS)

The DSRS was developed to measure moderate to severe depression in children (Birleson, 1981; Birleson et al, 1987). However, it is in fact a screening questionnaire that aims to identify children at risk of depressive disorder. As previously described in the review of literature the scale was chosen as it was designed primarily for use with pre-pubertal children. Consequently the wording of each item is simple and it was anticipated that young children involved in the study would find it easy to understand. The instrument also has the advantage of being fairly short and standardised on a British population. In addition, as most of the items in the scale have relevance to teenagers and young adults, it covered the age range of the complete sample, although two items were thought to be inappropriate

for an older age-group: 'I like to go out to play' and 'I get tummy aches'. The former item was changed in this study to 'I like to go out'. This modification was consistent with that of a previous study using an older group of children (Firth and Chaplin 1987). The latter was changed to 'I get stomach aches'. Two versions of the scale were used in the study, one, including the original items, was administered to children aged up to 11 years 11 months, and the revised scale was administered to adolescents.

The scale consists of 18 items which take the form of a statement. The child is asked to indicate whether a particular statement applies to him or her 'most of the time', 'sometimes' or 'never' over the previous week. In the scoring 'sometimes' always scores one, 'most' or 'never' score nought or two depending on the response polarity of the statement. The maximum score is 36.

Reliability using clinical populations has been satisfactory. In his original study Birleson (1981) reports a test-retest reliability of .80. A more recent study using 93 children aged between 8 and 16 years referred to a child psychiatry outpatient department in Newcastle describes a reliability coefficient of .82 (Fundudis et al 1991).

Validity of the scale has been assessed using clinic samples. During the development of the scale, scores for a clinic control group and a normal school group were clearly separated from a depressed group - the mean scores were 8.18, 4.32 and 17.65 respectively (Birleson, 1981). The results from subsequent studies indicate the DSRS is able to discriminate between depressed and non-depressed children. Birleson et al (1987) found that the scale discriminated between children given a clinical diagnosis of depressive disorder and outpatients with other disorders. An earlier study by Asarnow and Carlson (1985) conducted in the United States found the scale successfully distinguished depressed from non-depressed children in a sample of 82 child psychiatric in-patients. The scale has also been used in a small number of general population studies (Birleson et al, 1987; Firth & Chaplin, 1987; Yule, 1990). The results from both clinic and general population surveys are summarised in Table 12.

Caseness

Birleson et al (1987) suggests a cut-off point of 15 to determine caseness. On a clinical population aged between the ages of 8 and 14 this gave a specificity of 77%, a sensitivity of 67% and a misclassification rate of 24%. Other studies have described broadly similar rates but based on different cut-off points (Arsarnow and Carlson 1986). The discrepancy in cut-off scores is probably due to differences in the age range, the population studied and also limitations in sample size. However recent research has indicated the often confusing nature of using proposed cut-off points to determine caseness (Fombonne, 1991, 1994). Fundudis et al (op cit.) suggest that using a single threshold or cut-off point may be unwise. The authors suggest that cut-off points for optimal discrimination on the DSRS should be 11 for males and 14 for females. These points give a misclassification rate of 30%. For the purpose of this study it was decided to use the cut-off point of 15 to determine caseness, in order to ensure maximum comparability with previously published studies.

General Health Questionnaire:

The General Health Questionnaire (GHQ) (Goldberg, 1978) is a self report screening instrument designed to detect psychiatric disorder within an adult community population. The questionnaire focuses on 'breaks' in normal functioning rather than life-long traits, so items compare present state to the person's normal situation.

The scaled GHQ or 28-item version used in the study has four subscales: somatic symptoms; anxiety and insomnia; social dysfunction; and severe depression. The questions ask whether the respondent has recently experienced a particular symptom or type of behaviour. Responses range from 'less than usual' to 'much more than usual'. Items may be scored using conventional 0-1-2-3 Likert scores for the response categories, so that each sub-scale has a range of 0-21, or in a binary fashion 0-0-1-1, so that each sub-scale has a range of 0 - 7. For the purpose of case identification the questionnaire is scored 0-0-1-1 which gives the entire questionnaire a range of 0-28. This two-point score rates problems as present or absent. Caseness is determined using a cut point of 4/5. This threshold gives a

Table 12 Summary of clinic and general population studies using the Birleson DSRS

Study	N	Sample description	Age	DSRS mean score	S.D.
Birleson, 1981	19	"Normal school group"	11 - 12 years	4.3	± 3.342
	17	"Depressed group"	7 - 13 years	17.7	± 6.44
	17	"Clinic control group"	7 - 12 years	8.2	± 4.29
Firth & Chaplin, 1987	163	Boys attending mainstream school	7 - 12yr 11 month	9.0	± 4.32
	113		13yr - 18 years	6.3	± 1.30
Birleson et al 1987	9	Depressed children	8 - 14 years	15.9	- -*
	163	Non-depressed clinic sample		11.2	- -
Foreman & Goodyer, 1988	30	Depressed children	7 - 16 years	16.7	± 7.3
	16	Clinic controls		10.8	± 6.0
Yule et al, 1990	71	Girls from general population	14 - 16 years	11.5	- -
	25	Survivors of ferry disaster	14 - 16 years	14.7	- -
Rastam, 1992	51	Anorexics	"teenage"	11.9	± 7.7
	51	School matched controls	"teenage"	5.2	± 3.6

* S.D.'s not reported

sensitivity of 88%, a specificity of 84.2% and an overall misclassification rate of 14.2% (Goldberg and Hillier, 1979). Findings from subsequent studies support this cut-point. Using a sample of 100 attendees at a General Practitioners, Wilkinson and Barczak (1988) found a score of 5 to be the optimal cut-point: this gives a sensitivity of 77%, a specificity of 85% and an overall misclassification rate of 18%. Validation of the GHQ in a young community sample provided promising results. Using a sample of two hundred 17-year old school leavers, Banks (1983) reports that a cut-point of 5/6 gives a sensitivity of 100%, a specificity of 84.5% and an overall misclassification rate of 15%. The scale does seem to be a valid method of measuring psychiatric disorder in younger people. Indeed the questionnaire has been widely used with young people most notably in studies of the effects of unemployment on adolescents (Banks and Jackson, 1982) and more recently in the work of Monck et al (1994a; 1994b) monitoring the effects of life events on depressed mood.

Only adolescents aged 15 years and over completed the questionnaire although all parents attending the Institute of Child Health completed the GHQ regardless of their children's age.

Measures of family functioning and marital satisfaction

Family adaptability and cohesion evaluation scale (FACES II)

FACES II is a thirty item self report questionnaire designed for adults and children aged 12 years and over. The scale is based on the circumplex model of family functioning developed by Olsen and his colleagues (1978). A full description of the model is presented in the review of literature.

FACES II was designed to measure two dimensions of family functioning: adaptability and cohesion. Adaptability refers to the ability of the family system to change its structure, role relationships and rules in response to both situational and developmental stress. Families which have a low level of adaptability are described as 'rigid', those with a high level are described as 'chaotic'. The other dimension measured by FACES is family 'cohesion'. Cohesion refers to the emotional bonding between family members and to their degree of autonomy as individuals. Families high in cohesion are described as 'enmeshed', those with

low levels are described as 'disengaged'. Using the model a family's location at either of these extremes is regarded as maladaptive.

The 30 item scale includes 16 cohesion items and 14 adaptability items. Each item takes the form of a sentence which describes different aspects of family functioning. Children and their parents are asked to rate each item on a five point scale. The scale ranges from 'almost never' to 'almost always'.

The possible range of scores for the family cohesion dimension is 16 to 80. A high score (greater than 64) indicates that the family members perceive extreme closeness and limited autonomy in the family. A low score (less than 48) indicates low emotional bonding and high individual autonomy. A mid-range score (48 to 64) was thought to indicate a desirable balance between bonding and autonomy.

The range for adaptability is between 14 and 70. A high score (greater than 52) characterises the family as chaotically organised with shifting rules, roles and power structure. A low score (less than 38) describes a rigidly organised family. A moderate score (38 to 52) describes a family with a balance between stability and change. The 'norms' developed by Olsen et al (1982), although based on a national survey with over 2,000 American families, should be interpreted with caution in Great Britain given the scales sensitivity to cultural differences (Frude, 1991; Olsen and McCubbin, 1983). Because of this fact it is not planned to use these cut-points in the thesis.

The reported alpha reliabilities of the scale are .87 (cohesion) and .78 (adaptability) (Olsen et al, 1982). Test-retest reliability over a four to five week period is reported as .83 for cohesion and .80 for adaptability (Olsen et al, op cit.).

There have been many studies which have examined the discriminatory power of FACES. The results indicate the instrument is able to discriminate extreme or symptomatic families from healthy or non-symptomatic families. For example, using a sample of 27 families at high risk for destructive parent-child interaction and 35 low risk families, Garbarino et al (1985) found FACES successfully discriminated between low and high risk families. Similarly Rodick et al (1986) distinguished between families with and without a juvenile offender. A study by Cairns (1985) investigating the family systems of sex offenders found

high levels of extreme family types in both their families of origin and their current families. Numerous other unpublished studies using FACES cohesion and adaptability scores have reported the scale's ability to discriminate between functional and dysfunctional families (Anderson & Garvazzi, 1990).

Perspectives of family process: adolescent versus parental ratings

Studies of family process reveal that parents and adolescents describe the family in different ways (Noller & Callan, 1986). Adolescents tend to see their family more negatively than do their parents (Niemi, 1968, 1974; Noller & Callan op cit.; Olsen et al, 1982). One reason for this difference is that adolescents may be more accurate in their perceptions as they are less likely than their parents to give socially desirable answers. Alternatively the discrepancy may be the results of changes in the family life cycle and merely reflect the adolescent's increasing need for autonomy and independence (Erikson, 1963). Several studies using the FACES scale to compare the perceptions of adolescents and their parents have found that there is a systematic tendency for adolescents to perceive their families as less cohesive and more rigid than their parents (Noller & Callan, 1986; Olsen et al, 1982) . This pattern tends to hold true whether the adolescent is male or female. Conversely parents (both mothers and fathers) perceive their families as closer, more loving and more adaptable to change or adversity.

Golombok Rust Inventory of Marital State (GRIMS)

Marital disharmony has been found to be a risk factor for a variety of emotional problems, including depression, across a wide range of ages (Jenkins & Smith 1992). With the exception of more lengthy interview based assessments there have been problems obtaining reliable and valid measures of marital state for use in community surveys. Most of the available measures are American in origin and thus introduce a cultural bias into the assessment. A relatively recent addition to the measurement of marital discord which overcomes this problem is the Golombok Rust Inventory of Marital State (GRIMS (Rust et al, 1988)). GRIMS was validated in the United Kingdom and, because of its length and ease of scoring, seems particularly well suited for community surveys. For these reasons it was chosen as one of the measures for the thesis.

The Golombok Rust Inventory of Marital State (GRIMS) (Rust et al, 1988) is a 28 item self report questionnaire designed to measure the overall quality of a couple's relationship. The purpose behind the development of the questionnaire was to produce a scale, validated on a British population, which was capable of assessing the state of a marriage or relationship for demographic, research and therapeutic purposes (Rust op cit.).

To complete the questionnaire, individuals are asked to read each of the 28 items in turn and indicate how strongly they agree or disagree with each statement. The available response categories range from 'Strongly Disagree', 'Disagree', to 'Agree' and 'Strongly Agree'. Items are scored 0-1-2-3, where the higher score indicates a lower degree of marital satisfaction.

GRIMS offers two scores which can be used to assess marital state: a summary score, composed of the sum of scores for each individual item, and a 'transformed score' which rates the existence and severity of any relationship problem using a 9- point scale. Using the summary method, scores range from zero to 84. The authors propose that a raw score of below 30 is fairly standard in a reasonable relationship. Scores of 40 and above indicate very problematic relationships and GRIMS scores of between 30 and 40 reflect varying degrees of relationship difficulty.

Alternatively a more detailed appraisal of marital problems can be obtained using the 9-point scale. The transformation procedure is summarised in the table below.

Table 13: Transformation and interpretation of GRIMS

Transformed score	Interpretation	Raw score
1	(Undefined)	≤ 16
2	very good	17 - 21
3	good	22 - 25
4	above average	26 - 29
5	average	30 - 33
6	poor	34 - 37
7	bad	38 - 41
8	severe problems	42 - 46
9	very severe problems	≥ 47

A transformed score of 5 (a raw score of between 30 - 33) represents a normal relationship slightly worse than average in the population at large (Rust et al, 1990). Most good marriages score 2 or 3. It is suggested that transformed scores of 1 should be treated with caution as the respondents are either being untruthful or are at such a tender stage of the relationship as to render prediction invalid (Rust *op cit.*). Of course such a score could also indicate an exceptionally harmonious marriage. Unfortunately no information is given on this possibility.

The GRIMS was standardised using two groups: A sample of attendees at a General Practice clinic in Central London (30 men and 48 women) and a second group of 80 couples presenting as clients at Marriage Guidance Clinics throughout the North and South East of England. The General Practitioner group was used as an approximation to the general population. Mean GRIMS scores for the two different groups are described in the table below (the clinic group have been further sub-divided into three categories on the basis of the couples' presenting problem).

Table 14: Group means for the GRIMS

	GP Group	About to separate	Marital problems	Sexual problems
Men	28.37	41.74	36.79	22.75
Women	27.21	41.75	39.25	29.30

Split-half reliabilities and Cronbach alpha coefficients were obtained for both the clinic and general population groups. For the GP group split-half reliabilities were 0.81 for men and 0.89 for women. For the clinic group the reliability was 0.93 for men and 0.87 for women.

Validation of the instrument was conducted separately for men and women and was based upon the ability of the instrument to differentiate between couples with a range of different marital problems. Data obtained from the validation exercise indicated GRIMS was able to discriminate between the GP group and the clinic group for female respondents (means were 27.21 and 35.51 respectively), but was less successful discriminating between men with good and bad marriages, although the trend was in the expected direction. For the men in the standardisation study group means for the GRIMS were 28.37 in the GP group and 30.76 in the clinical group.

Measures of achievement

Performance assessment

Goodyer et al (1990) have drawn a distinction between social and private achievement domains. Social achievement is defined as 'any event that (has) social and personal connotations of desirability and would be seen by others as expressing a degree of personal competence' (Goodyer *op cit.* p. 1067). In contrast private achievement lacks the social connotation. Given the importance already afforded the social recognition of achievement as a protective factor it is proposed to concentrate on categories of social achievement as they relate to intensive sports participation. It is possible that social achievement in sport, either in terms of selection for a particular squad or competitive success could result not only in personal satisfaction but increased social recognition and status from family, peers or significant other adults at school or in sport.

Measuring achievement in sport

It is not an easy matter to provide an exact definition of a successful athlete. Success in youth sport is usually defined in terms of results. This may be in terms of team membership (football), national competition (swimming and gymnastics), and in selected club and age-group competition (swimming and tennis). For each sport studied a clear definition of success was required. Using defined criteria, it was decided to stratify the sample of young athletes into one of four groups (two for football), representing high and low achievement. It would then be possible using these categories to examine the strength of the relationship between achievement and the characteristics of mood, lifestyle and the adaptability and cohesion of the athletes family.

In football performers was divided into two groups. Group 1, the high performers, were those who were playing for English Football League Clubs at junior or senior level. Group 2 were those who played for youth teams or school and were characterised as having more modest or average skill levels.

In gymnastics and tennis the governing bodies were asked to provided an expert whose first task was to define performance criteria which could be used to

assess a child's current potential and then assign those young gymnasts and tennis players taking part in the TOYA study to one of four categories. Mr Brian Blincoe, the Director of National Development, and Mr John Atkinson, the Technical Director of the British Amateur Gymnastics Association, assigned the children into high and low achievers in tennis and gymnastics respectively. After discussions with representatives of the British Association of Swimming Coaches it was agreed that the performance success of young swimmers would be defined as the highest level of competition they had taken part in. These data were collected by means of a telephone survey. All young swimmers who had taken part in the study were contacted by letter. The letter described the reasons for the survey and asked them to cooperate in the survey. The interviews took place over a two week period in May 1992 and were conducted by myself and Mr Adam Jones, a research officer working on the study. Out of a total of 114 swimmers who took part in the original survey 103 were contacted by phone and agreed to take part. The response rate for the telephone survey was 90.4%.

The definitions of performance suggested by the four Governing Bodies are summarised in Table 15.

Physical measurements

Pubertal assessment.

Pubertal status was assessed by direct observation during the anthropometrical examination using the indices developed by Tanner (1962). Tanner's staging is based on a visual evaluation of secondary sexual characteristics The scales assess stages of growth of the penis and scrotum in the male and breast in the female[8]. Ratings range from 1 (pre-pubescent), to 2, 3 or 4 (pubescent), to 5 (adult). Testicular volume in males was also measured. The volume was determined by palpation in comparison with a string of models of testicular shape, known as the Prader orchidometer (Prader 1984). The models

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[8] Pubic hair in both sexes was also evaluated but as testicular development in boys and breast development in girls are more directly related to the production of sex hormones this measurement is not used in this thesis.

Table 15: Performance assessment of football, gymnasts, swimmers and tennis players

Performance Group	Football	Tennis Assessment	Gymnastic Assessment	Swimming Assessment
Group 1 High achievers	Playing for English Football League Clubsat junior or senior level	Players considered to have potential to reach top 20 in U.K.	Member of national squad competing at international level	Has competed in international competition.
Group 2 Moderately high achievers	-----------	Players who have competed in National tournaments or who have the potential to achieve this level.	National championship competitor	Has competed in the finals of National competition
Group 3 Average achievers	-----------	Players who have reached or have the potential to reach county standard	Regional squad gymnast	Hs competed in the heats of National competition.
Group 2 Low achievers	Playing for youth teams or school	Club player	Club gymnast	Club swimmer

are marked according to their volumes. Pubertal staging of all the female athletes was assessed by a trained female anthropometrist, all males by a male doctor.

Menarche

The age of onset of menarche in female athletes was also determined during the anthropometric assessment. Females were questioned as to whether menarche had occurred ('yes' or 'no') and if it had, the date of the first menstrual period was recorded. Most teenagers can recall age of menarche within a range of two to three months, a reasonably accurate assessment for group comparisons.

Home interview

In addition to the measurements taken during the childrens' annual visits to the Institute of Child Health, further psychological information was obtained from a single interview conducted at home with the child and one of his or her parents separtely. Patterns of friendships, attitudes towards eating education and sports involvement were all recorded using a semi-structured interview technique. Of interest to this thesis was the information pertaining to the level of parental involvement in their child's sport. Previous studies have suggested parental over-involvement may be a cause of emotional problems in young athletes. During the interview assessment several different ratings of parental involvement in sport were obtained:

- the young athlete's perceptions of the importance of sport to their parents.
- parental reaction to failure.
- ruminative worry about letting parents down during competition.
- avoidance of sport[9].

Families chosen to take part in the home interview assessments were selected at random: 200 children and their parents were interviewed and these were representative of the total sample, and did not differ significantly in age, gender or type of sports participation[10].

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[9] For the exact wording of the questions see Appendix II.

[10] It should be noted that the relibility of the interview measure was not assessed.

Chapter 5

RESULTS I: CHARACTERISTICS OF THE SAMPLE

INTRODUCTION

The research findings have been divided into three chapters. This chapter summarises the characteristics of the athlete and comparison populations for each of the measurements taken. The chapter following analyses the associations between measures for the cross-sectional component of the study. The third describes the analysis of the longitudinal data set.

BACKGROUND TO DATA ANALYSIS

All data were entered into R-Base, a relational database programme for MS-DOS micro-computers. All data were range checked and errors corrected. Data were transferred to an Apple Macintosh PC for analysis. All statistical analyses were conducted using SPSS versions 4.0 and 6.1 (Statistical Package for the Social Sciences, 1990, 1995) software programme.

CROSS SECTIONAL ANALYSIS 1: DATA ANALYSIS PROCEDURES

The objectives of the primary data analysis were as follows:

- to provide descriptive statistics (mean/median and standard deviations, S.D.) for each measurement, stratified by gender and group membership, ie. sports groups or the comparison population.

- to examine differences between sports and between athletes and children from the comparison population. For continuous data, analysis of variance (ANOVA) was used to determine gender, group and age effects[11]. If more than one dependent variable was present multivariate analysis of variance (MANOVA) was used. Where significant effects were detected the t-test for independent samples (two-tailed) was used to identify the size and location of gender differences; univariate analysis of variance was used to identify group differences. The Scheffe multiple comparison test was employed to locate which groups differed. This test was chosen as it is a conservative method which requires much larger differences between means for significance than other methods (Norusis, 1994). When the data were ordinal, significant differences between genders or groups were determined using Pearson Chi square (χ^2).

- to measure the association between variables. Regression analysis or the Pearson Product-Moment correlation coefficient (r) were used to measure the strength and direction of the association between measures. The .05 level was used as the standard level of significance for all analyses.

DEMOGRAPHIC CHARACTERISTICS OF THE SAMPLE

Age distribution of the sample

The mean age of the children at the start of the study in September 1988 is described in Table 16. A 2 (gender: male, female) by 5 (group) analysis of variance was conducted to establish whether there were significant differences in age between genders or between the sports and comparison groups. The results indicated no main effect for gender, ($F_{(1, 941)}$ .077, $p = .78$). There was however a significant group effect, ($F_{(4, 491)} = 9.2, p < .0001$). Children from the comparison population ($\bar{x} = 14.2$) and footballers ($\bar{x} = 14.4$) were significantly older than gymnasts ($\bar{x} = 13.2$) or tennis players ($\bar{x} = 13.1$) - $p = .05$ for all pairwise comparisons.

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[11] Homogeneity of variance was calculated using Cochran's C test. If variances were found to be unequal rather than reverting to a non-parametric statistic I used the suggestion made by Box (1954). Box has shown that with unequal variances the appropriate F distribution against which to compare the F obtained is a regular F with altered degrees of freedom.

Table 16: Mean age (years) and standard deviations (S.D.) for male and females
taking part in the survey

	Football		Gymnstics		Swimming		Tennis		Comparison group	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Male	14.4	± 1.6	13.6	± 2.6	13.7	± 2.1	13.1	± 2.4	14.2	± 2.4
N	65		38		54		74		244	
Female	- -	- -	13.4	± 2.7	14.0	± 2.2	13.1	± 2.5	14.2	± 2.4
N			81		60		81		253	
Total	14.4	± 1.6	13.2	± 2.2	13.9	± 2.2	13.1	± 2.2	14.2	± 2.4
N	65		119		114		155		497	

The significant age differences between the sports are to be expected given the different ages at which children begin intensive training, a factor which was reflected in the age at which the children from different sports entered the study (see the section on sampling in Chapter 4, 'Description of the research method'). However the difference between two of the sports groups and the comparison population was not anticipated and could have implications for the reliability of later analyses. An additional statistic was calculated to determine whether there was a significant difference in age between the athlete and comparison groups. A t-test established that the children from the comparison group were significantly older ($\bar{x}$ = 14.2) than the athletes ($\bar{x}$ = 13.5) by several months (t = 4.54, p < .001).

Social Class

An analysis of the social class distribution of the sports families[12] taking part in the study indicated that across all four sports there were fewer children from the lower socio-economic groups, partly skilled and unskilled occupations, when compared to the general population - indicated by census data (OPCS 1981). Table 17 illustrates the social class distribution of the TOYA families.

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[12] No data were available on the social class of children from the comparison group although the Head teachers of the schools chosen commented that it 'approximated the general population'.

Table 17: Social class distribution of the sports families (%)

Social Class	Football	Gymnastics	Swimming	Tennis	All	OPCS
Professional	6	8.	20	25	17	6
Intermediate	37	34.	35	45	39	25
Skilled non-manual	5	14	11	14	12	12
Skilled manual	39	36	26	15	27	34
Partly skilled	6	3	5	1	3	16
Unskilled	3	2	-	-	1	5
Armed forces	5	3	3	1	3	2
TOTAL	100	100	100	100	100	100

Such was the dominance of the middle classes that in sports such as swimming and tennis there were no families representing unskilled occupations. Even football, traditionally thought to be the preserve of the working classes, had a distribution biased towards the higher socio-economic groups. These data are summarised graphically in the histogram in figure 1.

In order to determine whether there was a significant difference between the four sports, social class was collapsed into two categories - non-manual (professional to non manual socio-economic groups) and manual (manual to unskilled socio-economic groups) - as an initial analysis indicated that more than one fifth of the cells were smaller than 5 making significance tests suspect. A chi square analysis indicated a significant difference between the groups (χ^2 = 33.165, D.F. 3, p< .001). There were significantly more non-manual families in the sample of tennis players (84%) and swimmers (68%) when compared to the families of young footballers (50%). The distribution is illustrated in table 18.

Figure 1

Social Class Distribution of Sports Families (%)
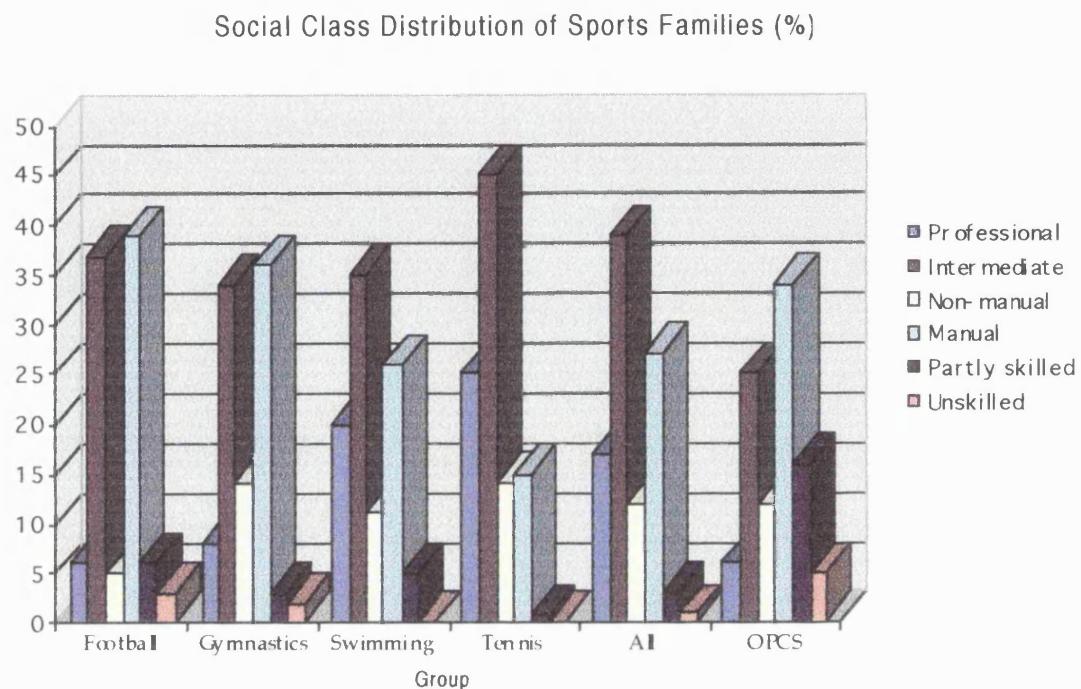
Table 18: A comparison of manual and non manual social class distributions by sport

Social Class	Football	Gymnastics	Swimming	Tennis
Non-manual	31 (50)	66 (58)	75 (68)	128 (84)
Manual	31 (50)	48 (42)	35 (32)	24 (16)
TOTAL	62 (100)	114 (100)	110 (100)	152 (100)

Values are numbers, % given in parentheses

Family type

Family type was classified according to whether the parents were married/cohabiting, single parent, divorced/separated or widowed. Table 19 provides estimates of the numbers of different types of one-parent families taken from a national sample (Haskey, 1989) compared with the number of one-parent sports families. Census data have established that 16.2% of families with dependent children have only one parent present (Haskey, op cit.). Nearly two-thirds are the result of divorce or separation. Comparison of these data with

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information on the type of family taking part in this study established there were significantly fewer one-parent 'sports families' (χ^2, D.F. 4, $p < .001$): one-parent families taking part in the TOYA study (5.3%), number recorded by census data (OPCS, 16.2%).

Table 19: A Comparison of the type of family with dependent children in Great Britain: Numbers and characteristics

Type of Family[13]	UK	TOYA
	%	%
Single father	10	--
Single mother	23	29
Divorced/separated	59	46
Widowed	8	25
Total one parent families	16.2	5.3
Total	100	100

Intensity of Training

For the purpose of this study 'intensity' was defined as the number of hours spent training a week. This figure included any sports related activity but excluded time spent travelling to and from the training facility, and competition. Descriptive statistics for the number of hours the athletes trained per week are described in Table 20 (14 cases or 3.1% of the data were missing). Time has been converted into decimal hours to enable statistical comparisons to be made.

Table 20: Mean hours trained per week for male and female athletes

Sport	N	Training Hrs/wk	Min/Max.	S.D	N	Training Hrs/wk	Min/Max.	S.D.
		Male				Female		
Football	55	5.3	1/24.5	4.6	--	--	--	--
Gymnastics	38	14.3	2.5/34	5.9	79	13.8	4/24.5	5.0
Swimming	54	10.6	1/22.5	4.6	59	11.4	3/22.5	4.8
Tennis	73	9.6	1.5/34.0	6.2	81	8.0	1/30.0	5.3

Values are means, ± S.D.; N, no of subjects. Min/Max. Minimum/maximum hours trained

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[13] Dependent children are defined as aged under 16 or 16 to 18 and in full-time education.

Analysis of variance established significant main effects on training for sport ($F_{(3,425)} = 51.8$, $p < .01$) and age ($F_{(9, 425)} = 11.7$, $p < .01$). Gender was not significant ($F_{(1, 425)} = 1.1$, p = n.s.). These results are analysed in greater detail below.

Group effects

Scheffe post hoc comparisons established football players trained significantly fewer hours per week than any other sport ($\bar{x} = 5.3$ hrs/wk). Gymnasts had the most intensive training routines of the four sports studied ($\bar{x} = 14.0$ hrs/wk) and swimmers ($\bar{x} = 11.0$) trained more hours per week than tennis players ($\bar{x} = 8.7$).

Age effects

Linear regression was used to examine the association between increasing age and intensity of training. Because of the significant group effect, analyses were conducted separately for each sport. In all cases there was a significant linear relationship between the intensity of training and increasing age. However the strength of the association, and the amount of variance explained, differed between sports. The results are described in Table 21.

Table 21: Summary of the association between age and intensity of training by sport

Sport group	F ratio	Sig.	r	R^2
Football	$34.0_{(1,53)}$	p < .0001	.62	.39
Gymnastics	$13.6_{(1,115)}$	p = .0003	.33	.12
Swimming	$53.8_{(1,111)}$	p < .0001	.57	.34
Tennis	$32.3_{(1,152)}$	p < .0001	.42	.18

The association between age and intensity of training can be clearly seen in figure 2.

Figure 2

Distribution of age and intensity of training by sport
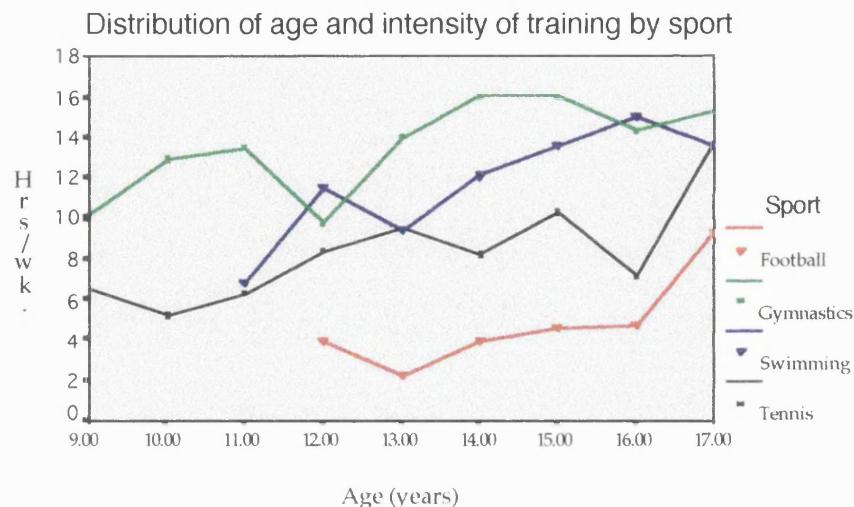
Pubertal development

To ensure adequate cell sizes for statistical comparison, male and female athletes were grouped into three stages of pubertal development: pre-pubescent, pubescent and adult, where pre-pubescent is equal to Tanner's stage 1, pubescent is Tanner's stages 2 to 3 and adult is Tanner's stages 4 to 5 (Tanner, 1962).

Pubertal status of male athletes

Pubertal data (genitalia) obtained by observation were available for 231 male athletes (there were no missing data). Differences between sports approached significance ($\chi^2 = 11.9$, DF. 6, $p = .06$). A larger percentage of gymnasts (36.8%) and tennis players (41.9%) were pre-pubescent, and a larger percentage of footballers had reached adult maturational status (56.9%). The distribution of pubertal rating by sport is summarised in Table 22.

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Table 22: Pubertal rating by sport for male athletes (%)

	Pre-pubescent	Pubescent	Adult
Football	16.9	26.2	56.9
	(11)	(17)	(37)
Gymnastics	36.8	26.3	36.8
	(14)	(10)	(14)
Swimming	27.8	25.9	46.3
	(15)	(14)	(25)
Tennis	41.9	18.9	39.2
	(31)	(14)	(29)

Numbers in brackets.

When testicular volume was used as an alternative index of maturation an analysis of covariance (age was entered as the covariate) indicated significant differences in maturation between sports (F $_{(3,225)}$ = 3.7.8, p = .01). It is interesting to note that age accounted for approximately 66% of the total variance. A further analysis established that footballers had significantly larger volumes ($\bar{x}$ = 12.5 mm, S.D. 7.7), i.e. were more mature, than tennis players ($\bar{x}$ = 8.7 mm, S.D. 8.7) (one way ANOVA: F $_{(3,227)}$ = 4.1, p = .007). Footballers also had larger volumes than either gymnasts ($\bar{x}$ = 8.5 mm, S.D. 6.7) or swimmers ($\bar{x}$ = 11.8 mm, S.D. 8.4) although these differences were not statistically significant.

Age and pubertal status

A correlation analysis established a strong relationship between increasing age and advancing maturation. The correlation matrix is reproduced in Table 23 (correlation coefficients were conducted for each sport separately. However, as the values of 'r' were very similar only those for the whole sample have been presented).

Table 23: Pearson correlation coefficients for pubertal ratings and age

	Genitalia	Testicular volume
Testicular volume	.89**	
Age	.85**	.84**

** p ≤ .01

Pubertal status of female athletes

Pubertal data (breast development) were available for 222 female athletes (there were no missing data). Between group comparisons established a significant difference between type of sport and maturational status (χ^2 = 19.6, DF. 4, p = .0006). A larger percentage of swimmers (65%) and tennis players (53.1%) had reached adult maturational status when compared to gymnasts (38.3%) - approximately a third of whom were still pre-pubescent (32.1%). The distribution of pubertal ratings by sport is summarised in Table 24.

Table 24: Pubertal rating by sport for female athletes (%)

	Pre-pubescent	Pubescent	Adult
Gymnastics	32.1	29.6	38.3
	(26)	(24)	(31)
Swimming	3.3	31.7	65.0
	(2)	(19)	(39)
Tennis	19.8	27.2	53.1
	(16)	(22)	(43)

Numbers in brackets.

Age and pubertal status

A correlation analysis established a strong relationship between increasing age and advancing maturation, r = .78, p ≤ .01. (As with the male athletes correlations were conducted for each sport separately. However as the values of 'r' were very similar only that for the whole sample has been described).

Age of onset of menarche

Data on menarcheal status was taken from 220 of the 222 female athletes taking part in the study (missing data .9%). Of these 176 (80%) had attained menarche. Analysis of variance established a main effects for sport (F $_{(2,173)}$ = 15.3, p < .0001), with swimmers ($\bar{x}$ = 13.3 years, SD 1.1) and tennis players ($\bar{x}$ = 13.2 years, SD 1.4) having significantly earlier menarche than gymnasts ($\bar{x}$ = 14.4 years, SD 1.4). When compared with reference data all the sports studied had later mean ages of menarche than the previously reported UK value of 13.0 years (Roberts et al, 1971).

Delay in menstruation

Brooks-Gunn and Warren (1988) have suggested late menarche can be defined as a menarcheal age of 14 or older. The sample of athletes was stratified using this cut-point to determine if there was a significant difference between the sports in the number of female athletes with delayed menstrual function. Results indicated that a significantly larger number of gymnasts (59.3%) had late menarche when compared to swimmers (22.2%) or tennis players (33.8%), (χ^2 = 16.6, D.F. 2, p = .0002). The distribution of ages at menarche by sport is given in figure 3.

Figure 3

Percentage of athletes that had reached menarche
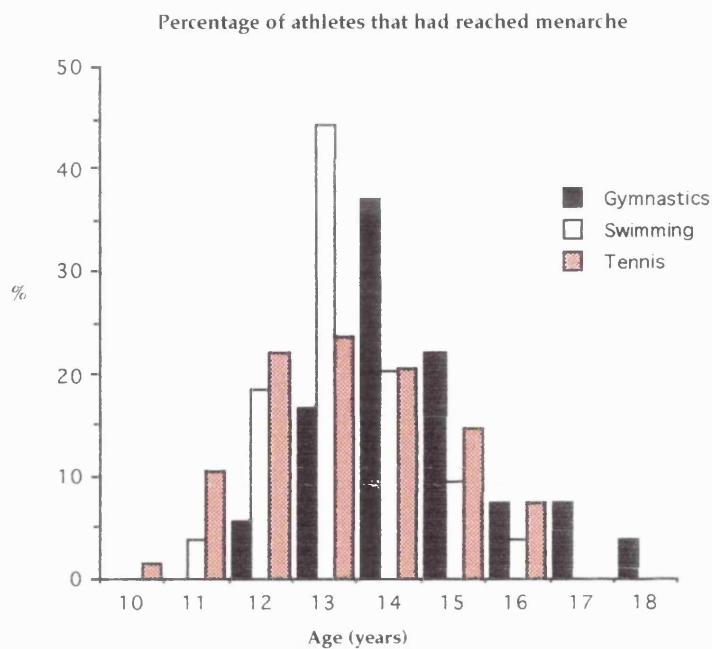
PSYCHOLOGICAL MEASURES

Intelligence Quotient (IQ)

Table 25 shows the mean verbal, performance and full IQ scores on the short form of the WISC stratified by sport and gender. These data are based upon IQ tests conducted on 404 children.

Table 25: Mean IQ scores (and S.D.) for the athlete population

	Performance IQ	Verbal IQ	Full IQ
Football **(58)**	106.1 ± 18.1	97.2 ± 11.8	101.3 ± 12.4
Gymnastics			
Male (31)	111.9 ± 16.6	101.1 ± 11.4	106.3 ± 12.2
Female (70)	107.6 ± 19.9	96.1 ± 13.7	101.6 ± 16.4
Swimming			
Male (49)	117.1 ± 18.3	107.3 ± 14.9	113.3 ± 15.8
Female (53)	108.0 ± 17.0	97.4 ± 13.6	102.5 ± 12.7
Tennis			
Male (69)	105.5 ± 17.1	104.4 ± 14.3	105.3 ± 14.5
Female (74)	112.6 ± 19.7	99.9 ± 12.7	106.4 ± 15.1

Multivariate analysis of variance (MANOVA) was used to identify the effects of the independent variables of sport, gender and social class. MANOVA was used as there were three dependent variables (more than one dependent variable being a precondition for using this statistic) - performance, verbal and full IQ scores. The results indicated social class had a significant effect on verbal IQ scores ($F_{(1,378)}$ = 4.1, p = .04). Group membership had a marginally significant effect on full scale IQ (F $_{(1,378)}$ = 2.5, p = .06) and performance IQ scores (F $_{(1,378)}$ = 2.3, p = .08). The sex of the young athlete had a significant effect on verbal IQ (F $_{(1,403)}$ = 11.9, p = .0006). Male athletes had significantly higher verbal IQ scores ($\bar{x}$ = 102.6) than females ($\bar{x}$ = 97.9).

Of particular interest to the aims and objectives of the study were that male and females from all four sports had scores which fell within the normal range for the general population ($\bar{x}$ = 103.6 ± 15).

SELF ESTEEM

Table 26 summarises the questionnaire results for each of the self esteem sub-scales stratified by gender and group. For each of the seven sub-scales the maximum score is 15, and for global self esteem the maximum is 30.

Gender comparisons

A series of t-tests (2 tailed - see Table 26) was carried out to determine the location of significant gender differences for each of the sub-scales. Within the athlete population male gymnasts (t = 3.10, p < .01) and swimmers (t = 3.24, p < .01) had significantly higher global self esteem than females. Male gymnasts (t = 2.51, p < .05), swimmers (t = 2.15, p < .05) and tennis players (t = 2.08, p < .05) had a more positive body image. For the athlete population as a whole males had a higher sense of global self worth (t = 5.21, p < .01), and rated themselves happier than female athletes with their physical appearance and attractiveness (t = 4.17, p < .01). Within the comparison group, males had significantly higher scores than females for global self esteem (t = 4.56, p <.001), body image (t = 6.87, p <.001) and sport (t = 7.20, p <.001).

Group comparisons

A one way analysis of variance established there was no significant difference between the sports on any of the sub scales, consequently for subsequent analyses the different sports groups were combined on the basis of gender to create two athlete populations. Means and standard deviations for these combined groups are shown in Table 26. A two (gender: male, female) by two (group: athlete, comparison population) ANOVA was conducted for each sub-scale. The results indicated significant differences between the groups for each of the eight sub-scales (see Table 28 for F ratios and significance tests). Post hoc identification of pairwise differences, made using Scheffe's test, indicated that, with the exception of global self esteem and body image, male and female athletes had significantly higher scores than males or females from the comparison population.

It is particularly interesting to note that for six of the sub-scales female athletes scored significantly higher than males from the comparison population, and for global self esteem and body image they scored approximately the same - 23.22 compared with 23.03 for global self esteem, and for body image they had the same mean score of 10.0. Male athletes scored significantly higher on all of the sub-scales than either males or females from the comparison population. The results of the Scheffe tests are summarised in Table 28.

Effects of age on self esteem

Previous research has indicated there is an inverse relationship between increasing age and feelings of self worth for both boys and girls (Hoare et al, 1993). A series of correlation coefficients was conducted to establish the relationship between age and gender for the athlete and comparison populations separately. Results indicated female athletes, and male and females from the comparison group experienced a general decline in most aspects of their self system with age. Satisfaction with physical appearance reduced significantly with age in females from both the athlete and comparison populations. Girls from the comparison group also had a decline in their sense of self worth associated with 'Mother' ($r = -.14$, p $\leq$ .05), 'Father' ($r = -.17$, $\leq$ .05) and 'School' ($r = -.20$, p $\leq$ .01). Males from the comparison group perceived their ability and performance in sport to decline with age ($r = -.20$, p $\leq$ .05). In contrast the 'Sport' ($r = .16$, p $\leq$ .05),

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Table 26: Descriptive and comparative (t - test) statistics of the self esteem scale for athletes and the comparison population

Group	Body image	Family	Father	Mother	Peer group	School	Sport	Global
Football								
Male	11.1 (2.7)	12.9 (2.0)	13.2 (2.3)	13.8 (1.7)	11.7 (1.9)	11.4 (2.6)	13.0 (1.6)	25.3 (3.0)
Gymnastics								
Male	*11.4 (2.4)	12.9 (1.8)	13.6 (1.7)	13.7 (1.5)	10.5 (2.2)	11.6 (2.7)	12.3 (2.0)	**25.1 (2.7)
Female	9.9 (2.8)	12.8 (2.2)	12.9 (2.7)	13.4 (2.2)	11.2 (2.4)	10.7 (2.8)	12.0 (1.8)	22.7 (3.8)
Swimming								
Male	*11.3 (2.8)	12.7 (2.1)	13.5 (1.7)	13.5 (1.9)	11.3 (2.0)	11.6 (2.3)	12.1 (2.1)	**25.4 (3.6)
Female	10.0 (2.8)	12.4 (2.4)	13.2 (1.9)	13.6 (2.2)	11.0 (2.1)	10.6 (2.9)	12.0 (2.0)	23.0 (3.8)
Tennis								
Male	*11.2 (2.7)	12.5 (2.2)	12.8 (2.1)	13.2 (2.4)	11.5 (2.5)	10.7 (2.9)	13.0 (1.8)	24.7 (3.7)
Female	10.2 (3.1)	12.6 (2.3)	13.3 (2.2)	13.5 (2.0)	12.0 (2.0)	11.3 (2.5)	13.0 (1.8)	23.8 (3.7)
Athlete population								
Male	**11.2 (2.7)	12.7 (2.0)	13.1 (2.0)	13.5 (1.9)	11.4 (2.2)	11.3 (2.7)	12.7 (1.9)	**25.1 (3.3)
Female	10.0 (2.9)	12.6 (2.2)	13.2 (2.3)	13.5 (2.1)	11.5 (2.2)	10.9 (2.7)	12.4 (1.9)	23.2 (3.8)
Comparison population								
Male	**10.0 (3.0)	**11.3 (2.8)	11.8 (3.0)	12.5 (2.8)	10.1 (2.6)	9.4 (2.6)	**10.4 (3.5)	**23.0 (4.2)
Female	7.9 (3.4)	11.2 (3.1)	11.9 (3.9)	12.4 (3.0)	10.0 (2.3)	9.6 (2.7)	7.9 (3.7)	21.1 (4.7)

Values are means. Numbers in brackets are standard deviations. * p ≤ .05, p ** ≤ .01.

'Peer group' (r = .19, p ≤ .05) and 'Global' (r = .23, p ≤ .01) sub-scale scores for male athletes increased between 9 and 17 years. The results are summarised in Table 27. The pattern of the distribution of mean scores for each sub-scale by age are illustrated in Figure 4.

Table 27: Pearson correlations for GOSSIP sub scales by age for athletes and comparison group

	Comparison group		Athletes	
Sub-scale	MR	FR	MA	FA
Body image	-.06	-.26**	-.05	-.23**
Father	-.02	-.17*	-.04	-.10
Family	-.12	-.12	.12	-.12
Mother	-.11	-.14*	-. 002	-.03
Peer group	-.11	.07	.19**	.07
School	-.10	-.20**	.03	-.06
Sport	-20**	-.15	.16*	.08
Global	-.11	-.12	.23**	-.01

MR: Male comparison population   * p ≤ .05 ** p ≤ .01
FR: Female reference popultion
MA: Male athletes
FA: Female athletes

Table 28: Means and planned comparison F ratios for sub scales of the GOSSIP

	Comparison population		*Young athletes*				
	Males (MR)	Females (FR)	Males (MA)	Females (FA)	F ratio	p	Scheffe test
Body image	10.0	7.9	11.2	10.0	44.68	<.0001	MA > FA, MR, FR MR > FR
Family	11.3	11.2	12.7	12.6	19.48	<.0001	MA, FA > MR, FR
Father	11.9	11.7	13.2	13.2	13.75	<.0001	MA, FA > MR, FR
Mother	12.5	12.4	13.5	13.5	11.31	<.0001	MA, FA > MR, FR
Peer group	10.1	10.0	11.4	11.5	21.99	<.0001	MA, FA > MR, FR
School	9.6	9.4	11.3	10.9	24.04	<.0001	MA, FA > MR, FR
Sport	10.4	7.9	12.7	12.4	120.46	<.0001	MA, FA > MR, FR
Global	23.0	21.1	25.1	23.2	34.36	<.0001	MA > FA, MR, FR MR > FR

MA = Male athletes
FA = Female athletes
MR = Male comparison group
FR = Female comparison group

Figure4
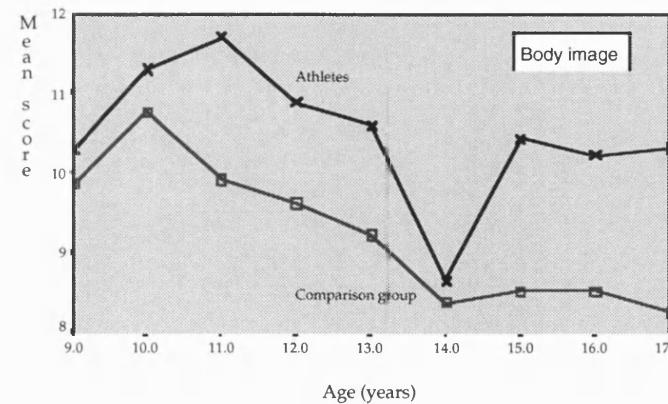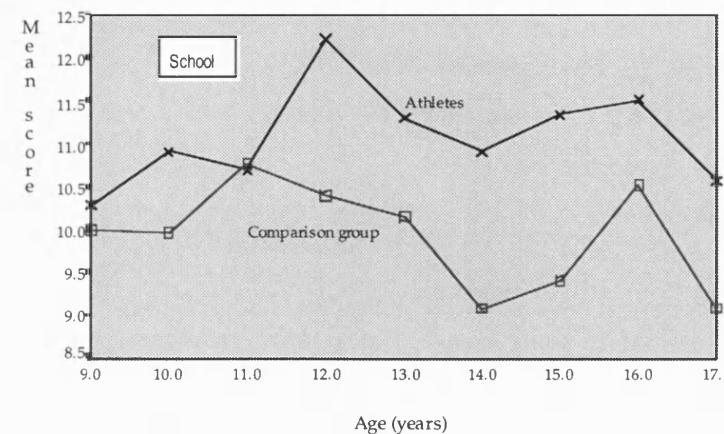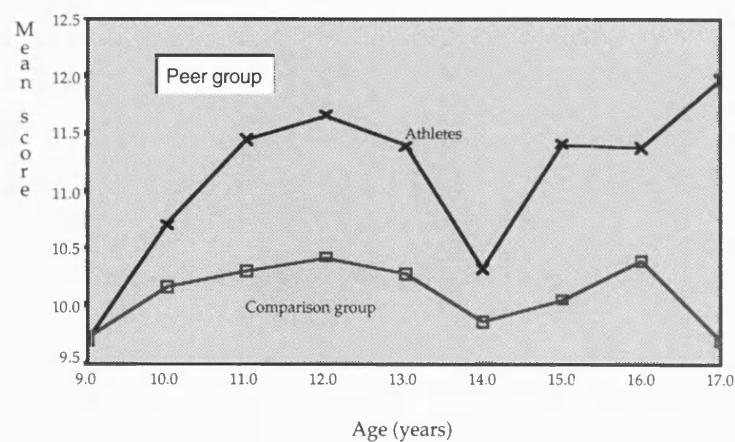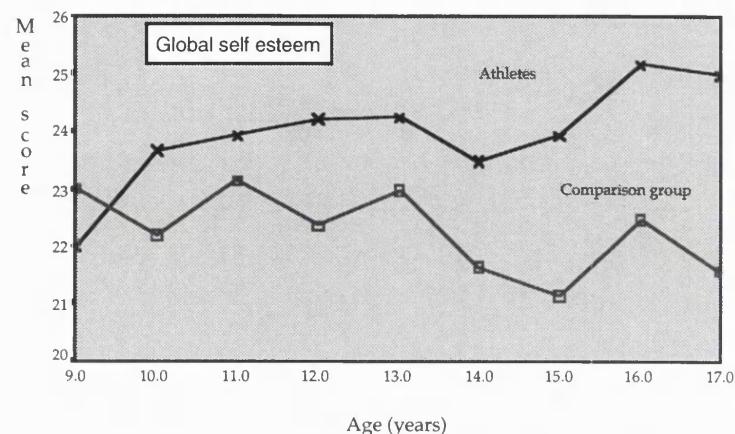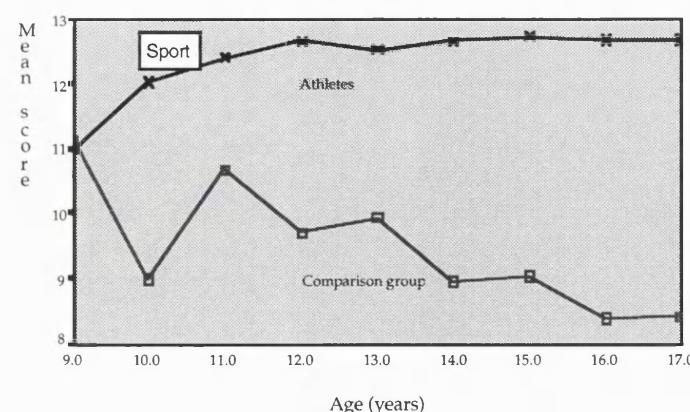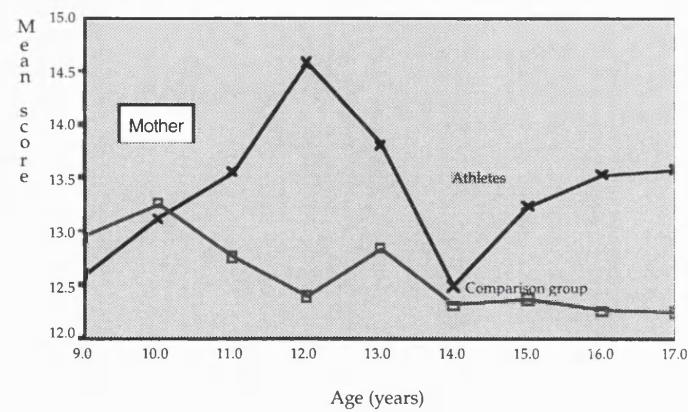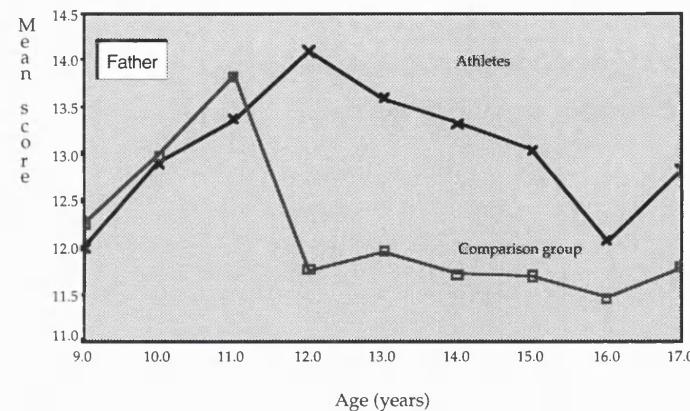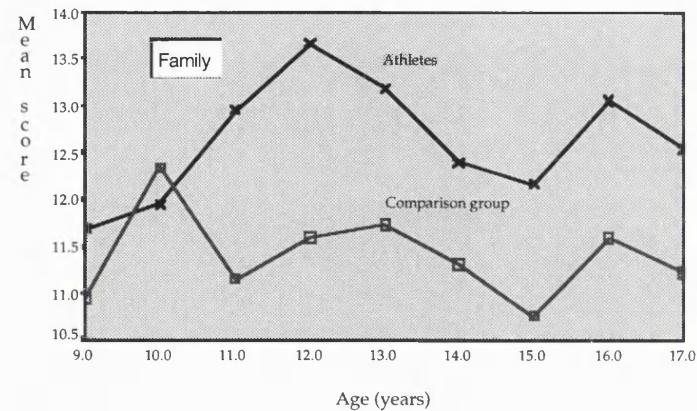
Ratings of importance

In addition to information on self esteem, children and adolescents also rated the importance of each domain.

Gender comparisons

There were no significant differences between male and female athletes in the importance they ascribed to having friends, a family that was proud of them, looking good, or doing well at school and sport. For the comparison population girls ascribed marginally more importance than boys to having a family which was proud of them ($\chi^2 = 8.1$, D.F. 3, $p = .04$). Doing well at sport was of significantly greater importance for males ($\chi^2 = 17.9$, D.F. 3, $p = .0004$).

Group comparisons

Between group comparisons established there was considerable agreement between young athletes, and children from the comparison population, on the relative importance of having friends, doing well at school and looking good. The groups did differ however on the significance of sport - nearly twice as many athletes (84.1%) as children from the comparison population (45.4%) rated doing well at sport as 'very important' to them ($\chi^2 = 157.5$, D.F. 3, $p < .0001$). The athletes also appeared to attach marginally more importance to having a family that was proud of them ($\chi^2 = 6.6$, D.F. 3, $p = .09$).

MEASURES OF MOOD

Birleson Depression Rating Scale for Children

Mean DSRS scores for the athlete and comparison groups are shown in Table 29. Thirty two children (3.4%) had uninterpretable scores. The mean score is therefore derived from 918 childrens' responses - 441 athletes' and 477 from the comparison population.

Table 29: Mean DSRS symptomatology score by group and gender

Group	Females			Males			Total population		
	N	Mean	S.D.	N	Mean	S.D.	N	Mean	S.D.
Football	-	--	--	64	5.3	± 2.8	64	--	--
Gymnastics	77	6.5	± 3.4	36	6.4	± 3.8	113	6.4	± 3.5
Swimming	53	6.0	± 3.6	53	6.1	± 3.3	106	6.0	± 3.5
Tennis	80	5.8	± 2.9	71	5.9	± 3.2	151	5.8	± 3.0
Comparison population	241	9.3	± 4.5	236	7.9	± 4.0	477	8.6	± 4.3

N, number of subjects. Values are means ± S.D.

Analysis of variance revealed significant gender ($F_{(1, 903)} = 9.4$, $p = .002$), group ($F_{(4, 903)} = 19.7$, $p < .001$) and age ($F_{(9, 903)} = 2.2$, $p = .02$) effects. The distribution of DSRS scores for male and female athletes and males and females from the comparison population is illustrated in figure 5.

Figure 5:

Distribution of DSRS scores
By group and gender

Birleson depression score
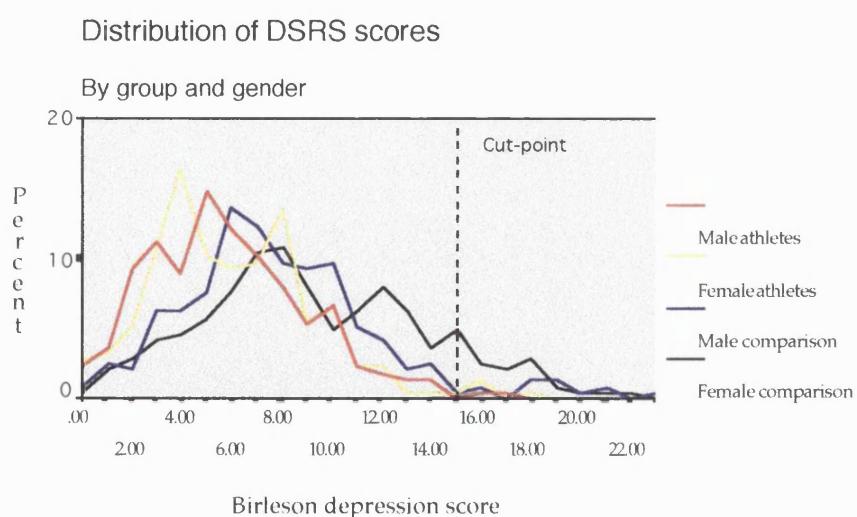
Gender comparisons

Independent t-tests (2 tailed) were carried out to determine the location of significant gender differences both between and within the athlete and reference populations. Results established there were no significant differences between any sport and gender group (gymnastics, $t = -.11$, p = n.s.; swimming, $t = -.20$, p = n.s. ; tennis, $t = -.34$, p = n.s.). Nor was there a significant difference between male and female athletes for the sports population as a whole ($t = -.70$, p = n.s.). However, within the comparison group, females had significantly higher scores than males ($t = -3.67$, p <.001).

Group comparisons

As there was no significant difference between male and female athletes their numbers were combined in each of the three sports groups. A one-way analysis of variance was used to determine whether there was a significant difference between the depression scores of the four sports groups. Results indicated there was no significant difference between the sports ($F_{(3, 437)} = 1.89$, p = n.s.). The effect group membership may have upon DSRS scores was calculated by comparing scores of male and female athletes' with those of the comparison population. Members of the athlete group had significantly lower DSRS scores (ANOVA, $F_{(3, 914)} = 42.6$, $p < .001$). Post hoc identification of pairwise differences indicated male athletes ($\bar{x} = 5.86$) had significantly lower depression scores than male or females from the comparison population ($\bar{x} = 7.89$ and 9.32 respectively (all $p < 0.5$). Female athletes (6.01) also had lower scores than either males or females from the comparison population (all $p < 0.5$).

Further analysis of the DSRS data for the athlete group established that there was no significant effect of social class, as assessed by the occupational status of the head of the household (OPCS, 1981), on depression scores ($F_{(1, 425)} = .352$, p = n.s.).

Effects of age on depressive symptomatology

Mean DSRS scores stratified by age for the athlete and comparison populations are shown in Table 30. Previous research has indicated a positive

linear relationship between increasing age and depressive symptomatology. The data from this study do not tend to follow this age gradient. For athletes the scores gradually decline with age - from 8.3 at age 9 years to 5.8 at age 18 years. Scores for children from the comparison population suggest a bi-modal distribution, higher depression scores occurring in childhood - ages 9 and 10 (mean scores 9.9 and 8.1 respectively) - and late adolescence - ages 17 and 18 (mean scores 9.0 and 10.0).

Table 30: Effect of age on mean DSRS scores

Age: years	Comparison population			Athletes		
	N	Mean	S.D.	N	Mean	S.D.
9	22	9.9	(4.1)	16	8.3	(2.2)
10	33	8.1	(3.8)	28	7.0	(3.5)
11	12	7.8	(3.5)	74	6.4	(3.6)
12	37	7.6	(4.8)	21	5.7	(2.7)
13	44	7.4	(3.8)	103	5.6	(2.7)
14	114	8.5	(4.5)	14	6.6	(4.3)
15	83	9.0	(4.3)	94	5.6	(3.4)
16	16	8.3	(4.5)	14	4.3	(1.6)
17	78	9.0	(4.4)	72	5.9	(3.6)
18	38	10.0	(4.2)	5	5.8	(2.7)

Linear regression was used to examine the association between age and depressive symptomatology. For the comparison population the association between the two variables approached significance - DSRS scores increasing with age - ($F_{(1, 475)}$ = 3.2, R^2 = .01, p = .07) but accounted for virtually none of the variance. For the athletes there was a significant inverse relationship between age and DSRS scores ($F_{(1, 439)}$ = 8.1, R^2 = .02, p = .005). The associations can be seen in figure 6.

Figure 6

DSRS score at each age point for athlete and comparison populations
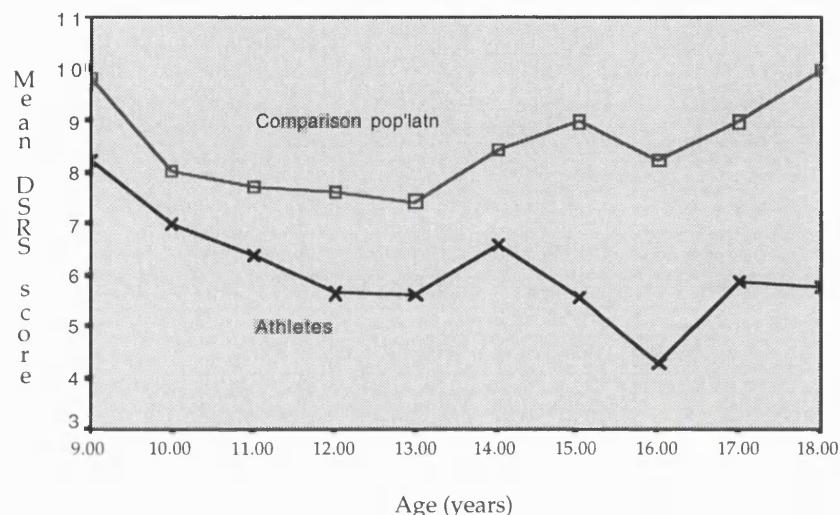
Prevalence of depressive symptomatology

Children scoring 15 or above on the DSRS are classified as possible cases of depressive disorder (Birleson 1987). In the present study a significantly greater proportion of cases came from the comparison population ($\chi^2 = 46.82$, $p < .0001$). For females, 2.3% of the young athletes (5 children) and 14.5% (35 children) from the comparison population were identified as cases. For males, 0.9% of the young athletes (2 children) and 5.5% (13 children) from the comparison population scored above the cut-point. The following table illustrates the distribution of scores above and below the cut- point.

Table 31: A comparison of high versus low depression scores by group

Self report	Athletes				Comparison population			
	Female		Male		Female		Male	
	N	(%)	N	(%)	N	(%)	N	(%)
Score < 15 (no case)	212	97.7	222	99.1	206	85.5	223	94.5
Score ≥ 15 (case)	5	2.3	2	0.9	35	14.5	13	5.5
Total	217	100	224	100	241	100	236	100

Controlling for the effect of age on depressive symptomatology

It is clear from the above analyses that male and female athletes have significantly lower depression scores than children from the comparison population. However, it is possible that rather than this finding reflecting some non-specific group effect on depressive symptomatology, it is an artefact of age. It is well established that depressive symptoms increase with advancing age (Rutter, 1988). As the comparison population is significantly older than the athlete group (see the section on the age distribution of the sample above) by several months, it is possible the difference in depression scores is due to this factor. To eliminate this possibility the number of athletes and comparison children in each age band were matched. Matching was achieved by randomly excluding children from either the athlete or comparison populations so that the numbers in each age group were approximately equal.

The randomising procedure

A 2 (group: athlete x controls) by 9 (age group: 9 to 18 years) contingency table established the number of subjects needed to be excluded in each age-band, in order to balance the sample population. Once the numbers had been identified, cases for exclusion were selected using a table of random numbers following the procedure suggested by Kahn & Sempos (1989). Tables are laid out in columns of two-digit numbers, with two columns providing four digits which corresponded to the size of the identification numbers of the children taking part in the study. If the number in the table corresponded to the identification number of a child of the right age, belonging to the right group, he or she was excluded from the sample.

Characteristics of the random population

The new sample comprised 675 children, 312 athletes and 331 children from the comparison population. There was no significant difference in age between the athlete ($\bar{x}$ = 14.1 years) and comparison ($\bar{x}$ = 14.1 years) populations (t = -.16, p = n.s). DSRS scores were available for the whole sample. There were no missing data. Mean DSRS scores for the athlete and comparison groups are shown in Table 32.

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Table 32: Mean DSRS symptomatology score by group and gender for the random sample

Group	Female			Male			Total		
	N	Mean	S.D.	N	Mean	S.D.	N	Mean	S.D.
Football	-	--	--	43	5.1	3.1	43	5.1	3.1
Gymnastics	55	6.4	3.8	27	5.7	3.9	82	6.2	3.8
Swimming	41	6.4	4.0	36	5.6	3.6	77	6.1	3.8
Tennis	60	5.6	2.9	50	5.8	3.4	110	5.7	3.1
Comparison population	181	8.9	4.6	150	7.8	4.0	331	8.4	4.4

The means for this sample are almost the same as those reported for the whole sample population (see Table 16 above). Analysis of variance conducted on these data established main effects for both gender ($F_{(1, 627)} = 6.0$, $p = .02$) and group ($F_{(4, 627)} = 16.0$, $p < .001$). For this population there was no significant age effect on DSRS scores ($F_{(9, 627)} = 1.2$, p = n.s.).

Gender comparisons

There were no significant differences between any sport and gender group (gymnastics, $t = -.82$, p = n.s.; swimming, $t = -.93$, p = n.s. ; tennis, $t = .31$, p = n.s.). Nor was there a significant difference between male and female athletes for the sports population as a whole (f - m = 0.3, $t = -.70$, p = n.s.). However, within the comparison group, females had significantly higher scores than males ($t = -2.29$, p = .02).

Group comparisons

As there was no significant difference between male and female athletes their numbers were combined in each of the three sports groups. A one-way analysis of variance was used to determine whether there was a significant difference between the depression scores of the four sports groups. Results indicate there was no significant difference between the four sports ($F_{(3, 308)} = .98$, p = n.s.). The effect group membership may have upon DSRS scores was calculated by comparing scores of male and female athletes

with those of the comparison population. Members of the athlete group had significantly lower DSRS scores (F $_{(3, 639)}$ = 24.8, p < .0001). Post hoc identification of pairwise differences indicated male athletes ($\bar{x}$ = 5.6) had significantly lower depression scores than males or females from the comparison population ($\bar{x}$ = 7.8 and 8.9 respectively (all p < 0.5). Female athletes ($\bar{x}$ = 6.1) also had lower scores than either males or females from the comparison population (all p < 0.5).

Prevalence of depressive symptomatology

Using the cut-point previously described, a significantly greater proportion of cases came from the comparison population (χ^2 = 25.8, DF. 3, p < .0001). For females, 2.6% of the young athletes (4 children) and 12.7% (23 children) from the comparison population were identified as cases. For males, 1.3% of the young athletes (2 children) and 4.7% (7 children) from the comparison population scored above the cut-point. The following table illustrates the distribution of scores above and below the cut- point.

Table 33: A comparison of high versus low depression scores by group

Self report	Athletes				Comparison group			
	Female		Male		Female		Male	
	n	(%)	n	(%)	n	(%)	n	(%)
Score < 15 (no case)	152	97.4	154	98.7	158	87.3	143	95.3
Score ≥ 15 (case)	4	2.6	2	1.3	23	12.7	7	4.7
Total	156	100	156	100	181	100	150	100

Results from this sample, where the possible effects of age were removed, suggest the significant difference in depression scores is a function of group membership rather than chronological age. Because of this finding the larger sample will be used throughout the reminder of the analyses.

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GENERAL HEALTH QUESTIONNAIRE (GHQ -28)

In addition to using the GHQ to obtain information on the level of psychiatric disorder in the survey populations, it was also of interest to see if the results for the DSRS would be replicated on the 'depression' sub-scale of the GHQ. It should be noted that only children aged 15 years and above completed this questionnaire, consequently only a sub-sample of the overall survey population were available for statistical analysis. As such these data can only offer partial 'validation' for the DSRS findings and, as the numbers of young people who completed the GHQ were small, differences between or within groups had to be large before statistical significance could be obtained.

The GHQ-28 provides three measures of psychiatric state - a total score, four sub-scale scores and a measure of caseness. Summary statistics for the sub-scale scores, according to group and gender, are shown in Table 34.

Table 34: Mean scores and standard deviations for GHQ sub-scales by group and gender

Sample	N	Somatic Symptoms	Anxiety and Insomnia	Social Dysfunction	Depression
Football	22	2.73 ± 3.13	1.68 ± 2.12	4.91 ± 2.47	0.32 ± 0.72
Gymnastics					
Males	14	3.71 ± 2.87	4.14 ± 4.38	5.29 (1.54)	0.71 (1.81)
Females	24	4.21 ± 3.56	4.04 ± 3.72	6.25 (1.82)	1.04 (2.13)
Swimming					
Males	18	4.00 ± 3.01	3.44 ± 2.55	6.11 ± 1.32	0.17 ± 0.51
Females	21	5.43 ± 4.03	5.67 ± 4.99	6.62 ± 2.27	2.57 ± 3.62
Tennis					
Males	18	4.89 ± 4.06	4.22 ± 3.61	5.61 ± 1.50	0.61 ± 1.09
Females	21	3.52 ± 2.73	3.57 ± 3.36	5.77 ± 1.32	0.95 ± 2.54
Comparison group					
Males	17	3.3 ± 2.3	3.59 (3.78)	6.35 (1.27)	1.94 (2.51)
Females	12	4.8 ± 4.3	4.75 (4.60)	6.68 (2.19)	1.75 (2.73)

Values are based upon the Likert scoring system

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Analysis of the sub-scales of the GHQ-28

Taking the athlete population first. Multivariate ANOVA indicated a significant effect of gender on GHQ scores (Pillais F = 3.18, D.F. 4, p = .016). Univariate F-tests established a significant difference between male and female scores on depression ($F_{(1, 131)}$ = 12.8, p > .001), and a marginally significant difference in anxiety and insomnia ($F_{(1, 131)}$ = 3.6, p = .06). Closer analysis of these data revealed females reported significantly more depressive symptomatology ($\bar{x}$ likert score 1.5) and anxiety ($\bar{x}$ likert score 4.4) than males ($\bar{x}$ score .43 and $\bar{x}$ 3.2 respectively), (t = -2.95, DF = 136, p = .004 for the depression sub-scale; and t = -1.86, DF = 136, p = .06) for anxiety and insomnia. To establish whether this finding related to the female athletes as a whole, or whether instead it indicated a particular sport effect an ANOVA was conducted using type of sports participation as the independent variable and depression and anxiety scores as the dependent variables. The results indicated a significant gender by sport interaction for the depression sub-scale ($F_{(2, 131)}$ = 3.10.8, p = .05) and a marginally significant main effect for anxiety ($F_{(1, 131)}$ = 3.65, p = .06). Further analysis aimed at identifying the source of the interaction established female swimmers had significantly higher depression scores than male swimmers (t = -2.78, DF 37p = .008). There were no significant differences between any other sport and gender group.

For the comparison group there was no significant difference between males and females on any of the four sub-scales.

Analysis of the athlete versus comparison group

Further analyses based upon gender established male athletes ($\bar{x}$ score .43) to have significantly lower depression scores than males ($\bar{x}$ score 1.94) from the comparison population (t = -3.867, DF = 1, p < .0001), and marginally lower social dysfunction scores (t = -1.89, DF = 1, p = .06). A comparison of female athletes with females from the reference population established that there was no significant difference between them on any sub-scale.

The results presented so far would seem to be somewhat at-odds with the findings from the DSRS described above. For the athlete group it appears that the female swimmers are skewing the data as, when they are removed, the gender difference is eliminated[14] ($F_{(94, 1)} = .29, p$ = n.s.). A subsequent analysis (with the swimmers omitted) established that there was a significant difference in depression scores between the athlete ($\bar{x} = .74$) and comparison ($\bar{x} = 1.9$) populations ($t = 2.7$ D.F. 126, $p = .008$).

Analysis of GHQ-28 total score

For the athlete population as a whole an analysis of variance established a main effect for gender ($F_{(1, 131)} = 5.43, p = .02$). Further analysis indicated that males had significantly lower scores ($\bar{x} = 12.9$) than females ($\bar{x} = 16.5$), ($t = -2.34$ D.F. 136, $p = .02$). For the comparison group, although females had a higher mean score than males the difference was not statistically significant (see Table 35 for a summary of mean scores) .

A further analysis to determine the existence of any specific group effects established a marginally significant effect for males ($F_{(3, 84)} = 2.34, p = .06$), but not for females. It is evident from table 35 that the likely difference for males lies in the respective scores of the footballers, tennis players and/or the comparison group.

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[14] It is interesting to speculate why the swimmers should be significantly different to the other sports. A sries of t-tests were run using a variety of variables. The only measurement which proved significant was sports self esteem. The swimmers aged 15 years and over had significantly lower sports self esteem ($\bar{x} = 11.9$) than the other athletes ($\bar{x} = 13.1$), ($t = 3.19$ D.F. 57.46, $p = .002$)

Table 35: GHQ Total Likert score by group and gender

Sample	N	Total Score
Football	22	9.6 ± 6.1
Gymnastics		
Males	14	13.9 ± 9.2
Females	24	15.5 ± 9.7
Swimming		
Males	18	13.7 ± 5.2
Females	21	20.3 ± 12.7
Tennis		
Males	18	15.3 ± 7.7
Females	21	13.7 ± 8.2
Comparison group		
Males	17	15.2 ± 5.9
Females	12	17.9 ± 11.3

Caseness

Taking the athletes first, a chi-square analysis indicated a marginally significant difference between male and female athletes in the respective proportions classified as a case (χ^2 = 3.1, DF. 1, p = .08). In keeping with previous research there was a larger percentage of female cases (63%). For the comparison group, significance tests could not be conducted due to the small number of cases (n = 5), however the results followed the expected trend. Of those classified as a case 60% were female. An analysis of the whole survey population established that there was no significant difference between the athlete and comparison populations in the proportion of adolescents scoring above the cut-point of 5 (χ^2 = .08, D.F. 1, p = n.s.).

Parental mental health measured by GHQ 28

The GHQ was completed by 504 parents, 308 mothers and 196 fathers. Twenty-three parents (15 mothers and 8 fathers failed to complete the questionnaire - 4.4% of the overall total). Summary statistics stratified by sport and gender are shown in Table 36.

Table 36: Parental mean scores and standard deviations for GHQ sub-scales by sport and gender

Sample	Somatic Symptoms	Anxiety and Insomnia	Social Dysfunction	Depression
Football				
Mother (36)	4.2 ± 3.5	4.3 ± 3.9	7.1 ± 1.9	1.1 ± 3.0
Father (32)	2.7 ± 2.1	2.5 ± 2.8	6.9 ± 1.5	.59 ± 1.4
Gymnastics				
Mother (76)	4.3 ± 3.4	4.6 ± 3.7	6.6 ± 2.2	.47 ± 1.4
Father (44)	3.8 ± 3.2	4.0 ± 3.8	6.7 ± 2.4	1.1 ± 2.6
Swimming				
Mother (82)	4.7 ± 4.0	4.8 ± 4.0	7.3 ± 3.0	.74 ± 2.1
Father (43)	3.5 ± 2.6	4.0 ± 3.8	6.5 ± 2.2	.81 ± 1.8
Tennis				
Mother (114)	3.7 ± 3.0	4.1 ± 3.9	6.8 ± 1.9	.66 ± 1.9
Father (77)	3.7 ± 2.9	4.4 ± 3.4	7.1 ± 2.4	.66 ± 1.5

Multivariate ANOVA indicated a significant effect of parental gender (Pillais $F = 2.6$, D.F. 4, $p = .04$) on GHQ scores. Univariate F-tests established a significant difference between mothers and fathers scores on somatic symptoms ($F_{(1, 496)} = 6.4$, $p = .01$). Closer analysis of these data revealed mothers reported significantly more physical symptoms than their husbands ($t = 2.19$, DF = 512, $p = .03$). The type of sports participation - football, gymnastics etc. - had no significant effect on scores (Pillais $F = 1.1$, D.F. 1485, $p = $ n.s.), nor was there a significant sport by gender interaction effect (Pillais $F = 1.3$, D.F. 1485, $p = $ n.s.).

Caseness

Using the recommended cut-point of 5 (Wilkinson & Brczak, 1988), 21.8% of mothers and 17.9% of fathers were at risk of psychiatric disorder. There was no significant difference between parents in 'caseness' ($\chi^2 = 1.1$, D.F. 1, p = n.s). It is interesting to note however that when comparing these data with previously published reports which have used the GHQ on community samples substantially fewer parents of sports children appear to be at risk of psychiatric disorder. For example in a recent survey of 487 mothers conducted by Monck and her colleagues (1994), 32.4% scored above the cut-point.

MEASURES OF FAMILY FUNCTIONING AND MARITAL SATISFACTION

Family Adaptability and Cohesion Evaluation Scale (FACES)

Mean scores and SD's for male and female athletes, their parents, and adolescents from the comparison population are illustrated in Table 37. The possible range of scores for the family cohesion dimension is 16 to 80. The range for adaptability is between 14 and 70.

Comparing these data with previously published norms (Olsen et al, 1982), parents with children in sport, and adolescents from the comparison population have comparable scores for family adaptability and cohesion. Olsen et al (op cit.) reports mean cohesion and adaptability scores for both parents combined, of 64.9 and 49.9 respectively. For adolescents they cite values of 56.3 for cohesion and 45.4 for adaptability.

Analysis of the adolescent data

For the adaptability dimension, analysis of variance (group x gender x age) established a main effect for group (F $_{(4,622)}$ = 4.2, p = .002). Age (F $_{(6, 622)}$ = .10, p = n.s.) and gender (F $_{(1, 622)}$ = .04, p = n.s.) were not significant. For family cohesion group (F $_{(4,622)}$ = 9.0, p < .001) and age (F $_{(6, 622)}$ = 3.3, p = .004) were significant. Gender had no effect upon perceptions of family closeness (F $_{(1, 622)}$ = .35, p = n.s.).

Group	N	Adaptability	Cohesion
Football	58	49.6 ± 6.8	64.3 ± 8.3
Gymnastics			
Males	26	50.1 ± 7.2	62.1 ± 6.2
Females	45	49.8 ± 7.5	61.2 ± 8.6
Swimming			
Males	39	51.4 ± 7.6	63.8 ± 7.9
Females	44	48.9 ± 7.0	61.9 ± 7.5
Tennis			
Males	42	49.6 ± 7.3	62.0 ± 9.6
Females	46	49.5 ± 7.7	61.2 ± 9.7
Total	300	49.8 ± 7.3	62.5 ± 8.4
Parents			
Mother	208	51.3 ± 6.2	64.5 ± 8.3
Father	122	51.0 ± 6.0	64.8 ± 8.6
Total	328	51.2 ± 6.2	64.6 ± 8.4
Comparison group			
Males	163	45.7 ± 9.8	55.7 ± 11.2
Females	171	46.3 ± 10.0	55.7 ± 11.7
Total	334	46.0 ± 9.9	55.7 ± 11.4

Group comparisons for adolescent data

As there were no significant gender effects the numbers of males and females were combined in each of the three sports groups, and within the comparison population. Analysis of group effects established athletes from all four sports perceived their families to be closer ($F_{(4, 629)} = 18.6$, $p < .0001$) and more adaptable ($F_{(4, 629)} = 7.3$, $p < .0001$) than adolescents from the comparison population. There was no significant difference between the sports groups in family process variables (post hoc identification of pairwise differences made using Scheffe's test).

Effects of age on family process

As there was no main effect for age and family adaptability this section focuses on cohesion only. Mean cohesion scores stratified by age for the athlete and comparison populations are shown in Table 38. In keeping with results from previous research (Noller & Callan, 1986) cohesion scores decline for both athletes and adolescents between 12 and 18 years, from 59.8 to 51.3 for the comparison group, and from 67.8 to 59.6 for the young athletes.

Table 38: Effects of age on perceptions of family cohesion for
athlete and comparison populations

| | Comparison group | | | Athletes | | |
Age	N	Cohesion	S.D.	N	Cohesion	S.D.
12	--			9	67.8	7.7
13	27	59.8	9.5	98	64.2	7.1
14	100	55.4	11.5	14	63.1	11.1
15	78	55.5	11.1	93	61.5	8.6
16	16	56.9	13.5	13	57.4	10.2
17	76	56.8	11.5	68	62.0	8.5
18	37	51.3	11.3	5	59.6	10.7

Values in the table are means.

A simple regression was used to determine the strength of the association between age and cohesion. For the athletes the results established a weak inverse relationship between the variables ($F_{(1, 298)} = 7.8$, $R^2 = .03$, $p = .006$). For the adolescents from the comparison population the results were not statistically significant ($F_{(1, 332)} = 2.3$, $R^2 = .01$, p = n.s.). The pattern of these associations is illustrated in Figure 7.

Parental assessment of family process

Descriptive statistics for mothers' and fathers' perceptions of family cohesion and adaptability are presented in Table 37 above. A two (mother x father) by four (sport group) ANOVA established no main effects for parental gender or sport group for adaptability (gender: $F_{(1, 322)} = .31$, p = n.s.; sport: $F_{(3,}$

$322) = .21$, p = n.s.), or cohesion (gender: $F_{(1, 322)} = .03$, p = n.s.; sport: $F_{(3, 322)} = 1.7$, p = n.s.).

Figure 7

Adolescent perceptions of family cohesion by age
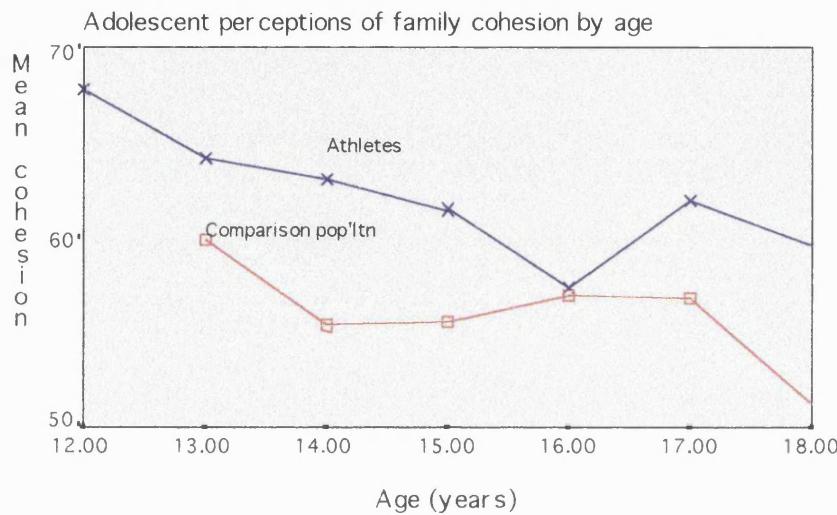
A further analysis did establish a significant main effect for role. When family ratings of mothers, fathers and adolescents were compared, parents tended to rate their families more favourably than their children (adaptability: $F_{(2, 627)} = 3.4$, $p = .03$; cohesion: $F_{(2, 627)} = 4.9$, $p = .008$). Mothers perceived their families to be more adaptable ($\bar{x} = 51.3$) than their children ($\bar{x} = 49.8$), and both mothers ($\bar{x} = 64.5$) and fathers ($\bar{x} = 64.8$) perceived their families to be closer and more cohesive than their children ($\bar{x} = 62.5$). These differences are all significant at the .05 level.

Golombok Rust Inventory of Marital State (GRIMS)

Estimates of the degree of marital satisfaction were obtained using the GRIMS self report questionnaire. Scores range from 0 to 84, the higher the score the more problematic the marriage. The GRIMS was completed by 211 mothers and 84 fathers. Data analysis was conducted on both groups. Mothers whose children were involved in football appeared to be most satisfied with their marriage (mean GRIMS score 18.6 ± 15.5). Mothers of children involved in intensive swim training appeared least satisfied (mean GRIMS score = 27.2 ±

12.1). The distribution of scores stratified by parental role and sport is described in Table 39.

Table 39: Descriptive statistics for GRIMS

	Mothers GRIMS			*Fathers GRIMS*		
Group	N	Mean	S.D.	N	Mean	S.D.
Football	21	18.6	15.5	17	22.4	11.8
Gymnastics	53	25.3	13.4	16	20.9	12.0
Swimming	60	27.2	12.1	22	18.9	11.6
Tennis	77	22.5	13.3	29	23.2	12.7
Total	211	24.2	13.4	84	21.5	12.0
Reference data	80	27.2	10.0	30	28.4	9.0

A comparison with published data indicates parents with children in sport tend to report greater marital satisfaction than parents in the general population. GRIMS reference data indicate a mean score for mothers of 27.2 and for fathers 28.4 (Rust et al, 1988). A recent study using GRIMS with a population of 43 'normal' families with naturally conceived children report a mean marital state for mothers of 25.9, and for fathers 29.8 (Golombok et al, 1995).

Husband, wife and group effects

There was no significant difference between partners in their perceptions of the quality of marriage ($F_{(1, 287)} = 1.4$, p = n.s.). Similarly the type of sport did not appear to have a significant effect ($F_{(3, 287)} = .40$, p = n.s.). However, the results did indicate a marginally significant 'Gender' by 'Sport' interaction ($F_{(3, 287)} = 2.3$, p = .07). In order to identify the interaction the results have been plotted graphically in figure 8. From the graph it appears that the mothers of young swimmers are the least satisfied with their marriage. While there is not much difference in scores between the mothers and fathers of footballers, gymnasts and tennis players, the difference is much larger for swimmers, a finding which is discussed in more detail in the section on 'Quality of Marriage' below.

Figure 8

Plot of two-way interaction: gender by sport
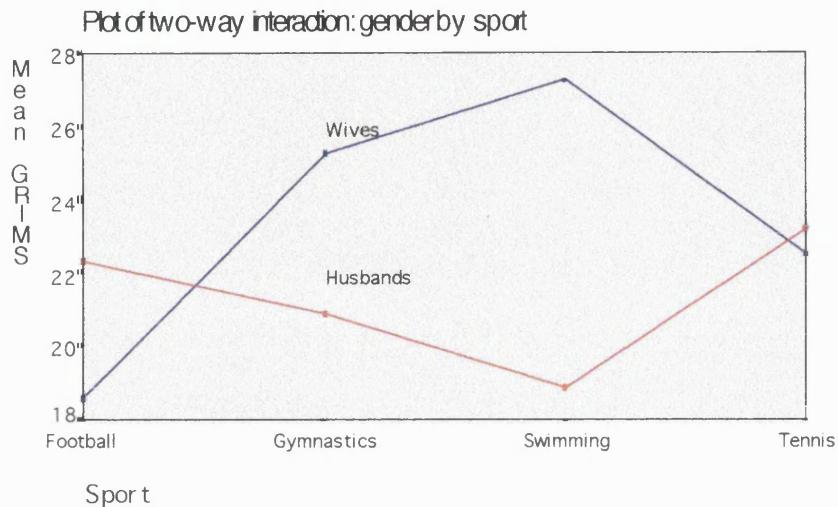
Quality of marriage

GRIMS also rates the existence and severity of any relationship problem using a 9- point scale. This scale is reproduced in full in the methods section. Because of the small numbers involved the 9-point scale was reduced to five points - $16 \leq$ remains undefined; 17 to 29 is rated above average; 30 to 33 average; 34 to 46, poor to bad; and GRIMS scores ≥ 47 reflect very severe marital problems.

Role effects

For three of the sports there was no significant difference between husbands' and wives' perceptions of the quality of the marriage (football: χ^2 = 1.93, p = n.s.; gymnastics: χ^2 = 2.95, p = n.s.; tennis: χ^2 = 1.23, p = n.s.). However, mothers of young swimmers had a significantly poorer view of their marriages than their husbands (χ^2 = 9.79, p = .04). One quarter of the sample of these mothers (N = 15) rated their marriage to be 'poor' or have 'severe problems'.

For the sample as a whole mothers (23.7%, n = 50) and fathers (34.5%, n = 29) with children involved in intensive training have a higher percentage of

'undefined' marriages when compared to reference data (wives: 14%; husbands, 7%).

Group effects

When mothers and fathers ratings were combined there was no significant difference between the sports in perceived quality of marriage ($\chi^2 = 9.99$, DF 12, p = n.s.). Most received a rating of 'above average' (69.1%). Only a small number appeared to have a marriage with 'severe problems' (17.3%, n = 51). The distribution of scores is illustrated in Table 40.

Table 40: Marital rating stratified by sport (%)

	Undefined	Above average	Average	Poor to bad	Very severe
Football	20.3	10.1	7.9	11.8	12.5
	(16)	(12)	(3)	(6)	(1)
Gymnastics	20.3	23.5	34.2	19.6	25.0
	(16)	(28)	(13)	(10)	(2)
Swimming	25.3	27.7	31.6	27.5	37.5
	(20)	(33)	(12)	(14)	(3)
Tennis	34.2	38.7	26.3	41.2	25
	(27)	(46)	(10)	(21)	(2)

Values in the table are percentages, numbers in brackets.

RESULTS II: MOOD, LIFE EXPERIENCE
AND FAMILY PROCESS

INTRODUCTION:

Having described in the first results section the characteristics of the athlete and comparison populations for each of the measurements taken, this second results chapter summarises the results of the analyses conducted to determine the magnitude and direction of any associations between mood, measured by the DSRS, life experience (athlete or non-athlete), self esteem and family process variables (FACES dimensions of cohesion and adaptability).

CROSS SECTIONAL ANALYSIS 2: DATA ANALYSIS PROCEDURES

The objectives and procedures for the secondary data analysis were as follows:

1. to examine possible explanations for group differences on Birleson depression scores. Bivariate correlation was used to examine the strength and direction of any association between mood, family process and self esteem for the athletes and comparison groups independently. This analysis yielded potential child and family variables with the best predictive power and also identified highly inter-correlated measures which could affect the stability of the models. Multiple regression analyses were then used to determine which variables significantly predicted DSRS scores.

2. to determine the effect family process and self esteem had upon caseness. The independent samples t-test (two-tailed) was used to identify significant effects.

3. to examine the ability of specific variables - life experience, family process and self esteem - to predict the probability of 'high' or 'low' depressive symptomatology. Logistic regression was used to determine the 'goodness of fit' of this model. In addition the analysis provided data with which to calculate the odds ratios associated with each of the above predictor variables.

4. to identify factors which influence mood in young athletes - for example factors associated with sport, and family and maturational factors.

PART 1 - FAMILY CHARACTERISTICS AND DSRS SCORES

Magnitude of the association between family process variables and mood

A Pearson correlation matrix was calculated to determine the association between adaptability, cohesion and DSRS scores. Computations were carried out for the athlete and the comparison groups separately. The findings are shown in Tables 41 and 42 respectively.

Table 41: Pearson correlation's between family process variables and DSRS scores for young athletes

	Adaptability	Cohesion	DSRS
Adaptability		.64* (300)†	-.34* (294)
Cohesion			-.33* (294)
DSRS			

* p <.0001; † due to missing data the size of the groups differs

Table 42: Pearson correlation's between family process variables and DSRS scores for the comparison group

	Adaptability	Cohesion	DSRS
Adaptability		.77* (334)†	-.39 (323)
Cohesion			-.42 (323)
DSRS			

* p <.0001; † due to missing data the size of the groups differs

The findings indicted that DSRS scores were negatively correlated with family adaptability and cohesion for both young athletes and adolescents from the comparison population. In addition to identifying family process variables as potential predictors of DSRS scores, the analysis also revealed a significant inter-correlation between adaptability and cohesion (r = .64 for the athlete group and .77 for the comparison group). Prior to conducting a multiple regression analysis using both family process variables, multicollinearity was assessed using diagnostics provided by SPSS. Variance proportions for adaptability and cohesion were .84 and .89 respectively, indicating the two variables were highly correlated. Because of this association, family adaptability was eliminated from subsequent analyses in this chapter.

Family cohesion and group membership (athlete or non-athlete) were then entered into a multiple regression analysis as independent predictors of DSRS scores for the total survey population. Results showed lower family cohesion and group membership predicted significantly higher DSRS scores (F $_{(2, 614)}$ = 112.8, p <.0001: beta = -.39). The adjusted R^2 for this model was .266. Cohesion and group membership accounted for approximately 27% of the variance in DSRS scores. The results are summarised in Table 43.

Table 43: Forced entry multiple regression analysis showing significant predictors of DSRS scores for the sample population

Variable	B	Beta	T	p
Cohesion	-.15	-.39	-10.7	.0001
Group	-2.0	-.24	-6.7	.0001

Family and caseness

To examine the effect perceptions of family process had upon the possibility of being a case of depressive disorder an independent samples t-test (2 tailed) was conducted for the athlete and comparison groups separately. Results established that adolescents from the comparison population identified as possible cases of depressive disorder perceived their families to be significantly less cohesive ($\bar{x} = 46.7$) than non-cases ($\bar{x} = 56.8$); $t = 5.12$, $p = .0001$.

For the athletes, significance tests could not be conducted due to the very small number of cases (n = 3), however the results were similar to those for the comparison population - athletes identified as cases perceived their families to be less cohesive ($\bar{x} = 54.3$) than non-cases ($\bar{x} = 62.6$).

PART 2 - SELF ESTEEM AND DSRS SCORES

Magnitude of the association between GOSSIP sub-scales and mood

Once again a Pearson correlation matrix was calculated to determine the association between sub-scales of the self esteem questionnaire and DSRS scores. Computations were carried out for the athlete and the comparison groups separately. The findings are shown in Tables 44 and 45 respectively. The correlations have been rank ordered based upon the size of the correlation coefficient.

Table 44: Pearson correlation's between GOSSIP sub-scales and DSRS scores for young athletes

Global	Family	Mother	Father	School	Body image	Peer group	Sport
-.48	-.43	-.42	-.39	-.39	-.33	-.31	-.26

p < .05 for all results

Table 45: Pearson correlation's between GOSSIP sub-scales and DSRS scores for the comparison group

Global	School	Family	Peer group	Mother	Body image	Father	Sport
-.50	-.45	-.43	-.39	-.37	-.36	-.33	-.28

p < .05 for all results

The findings are broadly similar for both groups. All sub-scales are negatively correlated with DSRS scores and several have similar sized correlation coefficients - for example family (-.43 for both groups), body image (-.33 and -.36 for the athletes and comparison groups respectively) sport (-.26 and -.28 respectively). For both groups global self esteem correlated most highly with DSRS scores. What is also interesting to note is the small contribution 'sport' makes relative to the other domains for both the comparison population (-.26), and, surprisingly, the young athletes (-.28).

Multiple regression analysis

Based upon the outputs from the correlation analyses specific sub-scales were identified as possible predictors of DSRS scores. Global self esteem, family, school and peer group were identified as the variables with the greatest predictive utility. Family related sub-scales (family, mother and father) were found to be highly inter-correlated for both groups indicating multicollinearity[15], consequently family self esteem was chosen as the 'summary' variable and the others were omitted from the regression analysis.

The sub-scales of self esteem and group membership (athlete or non-athlete) were entered into a stepwise multiple regression analysis as independent predictors of DSRS scores for the total survey population. Results showed lower scores on each of the sub-scales predicted significantly higher DSRS scores ($F_{(5,}$

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[15] The correlations between these sub-scales were as follows;

for the athletes -

	Father	Mother
Family	.52	.67

for the comparison group -

	Father	Mother
Family	.55	.70

$_{789)}$ = 119.8, p <.0001). The adjusted R^2 for this model was .43. The results are summarised in Table 46.

Table 46: Stepwise multiple regression analysis showing significant predictors of DSRS scores for total sample population

Step/Predictor	Multiple R	R2	Beta	R2 change	F	Sig. F
1 Global self	.54	.29	-.42	.29	321.27	<.0001
2 Family	.61	.37	-.33	.08	232.31	<.0001
3 School	.63	.40	-.18	.03	174.59	<.0001
4 Group	.65	.42	-.13	.02	142.29	<.0001
5 Peer group	.66	.43	-.13	.01	119.78	<.0001

* Although age was found to be significantly correlated with self esteem it was not a significant predictor of DSRS scores in the above model.

Self esteem and caseness

To examine the effect self esteem may have upon the possibility of being a case of depressive disorder an independent samples t-test (2 tailed) was conducted for the athlete and comparison groups separately. Global self esteem was selected as the best measure to use in this analysis as it accounted for the greatest proportion of the variance in DSRS scores (29%). The results established that children and adolescents from the comparison population identified as possible cases had significantly lower global self esteem ($\bar{x}$ = 17.4) than non-cases ($\bar{x}$ = 22.5) - t = 7.19, p < .0001. For the athletes significance tests could not be conducted due to the very small number of cases (n = 3), however the pattern of results was similar to that of the comparison population. Those athletes identified as a case perceived their general self worth more negatively ($\bar{x}$ = 20.8) than non-cases ($\bar{x}$ = 24.2).

Family process, psychological factors and mood

The analyses conducted so far yielded both child and family variables with the best predictive power. In order to extend the investigation, cohesion, global self esteem and group membership were entered into a multiple regression analysis to determine if a model including both family and child factors could predict DSRS scores. Results showed lower cohesion and lower self esteem predicted significantly higher DSRS scores (F $_{(3, 553)}$ = 123.6, p <.00001). The

adjusted R^2 for this model was .40. Of the three variables used in the model global self esteem appeared to be the most important predictor (beta - .38). Beta coefficients and significance tests for each predictor are illustrated in Table 47.

Table 47: Forced entry multiple regression analysis showing significant child and family predictors of DSRS scores for total sample population

Variable	B	SE B	Beta	T	Sig. T
Global self	-.36	.03	-.38	-10.5	< .00001
Cohesion	-.10	.01	-.27	-7.4	< .00001
Group	-1.42	.29	-.18	-5.0	< .00001
(Constant)	23.67	.89		26.7	< .00001

PART 3 - ANALYSING THE ASSOCIATIONS BETWEEN MEASURES

It is clear from the results presented that the young athletes have significantly lower DSRS scores than children from the comparison population and significantly higher family cohesion and self esteem. The models produced suggest these variables have some association with depression as measured by the Birleson questionnaire. However it is important to determine whether the lower self esteem and family cohesion scores were an artefact of higher depression, or independent factors in their own right. The cognitive features of depression are regarded as an integral part of the criteria for the diagnosis of a major depressive episode (DSM-IV, 1994), although their role in the aetiology of the disease still remains the subject of considerable contention (Harrington, 1993). Consequently it was important to the aims of this thesis to establish whether the higher depression of the comparison group was affecting perceptions of themselves and their families or whether these cognitive variables were important explanatory factors independently.

To analyse the direction of the association between self esteem, cohesion and depression the athlete and comparison populations were stratified into two sub-groups on the basis of scores on GOSSIP. Children and adolescents scoring below the 20th centile for GOSSIP (a score of 19 or less), were classified as the low self esteem group. Those scoring above this cut-point were 'high' scorers. A chi square analysis indicated a significantly greater proportion of young people from

the comparison population belonged to the low self esteem group (82.4%) when compared to the athletes (17.6%; $\chi^2 = 59.1$, D.F. 1, $p< .00001$).

For the second stage of this analysis individuals from the two groups were stratified on the basis of their DSRS scores. Children and adolescents scoring below the 20th centile for DSRS (a score of 11 or less), were classified as the 'low depression group'. Those scoring above this cut-point the 'high depression group'. A 2 (high/low depression scores) by 2 (high/low self esteem) chi square analysis was run for the athlete and comparison populations separately. For the comparison group 11% fell in the cell representing low self/high depression compared with 1.6% from the athlete group. The final statistic comprised the analysis of a 4 (self by depression categories) by 2 (group membership) contingency table. These data provided information as to the association between high/low self esteem and high/low depression scores and group membership. A chi square analysis indicated significant differences between the two populations - approximately eight times as many comparison children (88.7%) belonged to the 'low self/high DSRS' score cell compared to the young athletes (11.3%); ($\chi^2 = 61.7$, D.F. 3, $p< .00001$). Results of the analysis are summarised in Table 48.

Table 48: The pattern of associations between self esteem and DSRS scores

	High self/Low DSRS	Low self/Low DSRS	High self/High DSRS	Low self/High DSRS
Comparison group	45.7 (269)	65.0 (65)	78.7 (48)	88.7 (47)
Athlete group	54.3 (320)	35.0 (13)	21.3 (13)	11.3 (6)
TOTAL	100 (589)	100 (100)	100 (61)	100 (53)

Values are %. Figures in brackets equal the numbers of children

Using these data it was possible to calculate the odds of a child being a member of the comparison population and having low self esteem and high depression. The two-by-two contingency table is based upon the following cells:

Table 49: Contingency table for the association between self-esteem and DSRS scores for the sample population

Risk factor classification	Comparison Group	Athlete Group	Total
Low self/High DSRS	47	6	53
High self/Low DSRS	269	320	589
Total	316	326	642

Values are numbers of children

The odds of 'low self/high DSRS' if the child is a members of the comparison population is computed using the formula AD/BC , where A...D represents the respective cells in the above contingency table. The odds ratio is therefore 47*320/269*6 = <u>9.32</u>.

This means that a child from the comparison population is over nine times more likely to have low self esteem and a high DSRS score than a young athlete.

For cohesion a MANOVA established independent effects for high/low depression (F $_{(3, 553)}$ = 15.9, p <.0001), high/low self esteem (F $_{(3, 553)}$ = 9.2, p = .003) and group membership (F $_{(3, 553)}$ = 16.4, p <.00001). Interaction effects were not significant.

The association between life experience, family process and mood

Inspection of the results indicated that compared with young athletes, children and adolescents from the comparison group (both males and females) have lower mean self esteem, lower mean family cohesion scores and elevated mean depression scores. These data suggest the possibility that there may be meaningful differences in the life experience of the young athlete and comparison populations which influence mood. A logistic regression analysis was carried out to determine if family process (cohesion), self esteem and group

membership (athlete or non-athlete) predicted the likelihood of high depression. This analysis could only be carried out on adolescents from the data-set (331 athletes and 427 from the comparison group) as only children aged 12 years and over completed the FACES scale.

In logistic regression the dependent or response variable is an indicator of the presence or absence of a particular factor - in this case high depression versus low depression (membership of the high/low depression group was determined using the centile cut-point described above) - the independent or explanatory variables were indicators for the presence or absence of some risk or exposure factor. In this model these factors were self esteem, family cohesion and group membership - athlete or non-athlete (entered into the analysis as a categorical, indicator variable). The actual model tested in the analysis was for the data of the athlete group (for a thorough explanation of how to fit the logistic model to binomial data see Collett ((1994) p 56 - 62).

The likelihood-ratio test was used to assess which of the above variables should be entered and subsequently remain in the model. This test involves estimating the model with each variable eliminated in turn and calculating the change in log likelihood when each variable is removed. Using this method the best fit for the data was the one which included all of the above variables. The result of the likelihood ratio tests are illustrated in Table 50.

Table 50: Logistic regression analysis of the effects of self esteem, family cohesion and group membership on low depression

Factor	χML^2	Change in χML^2	DF	p
All factors	336.61			
No cohesion	519.29	182.68	2	.0001
No group	347.44	10.83	2	.0001
No self esteem	425.88	89.27	2	.0001

These data produced the following model:

Depressive status

|	Constant	Cohesion	Self esteem	Group
log p (high depression)/p (low depression) =	- 5.79 +	.057 +	0.19 +	1.11
(std. error)	(.94)	(.01)	(.04)	(.37)

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This additive model indicates that depressive status is best predicted by the independent terms family cohesion, global self esteem and group membership. Using this model it is possible to establish the probability of having low depression in the presence of the above factors. For example, using the population averages for the athlete group for self esteem (24.2), and cohesion (62.5), would produce the fitted log model log $[p(\text{low depression})/p(\text{high depression})] = -5.79 + .057\,(62.5) + .19\,(24.2) + 1.11\,(1) = 3.5$. The estimated probability of having low depression if an athlete with the above values is therefore .97 or 97%.

From the model it is possible to plot the estimated probability of having a low DSRS score for both the athlete and comparison populations using family cohesion and self esteem as indicator variables. The horizontal axis represents the range of cohesion and global self esteem scores respectively, and the vertical axis the estimated probability of low DSRS. As can be seen in both figures the probability of low DSRS increases with higher family cohesion and self esteem. The models are summarised in the graphs below.

Association between cohesion and predicted probability of low DSRS scores

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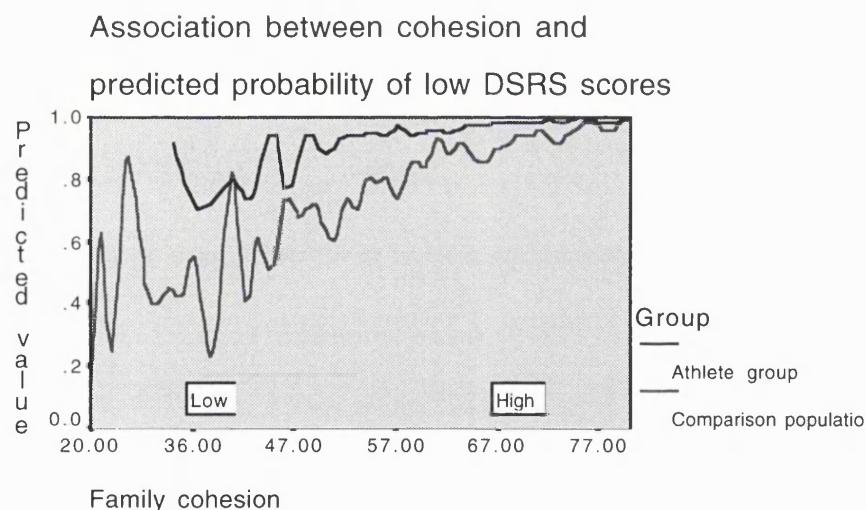
Association between self esteem and predicted probability of low DSRS

Athletes: n = 269. Reference group: n = 288
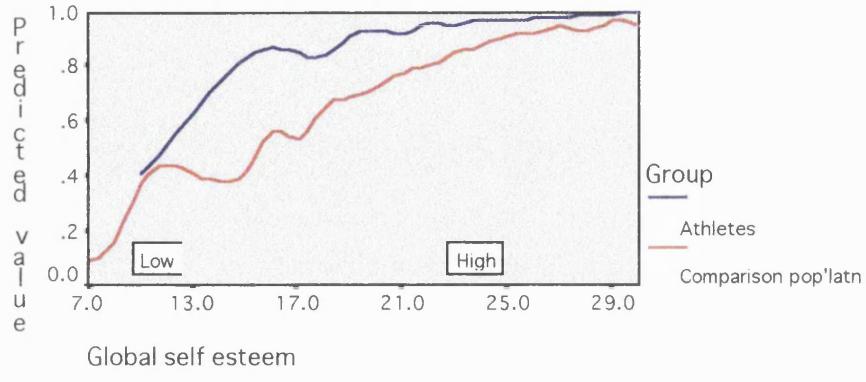
Goodness of fit of the model

After fitting the model to the data it is important to determine the extent to which the fitted values of the response variable under the model (high/low DSRS) compare with the observed values. One method is to use the classification table provided by SPSS. In this case the model correctly identified 87.8% of the population.

Odds ratios indicated by the model

In addition to providing an estimate of the probability associated with having a low depression score the multiple logistic function also provides odds ratios relating depressive status to each independent variable after adjustment for all the other variables. Odds ratios were calculated for each of the terms and are illustrated in Table 51. All odds ratios were greater than 1 according to 95% confidence levels. The highest odds ratio was obtained for group membership OR = 3.03. Using these data indicates that the odds of having low depression in the presence of all three factors - cohesion, self esteem and group membership - is 3.85.

Table 51 : Adjusted odds ratios for predictor variables

Factor	B	s.e.	Adjusted odds ratio	95% Confidence interval
Cohesion	.057	.01	1.06	2.83 - 2.94
Self esteem	.191	.04	1.2	3.16 - 3.6
Group membership	1.11	.36	3.03	10.2 - 42.1

FACTORS AFFECTING MOOD IN YOUNG ATHLETES

In addition to identifying significant differences between the athlete and comparison populations it was also important to the aims of this thesis to identify factors which may affect mood within the athlete group. Three areas were of specific interest - sports related factors, familial factors and biological factors[16].

Sports related factors

For sport there were two measures of specific interest, the intensity of a young athlete's training regime and his or her level of achievement.

Intensity of training and mood

A previous analysis indicated significant differences between the sports in the number of hours trained. Because of these differences the analysis of the association between training and mood was conducted for each sport separately. The number of hours trained was entered into a multiple regression analysis as an independent predictor of DSRS scores for each sport. Results showed no training effect even approaching significance. It was then decided to treat intensity of training as a categorical variable as previous research has indicated the association between over-training and mood (Morgan et al, 1987). To examine the possibility that extreme training regimes may be associated with

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[16] There was no significant difference between DSRS scores for the total athlete population and the sub-sample who took part in the interview assessment.

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higher DSRS scores, athletes from each sport were classified into one of three categories - low intensity, moderate intensity and high intensity of training. Definitions of each category were made on the basis of standard deviations for each sport group. Low intensity/high intensity were those athletes with hours trained ± 1.0 s.d. from the mean. Separate ANOVA's for each sport including intensity of training as the predictor variable revealed no main effect for gymnasts, swimmers or tennis players. For footballers the intensity of training was associated with DSRS scores ($F_{(2, 60)} = 3.9, p = .03$). A Scheffe test indicated footballers who had a high intensity of training had significantly lower DSRS scores ($\bar{x} = 2.5$) than those who trained only a moderate amount ($\bar{x} = 6.1$). This result should be interrrpreted with caution for two reasons. In the previous results section it was established that footballers had significantly lower levels of training when compared to the other three sports, consequently 'high' intensity of training in this population would be regarded as modest for a swimmer or gymnast; secondly this was the only significant effect noted in four comparisons.

Level of achievement and mood

Level of achievement was used as a predictor of DSRS scores. The subsequent analysis of variance indicated no significant main effect ($F_{(3, 423)} = 1.54, p = $ n.s.). Rather than using a four-point rating of achievement the sample was split into two sub-groups - high achievers and low achievers. The ANOVA approached significance ($F_{(1, 162)} = 3.13, p = .08$). Those who had achieved significant representative honours had lower mean DSRS scores (5.5) when compared to young athletes with more modest achievements ($\bar{x}$ DSRS = 6.5).

Family factors

Previous studies have suggested parental over-involvement may be a cause of emotional problems in young athletes. During the interview assessment several different ratings of parental involvement in sport were obtained:

- the young athletes' perceptions of the importance of sport to their parents.
- parental reaction to failure.
- ruminative worry about letting parents down during competition.
- avoidance of sport.

Importance of sport to parents

The distribution of the young athletes perceptions of the importance of sport to their parents is summarised in Table 52.

Table 52: Young athletes perceptions of importance of sport to their parents

Perceived importance	Father	Mother
Not important	3 (1.8)	-- (--)
Mild importance	44 (26.2)	41 (23.4)
Moderate importance	80 (47.6)	106 (60.6)
Marked importance	41 (24.4)	28 (16.0)
TOTAL	168 (100)	175 (100)

% in parenthases

The median value for both mothers and fathers was 2 - a rating of 'moderate importance'. Using level of importance as a predictor variable there was no evidence of an effect on DSRS scores for either parent (importance fathers: $F_{(3, 153)}$ = .381, p = n.s.; importance mothers: $F_{(2, 153)}$ = .422, p = n.s.).

Worry about parental reaction to failure

Most athletes reported never (71.1%) or only occasionally (23.9%) worrying about facing their parents after they hadn't done well in competition. A very small number (9 athletes - 5%) reported frequently or very often worrying. There was no significant association between level of parental importance and worry over facing parents after competition (father: χ^2 = 10.9, D.F. 6, p = n.s.; mother χ^2 = 7.7, D.F. 4, p = n.s.). Nor did worry have a significant effect on DSRS scores ($F_{(2, 174)}$ = .664, p = n.s.).

There was a similar distribution of scores for the rating of how often the young athletes worried about disappointing their parents or letting them down. Most reported never (66.9%) or only occasionally (27.1%) worrying, a very small number (11 athletes - 6.1%) reported frequently or very often worrying. All further statistical tests were not significant.

Latent avoidance

Most athletes reported that they did not feel relieved if they were forced, through injury or illness, to take a break from training (91.1%). Only a small number did express relief (n = 17, 9.7%). There was no significant association between the importance of sport to mothers and avoidance (χ^2 = 10.9, D.F. 6, p = n.s.), but there was a moderate association between children's perceptions of the importance of sport to their fathers and avoidance (χ^2 = 17.0, D.F. 9, p = .05). Specifically, those athletes who reported 'moderate' relief from missing training perceived sport to be of 'moderate' (41.7%) or 'marked importance' (50.0%) to their fathers. Analysing these cases further, of those who reported 'moderate' or 'severe' avoidance' (n = 17) most were male (82.4%). No other trend was discernible.

Using avoidance as an independent predictor of DSRS scores established a significant main effect (F $_{(3, 169)}$ = 2.73, p = .05) - those who reported severe avoidance had significantly higher DSRS scores than those who never avoided training or competition (a mean score of 11.0 compared to 5.8 respectively).

BIOLOGICAL FACTORS

Effect of pubertal status on depression scores for males

Two measures of male pubertal status were available - testicular volume and a visual assessment of genital maturation. A simple regression of testicular volume on DSRS scores was marginally significant (F $_{(1, 222)}$ = 3.34, p = .07) although it explained virtually none of the variance (the adjusted R^2 for this model was .01). Using the visual assessment of maturation as an independent variable established that there was no main effect of pubertal status on DSRS scores after controlling for the effects of age (F $_{(2, 219)}$ = 1.16, p = n.s.).

Effect of pubertal status on depression scores for females

For female athletes two measures of pubertal status were available - age of onset of menstruation and a visual assessment of breast development. Stage of breast development had no significant effect on DSRS scores (ANOVA: $F_{(2, 213)}$ = 1.05, p = n.s.). Subsequent analyses were conducted to determine if age of onset of menstruation and the timing of menarche predicted DSRS scores. A simple regression of age of onset of menarche with DSRS scores was not significant ($F_{(1, 170)}$ = .438, p = n.s.).

To examine the possibility that extreme deviations from the usual date of menarche may be associated with elevated DSRS scores female athletes were classified into one of three categories - early, on time and late menarche. Early developers were defined as those who had achieved menarche by the age of 12, late developers as those who had not started menstruation by their 14th. birthday[17]. The numbers associated with each category are described in Table 53.

Table 53: Sample of female athletes stratified by menearchal status

	N	%
Early	21	11.9
On time	88	50.0
Late	67	38.1
TOTAL	176	100

Analysis of variance indicted no significant main effect for timing of menarche ($F_{(2, 151)}$ = 1.76, p = n.s.).

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[17] These cut-points were suggested by Brooks-Gunn & Warren (1988).

RESULTS III:LONGITUDINAL ANALYSIS

INTRODUCTION:

The previous two results sections summarised the results of the cross sectional analyses. This, the third and final results section, presents the findings from the longitudinal data set.

LONGITUDINAL ANALYSIS: DATA ANALYSIS PROCEDURES

The objectives and procedures for the longitudinal data analysis were as follows:

- to determine the stability of the measurements taken over the period of the investigation and the predictive utility of measures taken.
- to determine the predictive utility of baseline measures of depression, self esteem and cohesion for visit 2 and visit 3 DSRS scores
- to determine whether there were significant differences at onset of the study, and later on, between those athletes who continued intensive training and completed all three visits and those who retired or changed their involvement.

Description of statistical methods.

The purpose of the statistical analysis in this chapter was to demonstrate the stability of measurements across the three visits. The variable-oriented method was selected to analyse stability. Using this approach the focus of interest is on mean differences for a certain variable or on the relationships among variables (for a review of longitudinal methodology stability and change see Magnusson et al, 1991). Stability was assessed in three ways. Pearson Product Moment correlation coefficients were computed for each of the main variables at visits 1, 2 and 3. To explore stability in greater detail, repeated measures multivariate analysis of

variance was used. In repeated measures analysis, the dependent variables represent different measurements of the same variable over time. Multiple regression analysis was used to predict visits 2 and 3 depressive symptomatology using family process and life experience variables measured at visit 1 (baseline).

STABILITY OF MEASURES ACROSS VISIT

The following analyses monitor the stability of the measures taken for those children who visited the Institute on all three occasions and who continued to participate in intensive training.

Stability estimates for DSRS, self esteem and cohesion

Depression data set

The DSRS longitudinal data set comprised 246 young athletes. Before analysing the stability of these scores a series of independent t-tests were conducted to establish whether those children who completed all three visits had significantly different scores compared with those who dropped out of the study and failed to return for either visits 2 or 3. Results established there were no significant differences between any sport or gender group. Nor was there a significant gender difference between those who continued in the study, and those who dropped out, for the sports population as a whole. Mean DSRS scores for the athletes who completed the survey stratified by visit, gender and sport are illustrated in table 54. Cross-sectional data from the comparison group have been included for comparative purposes.

Gender and group comparisons for the longitudinal data set

A MANOVA was conducted to determine if gender or the type of sports participation had any effect on depression scores for visits 1, 2 or 3. The results established that there was no significant gender by activity interaction (Pillais $_{(6, 476)}$ = .49, p = n.s.), nor was there a significant difference between male and female DSRS scores for the athlete population as a whole across the three visits

(Pillais $_{(3, 237)}$ = 1.9, p = n.s.). There was however a significant multivariate effect for type of sport (Pillais $_{(9, 717)}$ = 2.0, p = .03). A univariate F-test established gymnasts ($\bar{x}$ = 6.8) had significantly higher DSRS scores than tennis players ($\bar{x}$ = 4.8) for visit 3 (F $_{(3, 242)}$ = 4.5, p = .004). However this was the only significant result, among four comparisons.

Table 54: Mean DSRS symptomatology score by group, gender and visit

Group	Visit 1	Visit 2	Visit 3
Football (31)	5.1 ± 2.8	4.7 ± 3.6	4.7 ± 2.8
Gymnastics			
Male (16)	7.8 ± 4.2	6.4 ± 3.3	6.6 ± 3.8
Female (36)	6.4 ± 3.7	6.1 ± 3.2	6.9 ± 3.9
Swimming			
Male (32)	6.3 ± 3.6	5.8 ± 3.3	5.7 ± 4.1
Female (38)	4.9 ± 2.2	5.6 ± 3.6	6.3 ± 4.0
Tennis			
Male (52)	5.8 ± 3.1	5.1 ± 3.5	4.8 ± 2.9
Female (41)	5.7 ± 3.0	5.1 ± 2.9	4.9 ± 3.1
Comparison group			
Male (236)	7.9 ± 4.0		
Female (241)	9.3 ± 4.5		

Figures in brackets numbers of children. Values are means ± standard deviations.

Cohesion data set

The cohesion longitudinal data set comprised 155 young athletes. Before analysing the stability of these scores a series of independent t-tests were conducted to establish whether those children who completed all three visits had significantly different scores to those who dropped out of the study. Results established there were no significant differences between any sport or gender group. Nor was their a significant gender difference between those who continued in the study, and those who dropped out, for the sports population as a whole. Mean cohesion scores for the athletes who completed the survey stratified by visit, gender and sport are illustrated in table 55. Cross-sectional data from the comparison group have been included.

A MANOVA was conducted to determine if gender or type of sports particiption had any effect on cohesion scores for visits 1 to 3. Results established that there was no significant gender by activity interaction (Pillais $_{(6, 294)}$ = .52, p = n.s.), nor was there a significant difference between male and female cohesion scores for the athlete population as a whole across the three visits (Pillais $_{(3, 146)}$ = .43, p = n.s.). Neither was type of sport significant (Pillais $_{(9, 444)}$ = 1.1, p = n.s.).

Table 55: Mean family cohesion score by group, gender and visit

Group	Visit 1	Visit 2	Visit 3
Football (29)	63.3 ± 8.8	64.2 ± 7.0	62.1 ± 8.4
Gymnastics			
Male (10)	63.0 ± 5.7	58.2 ± 7.9	55.6 ± 8.5
Female (16)	63.3 ± 5.3	62.4 ± 5.1	60.3 ± 9.0
Swimming			
Male (22)	64.9 ± 8.3	61.3 ± 9.4	60.9 ± 8.2
Female (28)	62.5 ± 7.2	58.9 ± 7.8	58.7 ± 9.9
Tennis			
Male (27)	62.5 ± 7.2	61.2 ± 9.9	60.1 ± 11.1
Female (23)	61.4 ± 10.7	62.6 ± 10.3	61.5 ± 10.8
Comparison group			
Male (163)	45.7 ± 9.8		
Female (171)	46.3 ± 10.0		

Figures in brackets numbers of children. Values are means ± standard deviations.

Self esteem data set

The self esteem longitudinal data set comprised 195 young athletes. Before analysing the stability of these scores a series of independent t-tests was conducted to establish whether those children who completed all three visits had significantly different scores to those who dropped out of the study. Results established there were no significant differences between any sport or gender group. Nor was there a significant gender difference between those who continued in the study, and those who dropped out, for the sports population as

a whole. Mean scores for the athletes who completed the survey stratified by visit, gender and sport are illustrated in table 56. Cross-sectional data from the comparison group have been included for comparative purposes.

Gender and group comparisons for the longitudinal data set

A MANOVA was conducted to determine if gender or group had any effect on global self esteem scores for visits 1 to 3. Results established that there was a significant gender by activity interaction (Pillais $_{(6, 374)}$ = 2.3, p = .03). Thus data analysis indicated that there was no significant difference between male and female self esteem scores for the athlete population as a whole across the three visits (Pillais $_{(3, 186)}$ = 1.9, p = n.s.). Neither was type of sport significant (Pillais $_{(9, 564)}$ = .80, p = n.s.). A series of t-tests were carried out to determine the location of the interaction effect. The results established that male swimmers ($\bar{x}$ = 25.0) had significantly higher self esteem than females ($\bar{x}$ = 22.8) for visit 1 (t = 2.38, DF 57, p = .02), and that male tennis players ($\bar{x}$ = 26.0) had higher scores than female players ($\bar{x}$ = 23.9) for visit 2 (t = 2.45, DF 73, p = .01). Across all visits males had higher global self esteem scores than females (visit 1: t = 2.51, DF 193, p = .01: visit 2: t = 2.56, DF 193, p = .01: visit 3: t = 2.76, DF 193, p = .006).

Table 56: Mean global self esteem scores by group, gender and visit

Group	Visit 1	Visit 2	Visit 3
Football (24)	25.5 ± 2.7	25.4 ± 2.8	25.3 ± 2.8
Gymnastics			
Male (9)	24.4 ± 2.5	23.7 ± 3.7	25.1 ± 3.5
Female (28)	23.5 ± 3.6	24.9 ± 3.1	23.2 ± 4.6
Swimming			
Male (27)	25.0 ± 3.7	24.6 ± 4.2	24.1 ± 4.6
Female (32)	22.8 ± 3.2	23.2 ± 3.7	23.2 ± 3.8
Tennis			
Male (41)	24.3 ± 4.1	25.9 ± 2.9	25.9 ± 3.5
Female (34)	24.2 ± 3.5	23.9 ± 4.4	24.4 ± 4.6
Comparison group			
Male	23.0 ± 4.2		
Female	21.1 ± 4.7		

Figures in brackets numbers of children. Values are means ± standard deviations.

Summary of findings

The results of the analysis of the longitudinal data set for DSRS, family cohesion and global self esteem are almost identical to the cross-sectional findings reported the first results section (chapter 5). With the exception of DSRS scores the results remain relatively constant across visits and do not appear to be affected by type of sport or the gender of the young athlete. The reason for the between sports difference in depression scores would appear to be the result of a reduction in mean DSRS for tennis players, from 5.7 for visit 1 to 4.8 for visit 3, compared to a relatively stable pattern of results for young gymnasts. Overall these data indicate little in the way of group or gender effects over time, and therefore subsequent analyses investigating the stability of measures taken will treat the athletes as belonging to a homogeneous group.

Stability of the athlete data across visits

A Pearson correlation matrix was calculated to gauge the stability of individual athletes' self esteem, family cohesion and DSRS scores across visits. The results are shown in Table 57.

Table 57: Stability estimates across visits

	Visit 1 - Visit 2	Visit 1 - Visit 3	Visit 2 - Visit 3
Global self esteem (195)			
Male (101)	.41	.32	.54
Female (95)	.54	.52	.69
DSRS (246)	.46	.38	.53
Cohesion (179)	.62	.78	.62

Note: all estimates significant at p< .001; numbers of subjects given in parentheses

As can be seen in Table 57, the stability estimates were all significant, ranging in value from .34 to .78. The greatest stability of scores was for family cohesion.

To explore the stability of these variables in greater detail repeated measures MANOVA were conducted for each measure separately. Each analysis

tested the hypothesis that there was no significant difference in scores across visits. For the purpose of the following analyses two contrasts were available. The two contrasts, $t2$ and $t3$, represent the effect of time: $t2$ represents the main effect of visit 3, $t3$ the main effect of visit 2. Multivariate tests of significance established that adolescents' perceptions of family cohesion reduced over time (Pillais $(2, 153)$ = 9.6, p < .0005). Inspection of specific contrasts indicated a significant difference between visit 3 and baseline (F $(1, 154)$ = 19.0; p < .0005). For global self esteem and DSRS scores MANOVA established there was no significant time effect (Pillais $(2, 193)$ = 1.4, p = n.s. ; and Pillais $(2, 224)$ = 1.3, p = n.s. respectively).

STABILITY OF GROUP EFFECTS ACROSS VISITS - ATHLETES VERSUS THE COMPARISON POPULATION

Cross sectional analyses reported in the previous results chapters established that athletes had significantly higher cohesion and self esteem scores, and significantly lower depressive symptomatology than children and adolescents from the comparison population. Using the results from the comparison group as a criterion variable a series of ANOVA's were conducted to establish whether these group differences were stable across visits. Results established the athletes at visits 2 and 3 still perceived their families to be closer, had higher self worth and lower DSRS scores than the comparison group at single points in time. The results are summarised in Table 58 (see tables 54 to 56 for summaries of the group means).

Table 58: Planned comparison F ratios for the athlete and comparison populations

Measure/visit	F ratio	p
DSRS:		
Visit 2	$F_{(1, 841)} = 146.0$	<.0001
Visit 3	$F_{(1, 733)} = 96.4$	<.0001
Cohesion		
Visit 2	$F_{(1, 621)} = 59.0$	<.0001
Visit 3	$F_{(1, 567)} = 36.5$	<.0001
Self esteem		
Visit 2	$F_{(1, 769)} = 82.2$	<.0001
Visit3	$F_{(1, 695)} = 62.5$	<.0001

FAMILY PROCESS, COGNITION AND MOOD - STABILITY AND CHANGE IN ASSOCIATIONS ACROSS VISITS

Previous results showed lower cohesion, self esteem and group membership predicted higher depressive symptomtology. To assess the stability of this finding across visits scores on these variables from visits 2 and 3 were entered into a multiple regression analysis. Results established that for both visits the predictors were significantly associated with depressive symptomtology (visit 2: $F_{(3, 555)} = 123.5$, p < .005, $R^2 = .40$: visit 3: $F_{(3, 514)} = 126.8$, p < .0005, $R^2 = .42$). Beta coefficients and significance tests for each predictor are illustrated in Tables 59 and 60 respectively.

Table 59: Forced entry multiple regression analysis showing significant child and family predictors of DSRS scores for visit 2

Variable	B	SE B	Beta	T	Sig. T
Global self	-.33	.03	-.36	-9.7	< .00001
Cohesion	-.11	.01	-.29	-7.8	< .00001
Group	-1.6	.30	-.19	-5.4	< .00001
(Constant)	23.8	.89		26.8	< .00001

Variable	B	SE B	β	T	Sig. T
Global self	-.38	.03	-.41	-10.9	< .00001
Cohesion	-.11	.01	-.28	-7.6	< .00001
Group	-1.32	.30	-.15	-4.3	< .00001
(Constant)	24.6	.90		27.4	< .00001

In addition to using continuous variables to predict depressive
symptomatology contingency tables were used to measure the association
between various categories of self esteem and DSRS. The odds of low self/high
DSRS were calculated for both athletes and children from the comparison
population. The same statistic was calculated for visits 2 and 3. Risk odds ratios
were 5.9 for visit 2 and 4.25 for visit 3. These data indicate the odds of low self
image and high depressive symptomatology reduced over time from 8.75 at visit
1 to 4.25 at visit 3, i.e. the difference between the athlete group and the
comparison population reduced over the course of the study.

FAMILY PROCESS AND SELF ESTEEM AS PREDICTORS OF DEPRESSIVE SYMPTOMATOLOGY

Correlation analyses were conducted to determine whether demographic,
family and cognitive variables were predictive of visit 2 and 3 depression scores.
The predictor variables included age, cohesion, global self esteem, family self
esteem and DSRS scores at visit 1. These variables were chosen as they were
shown to have a significant association with DSRS scores in the cross sectional
analysis. The results are summarised in Table 61.

Table 61: Predictive correlation's between demographic, family and
self esteem variables at visit 1 and the depression measures at visits 2 and 3

	DSRS visit 2	DSRS visit 3
Age	-.06	-.10
Cohesion	-.16*	-.32**
Global self esteem	-.24**	-.26**
Family self esteem	-.34**	-.28**
DSRS score visit 1	.46**	.37**

* p < .05; ** p < .001

Multiple regression analysis

Stepwise multiple regression analyses were performed to predict the outcome of depressive symptomatology at visits 2 and 3 using visit 1 variables.

Prediction of visit 2 depression

To predict visit 2 DSRS scores, a visit 1 predictor set was constructed that included all of the items included in the above table. The regression analysis was a significant one variable equation, (F $_{(1, 201)}$ = 54.6, p < .0001) with baseline DSRS score the best predictor of time 2 depression accounting for 21% of the variance.

Prediction of visit 3 depression

The above predictor set was used once again and produced a significant 4 variable equation, (F $_{(4, 135)}$ = 12.7, p < .0001). Baseline DSRS was entered at step 1 and accounted for 19% of the variance. Cohesion was entered at step 2 (2%), age at step 3 (2%) and family self esteem at step 4 (2%). Global self esteem was not entered into the equation. The results are summarised in Table 62.

Table 62: Stepwise multiple regression analysis showing significant predictors of visit 3 DSRS scores

Step/Predictor	MultipleR	R2	R2 change	F	Sig. F	Beta In
1 DSRS	.44	.19	.19	32.6	<.0001	.437
2 Cohesion	.47	.21	.2	18.9	<.0001	-.18
3 Age	.50	.23	.2	15.0	<.0001	-.16
4 Family self esteem	.52	.25	.2	12.7	<.0001	-.18

RETIREMENT

The longitudinal sample included 271 athletes (this represented 59.8% of the initial total). Of the remainder 12.8% had retired from, or given up intensive training (n = 58) and 27.4% (n = 124) had withdrawn or been

excluded from the study[18]. The statistical analyses in this section focus on comparisons between athletes who continued intensive training and attended all three visits and those who retired. Cross-sectional data on the group which subsequently retired were compared on first visit data with the group that did not retire from sport. Further, a significant number of individuals from the group who retired, returned for further visits so it was possible to compare these with those who had not retired to examine the effect of retirement on mood, family process and cognition.

First visit comparisons of children who participated in all three visits compared to those who retired from intensive training indicated the retired group were more likely to be female (χ^2 = 6.9, D.F. 1, p= .009), be involved in gymnastics or swimming (χ^2 = 15.3, D.F. 3, p= .002), be older (14.9 versus 13.1 years; t = -5.56, D.F. 327, p < .0001) and train more hours per week (12.1 versus 9.97 hours per week; t = -2.61, D.F. 326, p = .01). There was no significant difference in scores on initial DSRS, family adaptability or cohesion, or global self esteem between the retired and non-retired groups. However athletes who attended all three visits did have significantly higher family self esteem (12.9 versus 12.2; t = 2.0, D.F. 373, p = .05). The results are summarised in Table 63 below.

Table 63: Comparison of mean scores for depression and family functioning by sample population

	All visits	Retired	't'	Sig.
DSRS (depression)	5.8	6.2	-1.18	.244
Family cohesion	62.8	62.2	.55	.589
Family adaptability	49.3	50.4	-1.31	.195
Hours trained	9.97	12.1	-2.61	<.001
Age	13.1	14.9	-5.56	<.001
Self esteem	12.9	12.2	2.0	.05

Results of a longitudinal analysis for the retirement sub-group

In addition to the 271 young athletes who attended all three visits a small but significant number of those who retired from youth sport also

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[18]   For a more detailed description of attrition see Chapter 4.

returned (n = 28). Data from these two groups enabled me to make longitudinal comparisons. Repeated measures ANOVA was used to analyse differences between the athlete and retirement groups mood, self esteem and family process. In addition to analysing within subject effects the model also included an analysis of the effects of retirement to establish whether athletes who remained in sport were significantly different from those who retired from intensive training.

Family process

The mean family cohesion scores for the two groups stratified by visit are presented in Table 64.

Table 64: Mean family cohesion scores by visit

	Visit 1	Visit 2	Visit 3
Non-retired group (155)	62.9	61.5	60.3
Retired group (28)	58.1	53.5	55.6

Figure in brackets number of children. p < .002 after correcting for age

Repeated measures ANOVA tested the within subject effect of cohesion across visits. The model also included the main effect, retirement status, and the interaction term retirement status by cohesion. As results from a previous analysis had established a significant association between advancing age and lower cohesion scores, age was entered into the model as a covariant. This removed the effect of the age difference between the two groups noted above.

The model established a significant difference in perceived family cohesion between the two groups after correcting for the effects of age, ($F_{(1, 175)}$ = 10.0, p =.002). Between first and subsequent visits the athletes perceived their families to be closer than children who had retired from sport. The adjusted means were 106.7 for the athletes and 96.5 for the retired group. Within subjects analysis indicated a significant effect for cohesion over time ($F_{(2, 351)}$ = 3.3, p =.04), the interaction term 'cohesion by retirement' approached significance ($F_{(2, 351)}$ = 2.9, p =.06). Further analysis of the

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adjusted and estimated means for the main effects of visits 2 and 3 established the largest difference to be for visit 2. The pattern of results and the meaning of the interaction term can be better understood by consulting figure 9.

Figure 9

A comparison of family cohesion scores by visit

Athlete and retirement groups
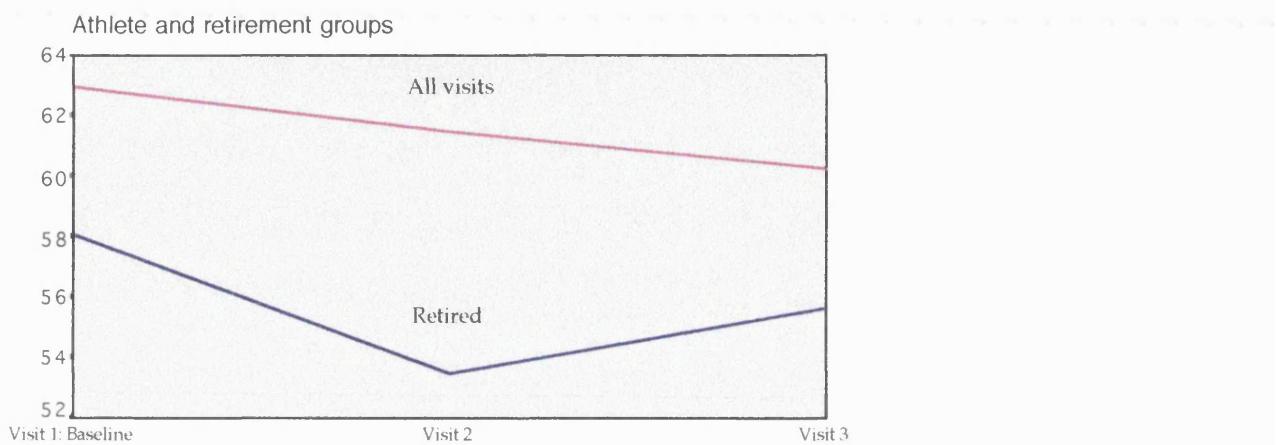
From the above illustration it is evident that although cohesion declines over time in both groups there is a particularly 'steep' reduction in scores for the retired group between visits 1 and 2 (contrast $t3$).

Mood

The mean DSRS scores for the two groups stratified by visit are presented in Table 65.

Table 65: Mean DSRS scores by visit

	Visit 1	Visit 2	Visit 3
Non-retired group (246)	5.8	5.5	5.6
Retired group (25)	6.6	5.3	5.3

Figure in brackets number of children. p not significant

The statistical model used was identical to the one described above but substituting DSRS scores for cohesion. The model established there was no significant difference in depressive symptomatology between the two groups

($F_{(1, 268)}$ = .47, p = n.s.). Similarly, the within subjects analysis indicated there was no significant effect for visit ($F_{(2, 537)}$ = .60, p < n.s.).

Self esteem

The mean global self esteem scores for the two groups stratified by visit are presented in Table 66.

Table 66: Mean self esteem scores by visit

	Visit 1	Visit 2	Visit 3
Non-retired group (195)	24.2	24.6	24.5
Retired group (26)	23.3	24.7	24.7

Figure in brackets number of children. p not significant

The statistical model used was similar to the ones described above with the exception of omitting the covariate. Previous analysis had not established age as a significant predictor of self esteem. The between group analysis established that the effect of retirement was not statistically significant ($F_{(1, 219)}$ = .09, p = n.s.). Within subjects analysis indicated a significant effect for visit ($F_{(2, 41619)}$ = 3.5, p =.03). Inspection of specific contrasts indicated a significant difference between visit 3 and baseline. The distribution of results is illustrated in the following figure.

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[19] Degrees of freedom were adjusted using Greenhouse-Geisser Epsilon value of .952 as Mauchly Sphericity test indicated the data may not be spherically distributed; a pre-condition when using repeated measures ANOVA.

Figure 10.

A comparison of self esteem scores by visit

Athlete and retirement groups
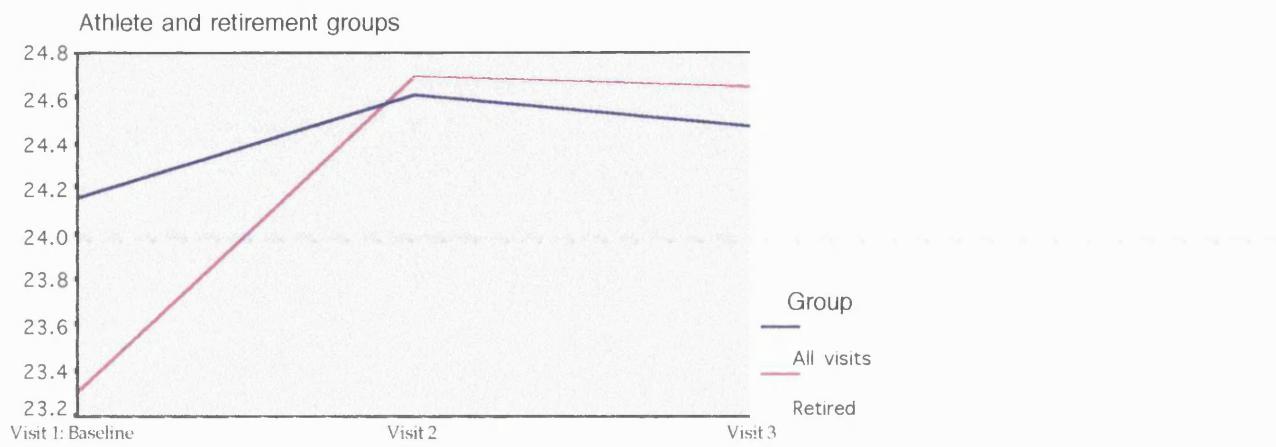
The above figure indicates that differences in self esteem across visits were accounted for by the increased self image of the retirement group. It would appear from these data that the retirement group had a more positive image of themselves once they had withdrawn from intensive training.

The following chapter will discuss the implications of the findings from both the cross sectional and longitudinal data analysis.

Chapter 8
DISCUSSION AND SUMMARY

DISCUSSION

The final chapter of the thesis will present the main findings of the research. The ways in which these may have been vitiated by methodological limitations will be discussed and policy implications and implications for future research presented.

REVIEW OF THE AIMS AND OBJECTIVES OF THE THESIS

Before discussing both the main findings and the strengths and weaknesses of the research methodology it is perhaps useful to re-capitulate the objectives of the thesis which were described in Chapter 3. The objectives were sub-divided into population based research questions, which considered differences between the athlete and non-athlete groups, and sports specific questions which addressed the life experience of the young athletes only.

Population based questions

- it was hypothesised that there would be no significant difference between the young athletes and comparison populations in depressive symptomatology. Related to this expectation were a number of subsidiary expectations based upon previous findings in the research literature: that male athletes and males from the comparison population would have lower depression scores than their female counterparts, and that there would be a significant association between depression and age for both groups.

- there was a series of related questions looking at the association between depression and the protective factors of self esteem and family process.

Sports specific questions

Sports specific questions concerned:

- the relationship between training and mood. It was anticipated that athletes involved in excessive training routines would be more at risk of depression than those with a more modest involvement.
- over-involved parents would be a source of emotional strain for athletes resulting in higher depression scores.
- retirement from intensive training would be associated with changes in depression scores

SUMMARY OF THE MAIN FINDINGS

The main findings of the thesis were as follows:

Group effects

There were significant differences between the athlete and comparison groups in self reported depressive symptomatology. Children and adolescents who participated in intensive training had lower depression scores as measured by Birleson's DSRS (1981), and, with the exception of swimmers, lower scores on the depression sub-scale of the 28 item GHQ (Goldberg, 1978)

Sex differences

Female athletes had significantly lower depression scores than males or females from the comparison population. There was no difference between the male and female athletes in their depression scores. This finding is at odds with the trend seen in the comparison population in this study and with previous research which has established higher levels of depression among girls than among boys (Rutter, 1986).

Effects of age on depressive symptomatology

For athletes, depression scores gradually declined with age. There was no significant age effect for the comparison population.

Effects of puberty on depression

Pubertal status had no effect on depression in males or females. In addition the timing of menarche - whether early or late maturation - did not affect the likelihood of low mood in female athletes.

Life experience, family process and depression

Compared with young athletes, children and adolescents from the comparison group (both males and females) had lower mean self esteem, lower mean family cohesion scores and elevated mean depression scores. These data suggest that either there are meaningful differences in the life experience of young athletes which protect them from depression, or that children with high resistance to depression are selectively likely to enter intensive training, or that no such selection factor operates, but that young athletes predisposed to depression drop-out after a relatively short period of time.

Odds and risk

A child from the comparison population was over nine times more likely to have low self esteem and high depressive symptomatology (as measured by the DSRS) than a young athlete.

Stability of findings

The findings were highly consistent over the time period of the study (two years) and indicate considerable stability in the athletes' perceptions of themselves and their families, whether or not they withdrew from intensive training.

Prediction of future depression

The best predictor of the cross-sectional depression score was a model which included global self esteem, family cohesion and group membership. This model accounted for 40% of the variance in DSRS scores. Using the longitudinal model, the baseline DSRS score was the best predictor of the subsequent depression score, explaining 21% of the variance. The best predictor of visit 3

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DSRS score (two years from baseline) was a model which included baseline DSRS, cohesion, age and family self esteem. These variables explained 25% of the variance.

METHODOLOGICAL STRENGTHS AND LIMITATIONS

Before beginning the analyses, I had not expected to find significant differences between the young athletes and the comparison population in depressive symptomatology. In addition it was anticipated that the prevalence of DSRS scores would increase with age and females would experience higher depressive symptomatology than males. This was clearly not the case. In this situation it was necessary to consider to what extent limitations in the design of the study could have been responsible for not finding what had been expected.

Strengths

I shall first consider the strengths of the research methods and procedures first.

Sample

The sampling process was designed to produce a representative sample of intensively training young athletes. Selection criteria were clearly defined and professional sports coaches provided lists of the names of all children who fulfilled these criteria. The sample population was then randomly selected from a database of eligible children. The catchment area of the study was sufficiently large to avoid criticisms of regional bias and the age range - 9 to 19 years - the number of hours trained and level of achievement were sufficiently varied to ensure the research findings were robust, and generalisable to the young athlete population as a whole.

Attrition

Psychological problems have been found to be more prevalent among those who withdraw from epidemiological studies (Aro, 1988; Cox et al, 1977). The comparison between athletes who continued in sport and those who retired

did not support this finding. Although significant differences did emerge between the two groups these were related to age and the number of hours trained and whilst not indicating greater pathology did reflect the life cycle of youth sport where most children 'retire' or change their involvement during mid-to-late adolescence (Rowley, 1992).

Attrition was larger than one would have wished (41.2%) but compares favourably with other longitudinal studies. For example, a review of multidisciplinary longitudinal studies conducted since 1900 found attrition ranged between 14% and 82% (Kemper et al, 1983).

Cohort effects

Could the difference between the athlete and comparison populations in depressive symptomatology be due to cohort effects? The modal ages of children in successive cohorts were separated by only two years (in the case of the athletes), and one year (in the case of the comparison group). Consequently there are no grounds for expecting that members of the different cohorts were exposed to different conditions which would affect their probability of experiencing depression.

Measurements

For screening large numbers of young people self report questionnaires offer a reasonably reliable and cost-effective method of measuring the dimension of depression. The measures of depression, IQ and family process were obtained using valid and reliable self report measures which enabled me to compare the results from both the athletes and comparison populations with previously published data. It would have been preferable however, to use interview measures to determine psychiatric status, but resources did not permit this. Pubertal status was determined by physical examination by two trained raters making statistical tests particularly reliable.

An important aspect of the research findings was to determine whether the depression scores of the comparison group were higher because of their greater chronological age. To eliminate a possible age effect the numbers of athletes and reference children in each age band were matched using a random

numbers procedure. Results from this sub-sample established that the significant difference in depression scores was a function of group membership rather than chronological age.

Comparison with other studies using the Birleson DSRS

An indirect method of validating the main findings of this study was achieved by comparing the findings with previous research which has used the DSRS. A summary of the main findings of these investigations is described in Table 12 in Chapter 4. From the table it is evident that studies using children and adolescents from the general population are limited. However, two of the larger studies do offer some reliable comparative data. Firth and Chaplin (1987) report mean DSRS scores of 9.0 (S.D. ± 4.32), for boys aged between 7 and 12 years 11 months, and 6.3 for adolescent males aged between 13 and 18 years (S. D. ± 1.30). Stratifying the athlete population using these age bands produces mean DSRS scores of 6.6 (S.D. ± 3.37) and 5.4 (S. D. ± 3.1) respectively. The male athletes have lower mean DSRS scores at both age periods. For females there is less available data. Yule et al (1990) do provide some comparative data for a group of 71 adolescent girls aged 14 to 16 years. They report a mean DSRS score of 11.5. Female athletes in the same age range had a substantially lower mean DSRS score of 5.4 (S.D. ± 3.2). It is also interesting to note that a comparison of the female athletes' DSRS scores with those obtained for males in the study conducted by Firth and Chaplin (op cit.) indicates that the athletes have lower mean scores at both age periods - 6.5 (S. D. ± 3.19) and 5.8 (S. D. ± 3.37) respectively.

Comparisons of the main findings with results obtained from other measures used in the study

Partial support for the main study findings was provided by the results from the depression sub-scale of the GHQ. Males from the athlete population were again found to have significantly lower depression scores than males from the comparison population. However, unlike the findings when using the Birleson depression scale there was no significant difference between females athletes and females from the comparison population. Closer inspection of group means indicated that female swimmers were skewing the athlete data. Omitting the swimmers from subsequent analyses established that there was a

significant difference in depression sub-scale scores between the athlete and comparison populations.

The findings from the GHQ-28 do need to be interpreted with caution and should not be taken as prima facie evidence for validating or invalidating the findings from the DSRS. Only children 15 years and above completed the questionnaire. Consequently, when compared to the DSRS which was completed by all participants in the study, only a sub-sample of the overall survey population was available for statistical analysis. It was important to establish whether the two scales measure the same or similar aspects of depression. Goldberg (1985) comments that the depression sub-scale of the GHQ measures 'severe depression'. Indeed inspection of the 7 sub-scale items reveals that 5 relate to suicide or suicidal ideation (see Appendix I for a description of the sub-scale items). In comparison Birleson's DSRS (1981) focuses on a much broader range of depressive symptomatology. This difference would imply that the two scales are measuring different aspects of depression. The GHQ focuses primarily on one particular symptom of depressive disorder - recurrent thoughts about death. The DSRS covers a broader spectrum of depressive symptomatology more commonly associated with a classification of depressive disorder. The findings from the GHQ suggest that as well as scoring lower on a range of depressive symptomatology the athletes also have lower suicidal ideation. Unfortunately no information was available from the single DSRS item focusing on suicidal ideation - 'I thought life wasn't worth living' - so it was not possible to compare responses from the two questionnaires.

It must be noted that this finding still leaves unanswered the question as to why female swimmers should score so highly on the depression sub-scale of the GHQ. There are several explanations for this finding. One possibility is that the swimmers had either made or were making the transition from age-group swimming, where they competed against same age peers, to open-age competition where they could be competing against swimmers who were somewhat older and stronger. Another further explanation focuses on the changes in body composition associated with menarche. Pubertal changes are mainly linked to weight gain in girls and muscularity and height in boys. It has been suggested that the combination of increase in weight and lack of increase in strength may have negative implications for athletic girls (Alsaker, 1995). This is particularly true for female swimmers who, despite continued intensive training, often experience a drop in performance around mid-to-late puberty

(Gnatt, 1992). Most of the female swimmers taking part in the TOYA study who completed the GHQ had reached menarche. It is possible that the elevated depression scores reflected an interaction effect between gender, pubertal change and sports participation. Partial support for this explanation was provided by the finding that these swimmers had significantly lower sports self esteem than any other sport by gender group. A final possibility was that the swimmers were reaching the end of their sporting careers but had yet to retire or change their involvement. Consequently the findings might be associated with the loss of the athlete role.

Findings from other measures

It was also important to consider results from other measurements taken in the study. Did these results directly or indirectly strengthen or weaken the main findings?

In the review of literature the protective function of above average IQ was described. Was it possible that the findings from this study were an artefact of high IQ rather than participation in youth sport? The results from the study established that athletes from all four sports had mean IQ scores which fell within the normal range for the population. It is unlikely therefore that the lower depression scores of the male and female athletes were due to elevated IQ. Measures of marital satisfaction (GRIMS) and family functioning (FACES II) did indicate that the athletes had closer, more supportive families than the comparison group, and that their parents had a significantly greater proportion of 'indefinable' or 'perfect' marriages when compared with reference data (Rust et al, 1988). Previous research has identified these family factors as protective against depression (Garmezy, 1983 ; Jenkins and Smith, 1990). It is possible therefore that the main findings of this study are due to enhanced or 'super-normal' family functioning. Unfortunately, because the design of the study did not provide a measure of family functioning prior to the young athlete becoming involved in sport, it is not possible to establish whether the lower depression scores of the athlete group are due to sports participation, family functioning, or a combination of the two.

A final factor which needs to be considered is whether the social class distribution of the sports families could account for the lower DSRS scores of the

athlete group. Within the athlete population the distribution of occupational status was skewed toward the higher socio-economic groups. It is conceivable therefore that it was the life experience associated with economic privilege, and not sports participation, which accounts for the difference in depression scores. Unfortunately, as social class was not assessed in the comparison group a comparative analysis between the athletes and non-athletes was not possible. However, the fact that social class was not related to depression in the athlete group, and the lack of association between social class reports in the literature review, both suggest that it is unlikely that this is a reason for the difference in depression scores between the two populations.

Procedure

The self report measures were completed by the young athletes and their parents in a standardised manner at the Institute of Child Health. Completion of the questionnaires was controlled to avoid collusion between a parent and their child or between children, and were completed under the supervision of a psychologist. This protocol ensured a high response rate and reliability of results.

Limitations

Sample

A clear limitation was my inability to follow-up the comparison population. Whilst the data from the comparison group provided essential information for the cross-sectional analyses it limited the longitudinal comparisons that were possible. Similarly the fact that these children did not visit the Institute of Child Health and complete the full battery of tests under the same controlled conditions made their experience different. However considerable care was taken to ensure reference children completing the questionnaires did so on their own and any problems they encountered were answered by me. I was present at all data collection points. It is unlikely therefore that the different data collection procedures would have prejudiced the results significantly.

A limitation which needs to be highlighted affected my ability to make causal inferences as to why differences between the two groups emerged. By definition the young athletes chosen to participate in the study were already

involved in intensive training. Consequently it was not possible to determine with any degree of confidence whether the main research findings were related to the process of training and group membership or were instead due to factors which selected these children into youth sport.

Measures

While the DSRS provided categorical information on 'caseness' for both groups, the lack of a standardised diagnostic interview made the 'true' rate of depressive disorder in these populations difficult to assess with any precision. Further the categorical measure of depression was less useful because of the very small numbers of athletes falling above the suggested 'cut-point'. This resulted in greater reliance on dimensional measures.

A further limitation in the measures used was that the Great Ormond Street Self Image Profile was unstandardised. The results from the thesis suggest it has considerable face validity, but, without proper validation, doubts must remain as to the psychometric properties of the instrument.

As far as training was concerned the measure of the intensity of the athletes' training regime was fairly crude. It was not really surprising that no association was found between intensity of training and mood as the questionnaire monitored the average number of hours trained rather than fluctuations in intensity over time.

Implications of the study and perspectives on resilience research

The main finding of the study was that young male and female athletes had significantly lower depressive symptomatology than children and adolescents who did not take part in sport, and that this finding was stable over time. The implications of this finding will now be discussed with particular reference to extending our understanding of resilience and psychopathology.

The simplest and most parsimonious explanation for these findings is that (a) only resilient children enter intensive training or are selected to continue in youth sport or (b) participation in intensive training develops resilience to

depression in the young. Support for these positions both from the literature and from this study is described below.

Resilience, heritability and sports participation

The first explanation for the findings focuses on the role of genetic influences. This position poses the question "to what degree does the greater resilience of the athlete group represent inherited constitutional, physiological and/or psychological traits?". Research into heredity and sports participation has focused mainly on physiological and constitutional factors such as height and limb length. Few studies have looked at the heritability of motor skills or personality in youth sport.

Genetic research in youth sport

Such is the influence of heredity on physical characteristics that Tanner (1964) proposed that "the basic body structure must be present for the possibility of being an athlete to arise". Similarly Astrand (1963) concluded his seminal analysis of high achieving swimmers with the comment "I am convinced that anyone interested in winning Olympic gold medals must select his parents very carefully". So if participation in sport is genetically determined what is the available evidence to support genetic sources of individual differences and what is the extent of its influence?

To begin to answer these questions it is necessary to borrow from research conducted in behavioural genetics. In the past few years child psychologist and psychiatrists have become particularly interested in identifying the role genetics and the environment play in developmental psychopathology (Rutter et al, 1990b; Rutter et al 1990c). It is not intended to provide the reader with a detailed account of the quantitative genetic method upon which this research is based, but a brief description is necessary for readers unfamiliar with the discipline (for a very readable account of the origins and findings of genetic psychology see Plomin 1994).

The genetic method

The genetic method consists of a quasi-experimental designs such as family, twin and adoptive studies (Plomin et al 1994; Simonoff, 1995). The purpose of the research design is to separate phenotypic (measured) variance on a dimension or disorder into genetic and environmental components of variance. Twin studies, both monozygotic (MZ) and dizigotic (DZ), are particularly important in determining the relative proportions of variance due to heritability and environment. It is assumed that MZ twins share all their genes and are therefore 100% similar genetically, and that DZ twins share only half their genes, while both types of twins share their environment to the same extent (Simonoff, op cit.[20]). The statistical significance for genetic influence can be tested by the significance of the difference in correlation's between identical twins and fraternal twins. The effect size of genetic influence, called heritability, is estimated by doubling the difference between the identical and fraternal twin correlation's. For example, for height, correlation's for MZ and DZ twins are approximately .90 and .45, respectively. Doubling the difference between the identical and fraternal twin correlation's gives a heritability estimate of 90% (.90 - .45 = .45 x 2 = 90). This means that 90% of the variance observed among individuals in height can be attributed to genetic differences (Plomin 1994). It is important to note however that heritability does not imply genetic determinism for the individual - it refers instead to probabilistic propensities for populations (Plomin, 1994). Phenotypic variance not explained by genetic factors is attributed to the environment. Further, the findings from twin studies can only be generalised to children living in broadly similar social circumstances and from the same gene pool.

Heritability and sports participation

There have been several studies which have used the twin methodology described above to determine the effect of heredity on physiological functioning. However research evidence to support genetic sources of individual differences in psychological functioning in sport is thin.

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[20] There has been considerable debate concerning the equal environments assumption (EEA) see Simonoff et al, 1994).

A number of studies have indicated that discriminating factors in outstanding sports performance such as maximal aerobic and anaerobic power and capacity, maximal muscular power and the percentage of the distribution of slow twitch fibres, are to a considerable extent, genetically determined (Bouchard and Lortie, 1984; Klissouras, 1976). These data suggest that rigorous sports training cannot contribute to functional development beyond a limit set by the genotype.

Psychological and temperamental factors

In addition to physiological characteristics there are also a number of psychomotor and personality variables identified as important to participation in youth sport (Kane, 1986), e.g. reaction time and balance, persistence, self-confidence, competitiveness and determination. Research into these areas is sparse. This is not because it is not perceived to be an important area of study but rather that there has been little agreement as to what personality characteristics to measure and considerable scepticism that the instruments designed to assess cognitive and temperamental variables are valid or reliable. However, using research findings from work conducted in child psychology generally it is possible to gauge the likely influence of heritability in sports.

There is now considerable evidence that suggests activity level is an inherited temperamental trait (Scarr, 1966; Vandenberg, 1962) and that there is continuity of activity level through different developmental periods (Thomas et al, 1968). Results from these various studies indicate a genetic component of between .67 and .85 (Scarr 1966; Willerman, 1973). In a particularly interesting study Willerman and Plomin (1973) investigated the correlation between parental activity levels and that of their children. The childhood activity levels of both mothers and fathers correlated significantly with the activity levels of their children (r = .48 and .42 respectively). The authors suggest that the results indicate that activity level shows phylogenetic evidence of being inherited. A more recent study using twin methodology extended the area of study to include persistence as well as activity (Cyphers et al, 1990). The study found a significant genetic component for both persistence (h^2.65) and activity (h^2.57). As far as research using children participating in youth sport there is now considerable evidence to suggest family aggregation of sports participation. At least one of the parents of elite performers have been found to be interested or active in the same

sport (Bloom, 1985b; Fowler, 1969). It would seem therefore that sports participation is significantly influenced by inherited family traits (Rowley, 1992b). It is likely that phenotypic transmission plays some part in some children entering youth sport. Here the parental behaviour or phenotype influence characteristics of the child's environment and induce similarities between the adult and child (Simonoff, 1995). Based upon other published data from the TOYA study (Rowley, 1992b) it would seem that many children taking part in the study had a mother and/or father who also took part in sport. This participation was not necessarily to a high level or even in the same sport but still perhaps had some bearing on the child entering sport in the first place.

However whilst the above data provide a compelling argument for the heritability of certain physiological and psychological factors in youth sport it does not explain whether resilience itself is an inherited trait or whether the low scores for the athletes in this study reflect a genetic predisposition providing protection from depressive symptomatology.

Genetic influences on depressive symptoms

The role of genetic influences in childhood depressive disorder has become of particular interest to researchers working in the area of developmental psychopathology. It is now generally agreed that genetic influences do play an important part in depressive symptoms and disorders among the young although the mechanisms responsible for parent-child transmission are as yet unclear. Heritability estimates from twin studies are mixed and range from 39% to 79%. In her critical review of heritability and depression Simonoff (1995) describes the problems associated with these and similar studies. If some children are genetically predisposed to depressive disorder it would seem logical to assume other children have a genetic 'protection' against becoming depressed, and this issue is relevant to the present study.

Resilience as a heritable trait

The possibility of genetic involvement in resilience has recently been proposed as an area of study to further our understanding of individual differences in response to environmental adversity (Rende and Plomin, 1993). To date resilience has been usually been considered in terms of environmental

factors such as close family relationships and the availability of social support. Yet there are good reasons why genetic factors might offer a partial explanation why some children and not others growing up in the same family develop psychopathology (Rende and Plomin op cit.).

In their paper on families at risk for psychopathology Rende and Plomin (op cit.) propose there are a number of ways in which genetics may influence resilience. The first is that some genetic conditions that lead to psychopathology may carry some benefits with regard to other areas of functioning (Rutter, 1991). For example the social deficits seen in autism may increase the ability of a child to focus intensively and independently on tasks (Rende and Plomin op cit.). It is proposed that further support for the role of genetics is provided by studies of temperament and intelligence. Both the dispositional attributes of a child and his or her cognitive ability have been shown to have significant genetic aetiology (Plomin and Rende, 1991; Plomin, DeFries and McClean, 1990). Both have also been widely studied factors in resilience research (Luthar and Zigler, 1991). Rende and Plomin (1992) argue:

> "Considering temperament and intelligence not only as potential protective factors but also as heritable influences that may promote resilience serves as a concrete reminder that genetic influences may directly contribute to adaptive development despite the presence of environmental risk factors". (p. 535)

Based upon these findings it would appear that future research into resilience should consider not only the environmental influences but also the genetic factors that may be protective. The role of environmental influences on acquired resilience will now be discussed.

Environmental factors and acquired resilience

The second possible explanation proposes that through participation in intensive training the young athlete acquires resilience to depression. Previous research by Rutter (1987; 1990) offer some clues as to the processes involved. He identified three groups of childhood life experiences that could have a protective influence against childhood psychiatric disorder; the quality of personal relationship within the family; benefits which stem from successful task accomplishment; and turning points in children's lives. Certainly the quality of parent-child relationships and task accomplishment would seem of particular importance to young athletes involved in intensive training. However there are

also other candidates which need to be considered. The cognitive changes associated with sports participation and the physiological and hormonal effects of vigorous exercise also seem important.

Family process

Perhaps the most obvious explanation for the main finding of this thesis is the protective role of positive parent-child relationships. Many studies, including this one, have identified family cohesion as a protective factor against depression in children and adolescents (Garrison et al, 1990; Rubin et al, 1992). Other research which has monitored the home environment of high achieving or gifted children has found that these families tended to show strong family ties and warm relationships between adult and children. Parents were also found to be more involved with their children (Colango & Deltman, 1983). However, these findings tell us little about the specific behaviours which are labelled cohesive. The important question to consider therefore is how might sports participation affect cohesion by strengthening the relationship between a young athlete and his or her parents?

Research which has monitored specific aspects of the quality of the parent-child relationship which favour resilient outcomes offers some clues. Parker (1981; 1983) proposed that parents who are affectionate and empathetic facilitate greater self esteem in their child and thus provide protection against depression in adulthood. More recent research has demonstrated the association between the dimensions of 'care' and 'protection' and depressive disorder in childhood and adolescence (Burbach et al, 1989; McFarlane et al, 1995). Using self report measures of depressive disorder ('The Inventory to Diagnose Depression'), parental bonding and family process, McFarlane and his colleagues found that overprotection on the part of both parents correlated with depression. The authors propose overprotection inhibits the development of autonomy and social competence making the youngster vulnerable to depression. The implications of McFarlane's study for young athletes are considerable. The parents of young athletes cannot protect them from threat of competition or the disappointment of defeat (although they my ameliorate its effects by care) and this may 'steel' the child against future adversity through the development of autonomy, self reliance and persistence. More will be said about this process below.

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Further work has focused on parental interest in, and support of children's activities as possible protective mechanisms against depression. Gribble et al (1993) identified three important aspects of the parent-child relationship associated with adaptive child outcomes. These were *'Parental Attitudes'*, characterised by loving, caring feelings toward the child and an appreciation of his or her abilities; *'Parental Involvement'* defined as the degree to which the mother or father participate in activities with the child; and *'Parental Guidance or discipline'*. These particular dimensions have direct relevance to the life experience of the young athlete. Most young athletes perceived sport to be important to their parents and data provided by GOSSIP and FACES indicted that the young athletes had high family self esteem and close, loving family relationships. Previously published data from the TOYA study (Rowley, 1987; 1992b) established that parents had a significant involvement in their child's sport. Many provided considerable physical, emotional and financial support. We are often impressed by the amount of time children dedicate to intensive training yet this often obscures the considerable number of sacrifices parents make in order to support their child's involvement. For example parents may spend a considerable amount of time taking the child to and from the training facility (a journey which took, on average, between 40 to 45 minutes (Rowley 1992b)). Interestingly, parents reported that taking the child to the training facility gave them time to talk and improved their relationship (Rowley, 1992a). It would appear this involvement can strengthen and preserve family relationships.

It must also be noted that the quality of the parental marital relationship and mental health are other risk factors associated with depressive disorder. Comparisons with published data indicated parents with children in sport reported greater marital satisfaction and lower levels of psychiatric disorder.

Self esteem

A second, related possibility is that participation in youth sport has a beneficial effect on a child's sense of competence and mastery and that this enhances feeling of self worth. Both male and female athletes participating in this study had higher global self esteem than the comparison group. Many other studies which have looked at the effects of exercise on self esteem have reported

similar findings (Sonstroem, 1984). Possible mechanisms proposed include: (a) experiences of mastery associated with task accomplishment improve self confidence, competence and control; (b) participation in the activity is reinforced by significant others, for example a coach and/or parent, and this recognition enhances feelings of self worth; (c) increases in physical fitness may influence self esteem. Females in particular may derive significant benefits from intensive training protecting them against depression particularly during adolescence. Self evaluations of physical attractiveness and body image have been found to be associated with depressive symptomatology (Asarnow & Bates, 1988). Satisfaction with the body's appearance may be more salient in the self concept of young women than satisfaction with the body's effectiveness (Lerner et al, 1976). It is possible that participation in intensive training improves perceptions of physical attractiveness and body image in female athletes with corresponding increases in self acceptance. A further possibility is that group membership and peer support protects these young women from the more negative, stereotyped, messages about their role in society.

An explanation related to the protective function of high self esteem involves the socio-cognitive theory of depression proposed by Oatley and Bolton (1985). Based upon the studies conducted by George Brown in the 1970's Oatley and Bolton (op cit.) propose a theory of role to explain the aetiology of depression in adults. The onset of depressive symptoms occurs when there is a deficiency in a person's role expectations. For example a woman's perception of herself may be dependent on her role as a 'good' mother. This role may be threatened by events such as her child becoming a drug addict or being expelled from school. In such circumstances being without an alternative role makes the woman vulnerable to the adverse event. It is evident from this study that young athletes attached considerable significance to being involved in sport and also being a member of their family. These findings could be taken to suggest that the sports children have two particularly salient roles as athletes and family members and that these roles could offer protection against adverse life experiences. It is particularly interesting to speculate how the role of athlete may reduce some of the turmoil associated with the adolescent period when questions of reference are particularly important.

A related consideration is that young athletes are steeled by the experience of intensive training and competition. This type of exercise is physically, intellectually and emotionally taxing. It is goal directed behaviour the aim of which is either success in competition or selection for a particular squad or group. It is possible that graded exposure to training and competition 'inoculate' the child against threat through what has been termed 'paced defensiveness' (Epstein, 1967) or the 'immunisation model of resilience' (Anthony, 1987). Inherent in this process is the acceptance that resilient children are not invulnerable but are able to 'process' the strong affect they experience in negative or adverse situations to develop positive growth and development.

Previously published data from the TOYA study (Rowley, 1995) suggest that young athletes are not invulnerable but are able to experience low mood and grow from the experience. Young athletes were asked to describe their mood after being beaten or performing badly, and how long this feeling usually lasted. The more successful performers were found to have a tendency to take defeat somewhat harder. Nearly one-third described feeling so upset that it affected their daily lives the following day.

Most research into scarring and steeling has tended to look at those who are scarred by negative life experiences. Consequently it is not yet clear why some children are steeled by stressful events whilst others are scarred. Research into coping styles suggests affective-cognitive appraisal is implicated in this process and that there are several reasons why young athletes may be steeled by the experience of defeat:

Coping and resilience

Folkman and Lazarus (1988) have suggested that there are two distinct forms of coping: one designed to manage or change the problem (problem focused coping); and one designed to regulate one's emotional response to the problem (emotional focused coping). In a recent review of research on emotional regulation and emotional response McCauley et al (1995) propose that the child's ability to regulate negative emotion, and to evolve adaptive coping skills, are important in protecting against the onset of depression. In this context

adaptive coping skills refer not only to the child's ability to tolerate the negative emotion associated with adversity but also to devise strategies to manage the situation. Research which has analysed the coping preference of depressed and non-depressed children indicates that non-depressed children offer more problem-focused and more active distraction strategies than did depressed children (Compas et al, 1988; Garber et al, 1991). So far so good but what does this research tell us about the resilience of children participating in youth sport? It is possible that athletes learn how to use more problem focused coping styles. Following defeat an athlete is helped by his or her coach to identify what went wrong and rectify the situation through altering training. This process may be likened to the cognitive modification techniques of decentering or distancing. That is the young athlete is asked by the coach to stand away from his or her negative thoughts or interpretations and examine their experiences in a realistic, proactive fashion.

In addition, many studies have stressed the significance of health and vitality in meeting life's challenges as well as being able to use available social supports. Consequently the process of reflection and planning in conjunction with the coach and parent may assist the young athlete in developing a sense of mastery and competence. Intrinsic to this process is the child's ability to form collaborative reciprocal relationships, a factor which has been proposed by Beardslee (1995) as being an important aspect of resilience.

3. Physical and hormonal changes

A final candidate for the lower depression scores of the athlete group are the physical and hormonal changes associated with exercise. In addition to the literature describing the positive effects of exercise upon psychological functioning, including mood, there is now burgeoning interest in the physiological mechanisms associated with these mental health benefits. For example, strenuous physical activity has been associated with decreases in neuromuscular tension (de Vries, 1987) and a reduction in circulating catecholamines (Cousineau et al, 1977). A considerable body of work has focused on the effect of endogenous opoids, β-endorphin, β-lipotrophin and enkephalin, on mood - colloquially referred to as the 'runners high'.

Based upon the above findings Sime (1987) concluded that there were four possible physiological mechanisms responsible for the anti-depressant effect of exercise:

1. the apparent increase in blood flow and oxygenation to the central nervous system.
2. that increased blood endorphin levels reduce pain and elevate mood.
3. enhanced aminergic synaptic transmission.
4. the increase in urine norepipherine levels.

Research into these possible explanatory factors has been equivocal. For example in their review of 13 studies investigating endorphins and exercise Harber and Sutton (1984) report slight to 5-fold increases in endorphin concentrations in men and women following bouts of exercise. In addition where increases in blood endorphin levels were identified there was no clear association with alterations in mood. Controversy still exists as to whether naloxone blocking studies (naloxone is an opoid receptor antagonist which blocks the proposed mood enhancing effects of the endogenous opoids) have proved or disproved the relationship between endorphins and exercise. It has been suggested that the tools and techniques used are crude (Harber and Sutton op cit.) and that there is a need for more specific antagonists.

The research protocol of the TOYA study did not include any invasive assessment of blood endorphin levels or other metabolic changes associated with exercise so it was not possible to identify the strength or direction of any physiological relationship between exercise and DSRS scores. However it is important to note that if physiological mechanisms are implicated the duration of their effects is likely to be short-lived. In this study the young athletes who had retired or given up training still had significantly lower depression scores than the comparison group. Could this be due to the prolonged physiological benefits of exercise? It would seem unlikely that the biochemical or metabolic association between exercise and mood remains when an athlete retires. As such the direct effects of training on mood (e.g. through hormonal influences) seem an unsatisfactory explanation for the main findings in this study.

Summary

In summary there are a number of reasons which might explain the lower depression of the athlete group. Firstly, the process of intensive training in and of itself may protect against depression. The data suggests this effect may be more pronounced in girls. Secondly, the finding of an association with family cohesion suggests that, if protection against depression is provided by training, this effect may be mediated by family factors. However the link with self esteem suggests the effect may also be mediated by the influence sports participation has on the self-confidence of the individual. Thirdly, the finding that young athletes show no increase in depression when they have retired or given up training (if indeed that is so) suggests that direct effects of training on mood (e.g. through hormonal influences) are relatively unimportant. The low rates of depression in retired young athletes may therefore be explained by initial selection factors, or by an irreversible lessening of vulnerability that sports participation bestows.

Finally, the finding that parental pressure is unrelated to depression in the child or young person implies that parental attitudes to athletes success do not, in general, have a deleterious effect on young athletes' mental functioning, but, of course, there may be isolated cases in which undue parental pressure really is important.

POLICY IMPLICATIONS

A Sports Council report (1988) into sport and young people suggested that "a broad interpretation of sport as set out in the Council of Europe's Sport for all Charter should inform policy making at all levels". How might the findings from this study contribute to policy?

Parents of young children need encouragement to introduce their children to a range of sporting activities at a relatively young age. It is important to note that the protective function of sports participation was not associated with level of achievement. Children with modest accomplishments and aspirations appeared to derive the same protective benefits as those with significant achievements so such early activity need not be highly competitive.

Based upon the findings of this study it would appear that involvement in youth sport may have mental health benefits for children and adolescents. Although the mechanisms associated with this protective effect remain unclear, both family process and cognitive changes seem implicated. Previously published findings from the TOYA study established that parents were usually the main reason children became involved in sport (Rowley, 1992). However, few children taking part in this study came from working class families or one-parent families. Such was the dominance of the middle classes that in sports such as swimming and tennis there were no families in the sample representing unskilled occupations. Even football, traditionally thought to be the preserve of the working classes had a distribution biased towards the higher socio-economic groups. Reasons for this appear to be:

1. Considerable financial support is required to enable children to participate in intensive training routines.

2. Occupational flexibility and greater mobility of middle class families allows parents more time to take their children to and from sports clubs.

3. Parents play a significant role in introducing children into sport for health or safety reasons. It is more likely that the middle classes attach greater value to these attributes and see sport as contributing towards them.

Consequently, attention should be focused on the social inequality associated with sports participation which emerged in the study.
The effectiveness of any policy aimed at increasing participation in youth sport will be significantly reduced if the limiting factor is not a child's potential or interest but parental income. Low-income families need particular encouragement to introduce their children to sport and, if their child shows talent, there is a need for direct financial assistance if such talent is to be nurtured.

Girls and young women in particular appear to derive significant benefits from sports participation and campaigns to encourage their participation need to be designed with greater precision to overcome the negative stereotype often associated with sports participation. In addition more information is required on why they drop out of sport during puberty.

Thought needs to be given to publicising the mental health benefits of sports participation. To date, interest in children's activity levels has focused on the long-term consequences of a sedentary lifestyle as a risk factor for cardio-pulmonary disease. Interest in the mental health of the young has tended to lag behind these concerns. Yet depression in children and adolescence is more common than previously considered (Goodyer 1993). Several recent studies have provided evidence for a secular increase for child and adolescent onset affective disorders (Fombonne, 1995). This secular trend has been identified as an important public health problem (Harrington et al 1994). It would seem important therefore to publicise more widely the protective function of sports participation to health professionals and the general public. In addition consideration needs to be given to the role of exercise programmes as an adjunct to the more traditional treatment modalities of depression in children and adolescents.

FUTURE RESEARCH

The TOYA study and the data provided in this thesis represent the first epidemiological studies of the psychological effects of intensive training on young athletes. The information established so far would suggest it is a fruitful avenue for future research. The following describe possible questions which need to be examined and explained.

1. Self selection vs. life experience

Perhaps the most fundamental question to be answered concerns whether the resilience of young athletes and their families is a function of participation in youth sport or arises from a selective process. It would seem desirable to examine data on depression and family process in children before they became involved in intensive training. A related set of questions concerns the need to isolate the protective mechanisms involved. For example Rutter (1990) has proposed that success in an absorbing free-time interest might be protective. However it is not known whether protection resides in the activity or is instead a function of family involvement or changes in cognitive style. Comparing similar activities whilst controlling for the possible benefits of fitness training would be useful. For example children involved in sports participation could be compared with young musicians.

2. Protective effect in adverse situations

Although children who have taken part in sport appear less at risk of depression it is not known whether their involvement might afford them protection against depression in adverse situations such as illness, injury, or relationship difficulties and losses.

3. Follow-up studies.

Further follow-up studies of young athletes who retire from competitive sport would enable researchers to identify continuities and discontinuities in the protective effect.

4. Two stage screening

Epidemiological studies using two-stage screening methodology would be desirable to obtain more accurate rates of depressive disorder in the young athlete population. Interview assessments of depression are particularly important as it is not known whether sports participation masks the symptoms used in many self report questionnaires.

5. Thresholds of training and competition associated with positive effects.

The measures of training intensity used in this study were crude and it was not possible to determine the threshold of participation associated with any protective effect. Of related interest would be to identify the cognitive strategies used by young athletes. For example research into cognitive factors associated with elite sports participation in adults suggests there are significant differences in the quality of self-talk and the use of imagery (Mahoney & Avener, 1977). It would be interesting to establish whether this was the case in young athletes and whether there were developmental changes in cognitive style. Similarly, evidence suggests athletes are seldom strangers to the experience of errors, suboptimal performance and defeat. Information on how they assimilate this

information in a way that does not detract from their confidence or persistence would be useful.

6. Sex differences

More research is needed to identify the mechanisms which protect adolescent female athletes. Previous research has suggested that gifted females develop a fear of success because their gift conflicts with the societal expectations of their role. The young athletes involved in this study did not seem to experience this problem, except possibly in the case of simmers.

7. Using exercise in treatment of depressed youngsters.

Properly designed studies using children of different ages are required to determine if physical activity could be used as an adjunct to the more traditional modalities in the treatment of depression.

8. Family process

It is important to understand the ingredients of family resilience. Research needs to be directed at understanding how sports families respond to life challenges - such as the increasing involvement of their child in sport. Research could identify key transactional and problem solving processes that enable mastery to be achieved. A further avenue would be to look at bi-directionality. It is reasonably well established that depression in children can affect the parent. Can the resilient child affect other members of the family?

9. Effect on sibs

The final research question concerns the sibs of the young athlete. It is possible the specific qualities of the parent-athlete relationship which afford protection may be a risk factor for the sib who feels excluded, unappreciated and unloved. In order to understand the wider familial ramifications of intensive sports participation an important question to consider is whether having a brother or sister involved in intensive training increases or reduces the vulnerability of the sib to emotional problems such as depression?

A second avenue of research concerns the impact and outcome of shared and non-shared environmental factors (Kelvin 1995). Sibs exposed to adverse situations do not always respond in the same way. Kelvin (op cit.) has recently formulated a 'sibling study model' which could be used to analyse the risk and resilience of sibs when both are involved in intensive training.

APPENDIX I: TOYA QUESTIONNAIRES

```
Surname              Idno
Christian name
Gender               D.O.B.
Sport
Visit date
```

Training of Young Athletes Study
Athlete Questionnaire

Institute of Child Health, London

&

The Sports Council

Training of Young Athletes Study

Please read these instructions carefully

Printed on the next few pages are a number of short questionnaires asking you about your thoughts and feelings.

At the start of each questionnaire is a list of instructions which will tell you how to answer. If you don't understand something then please ask and we will try to help.

The questionnaires are completely confidential - no-one will find out what you have answered. Also please remember there are no right or wrong answers to these questions - it is not a test - *it is what you think that is important.*

Please make sure that you have answered all the questions.

Training Schedule

How often do you train for your sport? Please fill in the times you usually start and finish training.

EXAMPLE:

<table>
<tr><td colspan="2" align="center"><u>Morning</u></td><td colspan="2"><u>Afternoon and Evening</u></td></tr>
<tr><td>Start time</td><td>Finish time</td><td>Start time</td><td>Finish time</td></tr>
<tr><td>10 : 00</td><td>to   11 : 00</td><td> : </td><td>to   : </td></tr>
</table>

TRAINING

<table>
<tr><td></td><td colspan="2" align="center">Morning</td><td colspan="2">Afternoon and Evening</td></tr>
<tr><td></td><td>Start time</td><td>Finish time</td><td>Start time</td><td>Finish time</td></tr>
<tr><td>Sunday</td><td>__ : __</td><td>to __ : __</td><td>__ : __</td><td>to __ : __</td></tr>
<tr><td>Monday</td><td>__ : __</td><td>to __ : __</td><td>__ : __</td><td>to __ : __</td></tr>
<tr><td>Tuesday</td><td>__ : __</td><td>to __ : __</td><td>__ : __</td><td>to __ : __</td></tr>
<tr><td>Wednesday</td><td>__ : __</td><td>to __ : __</td><td>__ : __</td><td>to __ : __</td></tr>
<tr><td>Thursday</td><td>__ : __</td><td>to __ : __</td><td>__ : __</td><td>to __ : __</td></tr>
<tr><td>Friday</td><td>__ : __</td><td>to __ : __</td><td>__ : __</td><td>to __ : __</td></tr>
<tr><td>Saturday</td><td>__ : __</td><td>to __ : __</td><td>__ : __</td><td>to __ : __</td></tr>
</table>

DSRS

Below is a list of the ways you might have felt or acted during the past week. To answer tick ✔*one* of the boxes to the right of the statement to show how often you have felt this way during the *past week,* including today.

	Most of the time	Some of the time	Never
1. I looked forward to things as much as I used to	❏	❏	❏
2. I slept very well	❏	❏	❏
3. I felt like crying	❏	❏	❏
4. I liked to go out to play	❏	❏	❏
5. I felt like running away	❏	❏	❏
6. I got stomach aches	❏	❏	❏
7. I had lots of energy	❏	❏	❏

	Most of the time	Some of the time	Never
8. I enjoyed my food	❏	❏	❏
9. I stuck up for myself	❏	❏	❏
10. I thought life wasn't worth living	❏	❏	❏
11. I was good at things I did	❏	❏	❏
12. I enjoyed the things I did as much as I used to	❏	❏	❏
13. I liked talking with my family	❏	❏	❏
14. I had horrible dreams	❏	❏	❏
15. I felt very lonely	❏	❏	❏

	Most of the time	Some of the time	Never
16. I was easily cheered up	❏	❏	❏
17. I felt so sad I could hardly stand it	❏	❏	❏
18. I felt very bored	❏	❏	❏

GOSSIP - B

Below is a list of sentences people your age have used to describe themselves. Please read each one carefully and then put a tick in one of the boxes, to the right of each sentence to show how true the sentence is for you. Is it "*Very true for me*", "*Quite true for me*", "*Not very true for me*" or "*Not at all true for me*".

Remember there are no right or wrong answers, just tick ✔ the box which describes your own feelings.

	Very true for me	Quite true for me	Not very true for me	Not at all true for me
1. I am proud of my school work	❏	❏	❏	❏
2. My mother likes me	❏	❏	❏	❏
3. No one takes much notice of me at home	❏	❏	❏	❏
4. I don't think much of myself	❏	❏	❏	❏
5. My father is proud of me	❏	❏	❏	❏
6. I am fun to be with	❏	❏	❏	❏
7. I like my body the way it is ...	❏	❏	❏	❏

	Very true for me	Quite true for me	Not very true for me	Not at all true for me
8. Most of the time I am satisfied (pleased) with myself	❏	❏	❏	❏
9. My father trusts me	❏	❏	❏	❏
10. I can always look good if I try	❏	❏	❏	❏
11. Other girls often make fun of me	❏	❏	❏	❏
12. My mother is proud of me	❏	❏	❏	❏
13. I feel unimportant at school	❏	❏	❏	❏

	Very true for me	Quite true for me	Not very true for me	Not at all true for me
14. I am good at sport	❏	❏	❏	❏
15. I am popular with people/children my own age	❏	❏	❏	❏
16. My father doesn't praise me when I do well	❏	❏	❏	❏
17. I am not doing as well at school as I would like	❏	❏	❏	❏
18. I find it hard to make friends	❏	❏	❏	❏
19. My mother trusts me	❏	❏	❏	❏

	Very true for me	Quite true for me	Not very true for me	Not at all true for me
20. My teacher makes me feel I am not good enough	❏	❏	❏	❏
21. I am not as good-looking as most girls	❏	❏	❏	❏
22. My mother does not know me very well	❏	❏	❏	❏
23. I am happy at home	❏	❏	❏	❏
24. I wish I could be better at sports	❏	❏	❏	❏
25. My father likes me	❏	❏	❏	❏
26. I am happy with the way I look	❏	❏	❏	❏

	Very true for me	Quite true for me	Not very true for me	Not at all true for me
27. My mother does not praise me when I have done well	❏	❏	❏	❏
28. I am an important person in my family	❏	❏	❏	❏
29. I feel happy at school ...	❏	❏	❏	❏
30. My family is disappointed in me	❏	❏	❏	❏
31. I am able to do things as well as most children my age	❏	❏	❏	❏
32. I like myself	❏	❏	❏	❏
33. I am better than other children my age at sport	❏	❏	❏	❏

	Very true for me	Quite true for me	Not very true for me	Not at all true for me
34. There are parts of my body I wish I could change	❏	❏	❏	❏
35. My father does not know me very well	❏	❏	❏	❏
36. I am easy to like	❏	❏	❏	❏
37. My parents expect too much of me	❏	❏	❏	❏
38 People of my own age follow my ideas	❏	❏	❏	❏
39. I am a failure	❏	❏	❏	❏
40. I have a number of good points	❏	❏	❏	❏

	Very true for me	Quite true for me	Not very true for me	Not at all true for me
41. In games and sports I like to watch rather than take part	☐	☐	☐	☐
42. I like being the kind of girl I am	☐	☐	☐	☐
43. I often wish I was someone else	☐	☐	☐	☐
44. I am pretty sure of myself	☐	☐	☐	☐
45. I feel good when I'm doing sport	☐	☐	☐	☐

Finally, how important are these things to how you feel about yourself as a person? Please tick ✔ the box to show how important these things are to you.

	Very true for me	Quite true for me	Not very true for me	Not at all true for me
1. It is important to me to do well at school work	☐	☐	☐	☐
2. It is important to do well at sport	☐	☐	☐	☐
3. Having a lot of friends is important to me	☐	☐	☐	☐
4. How I look is not important to me	☐	☐	☐	☐
5. It is important that my family is proud of me	☐	☐	☐	☐
6. Having a close friend is important to me	☐	☐	☐	☐

FACES

To answer this questionnaire read each statement carefully and then tick ✔ the box which best describes your own family.

Don't spend too much time on any one question - first impressions are often best.

Please make sure you answer all the questions.

How would you describe your family now?

	Almost never	Once in a while	Sometimes	Frequently	Almost always
1. Family members support each other during difficult times	❑	❑	❑	❑	❑
2. In our family it is easy for everyone to express his or her opinion	❑	❑	❑	❑	❑
3. It is easier to discuss problems with people outside the family than with other family members	❑	❑	❑	❑	❑
4. Each family member has a say in major family decisions	❑	❑	❑	❑	❑
5. Our family often gathers together in the same room	❑	❑	❑	❑	❑
6. Children have a say in their discipline	❑	❑	❑	❑	❑
7. Our family does things together	❑	❑	❑	❑	❑
8. Family members discuss problems and usually feel good about the solutions	❑	❑	❑	❑	❑
9. In our family, everyone goes his or her own way	❑	❑	❑	❑	❑

	Almost never	Once in a while	Sometimes	Frequently	Almost always
10. Household responsibilities shift from person to person	❏	❏	❏	❏	❏
11. Family members know each other's close friends	❏	❏	❏	❏	❏
12. It is hard to know what the rules are in our family	❏	❏	❏	❏	❏
13. Family members consult each other about decisions they make	❏	❏	❏	❏	❏
14. Family members say what they want	❏	❏	❏	❏	❏
15. We have difficulty thinking of things to do as a family	❏	❏	❏	❏	❏
16. When solving problems, the children's suggestions are followed	❏	❏	❏	❏	❏
17. Family members feel very close to each other	❏	❏	❏	❏	❏
18. Discipline is fair in our family	❏	❏	❏	❏	❏
19. Family members feel closer to people outside the family than to their family members	❏	❏	❏	❏	❏
20. Our family tries new ways of dealing with problems	❏	❏	❏	❏	❏
21. Family members go along with what the family decides to do	❏	❏	❏	❏	❏
22. In our family, everyone shares responsibilities	❏	❏	❏	❏	❏
23. Family members like to spend their free time with each other	❏	❏	❏	❏	❏
24. It is difficult to get a rule changed in our family	❏	❏	❏	❏	❏

	Almost never	Once in a while	Sometimes	Frequently	Almost always
25. Family members avoid each other at home	❏	❏	❏	❏	❏
26. When problems arise, we compromise	❏	❏	❏	❏	❏
27. We approve of each others friends	❏	❏	❏	❏	❏
28. Family members are afraid to say what is on their minds	❏	❏	❏	❏	❏
29. Family members pair up rather than do things together	❏	❏	❏	❏	❏
30. Family members share interests and hobbies with each other	❏	❏	❏	❏	❏

GHQ - 28

We should like to know if you have had any medical complaints and how your health has been in general, over the past few weeks. Please answer all the questions on the following pages simply by <u>underlining the answer</u> which you think best applies to you Remember that we want to know about present and recent complaints, not those that you had in the past.

Have you recently:

1. Been feeling perfectly well and in good health	Better then usual	Same as usual	Worse than usual	Much worse than usual
2. Been feeling in need of a good tonic	Not at all	No more than usual	Rather more than usual	Much more than usual
3. Been feeling run down and out of sorts	Not at all	No more than usual	Rather more than usual	Much more than usual
4. Felt that you are ill	Not at all	No more than usual	Rather more than usual	Much more than usual
5. Been getting any pains in your head	Not at all	No more than usual	Rather more than usual	Much more than usual
6. Been getting a feeling of tightness or pressure in your head	Not at all	No more than usual	Rather more than usual	Much more than usual
7. Been having hot or cold spells	Not at all	No more than usual	Rather more than usual	Much more than usual
8. Lost much sleep over worry	Not at all	No more than usual	Rather more than usual	Much more than usual
9. Lost much sleep over worry	Not at all	No more than usual	Rather more than usual	Much more than usual
10. Felt constantly under strain	Not at all	No more than usual	Rather more than usual	Much more than usual
11. Been getting edgy and bad-tempered	Not at all	No more than usual	Rather more than usual	Much more than usual
12. Been getting scared or panicky for no good reason	Not at all	No more than usual	Rather more than usual	Much more than usual
13. Found everything getting on top of you	Not at all	No more than usual	Rather more than usual	Much more than usual

Please answer by <u>underlining the answer</u> which you think best applies to you.

14. Been feeling nervous and strung up all the time	Not at all	No more than usual	Rather more than usual	Much more than usual
15. Been managing to keep yourself busy and occupied	Not at all	Same as usual	Rather less than usual	Much less than usual
16. Been taking longer over the things you do	Not at all	Same as usual	Longer than usual	Much longer than usual
17. Felt on the whole you were doing things well	Better than usual	About the same	Less well than usual	Much less well
18. Been satisfied with the way you've carried out your tasks	More satisfied	About the same as usual	Less satisfied than usual	Much less satisfied
19. Felt that you are playing a useful part in things	More so than usual	Same as usual	Less useful than usual	Much less useful
20. Felt capable about making decisions about things	More so than usual	Same as usual	Less so than usual	Much less capable
21. Been able to enjoy your day-to-day activities	More so than usual	Same as usual	Less so than usual	Much less than usual
22. Been thinking of yourself as a worthless person	Not at all	No more than usual	Rather more usual	Much more usual
23. Felt that life is entirely hopeless	Not at all	No more than usual	Rather more usual	Much more usual
24. Felt that life isn't worth living	Not at all	No more than usual	Rather more usual	Much more usual
25. Thought of the possibility that you might take your	Definitely not	I don't think so	Has crossed my mind	Definitely have

Please answer by <u>underlining the answer</u> which you think best applies to you.

26. Found at times you couldn't do anything because your nerves were too bad	Not at all	No more than usual	Rather more usual	Much more usual
27. Found yourself wishing you were dead and away from it all	Not at all	No more than usual	Rather more usual	Much more usual
28. Found that the idea of taking your own life kept coming into your mind	Definitely not	I don't think so	Has crossed my mind	Definitely have

Please make sure you have answered all the questions before handing
the questionnaire back. Thank you for your help.

APPENDIX II: SUB-SET OF ATHLETE INTERVIEW SCHEDULE

Importance of sport : parents

How much do you think your involvement in 'S' [name of sport] means to your mum - how do you know what does she do?

What about your dad, what do you think your involvement in sport means to him - how do you know what does he do?

Mother
Father

Not at all important	1
Mild importance	2
Moderate importance	3
Marked importance	4

Parental reaction to failure - child

Some athletes worry about facing their parents after they haven't done very well in competition because of what their mum or dad may say or do to them. Do you ever feel like that? When was the last time - what happened?

Never worry	0
Occasionally worry	1
Frequently worry	2
Nearly always worry	3
Missing	8

Worries

During competition do you ever worry about disappointing your parents or letting them down? When was the last time - what happened?

Never worry	0
Occasionally worry	1
Frequently worry	2
Worry all the time	3
Missing	8

Latent avoidance

Occasionally, children involved in sport are relieved if they are forced to take a break or rest because of illness or an injury. Do you ever feel this way? When was the last time - what happened?

None	0
Mild	1
Moderate	2
Severe	3
Missing	8

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