THE EFFECT OF TEST ANXIETY ON IQ TEST PERFORMANCE, ACHIEVEMENT, AND SELF-CONCEPT IN ELEMENTARY SCHOOLCHILDREN

by

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A B S T R A C T

IQ test performance of elementary schoolchildren was investigated as a function of two levels of test anxiety and two types of IQ measure. IQ measures used, the New South African Group Test (NSAGT) and the Wechsler Intelligence Scale for Children - Revised (WISC-R) were assumed to vary in anxiety-provoking cues on cognitive-attentional theoretical grounds. The hypothesis tested was that high test anxiety would lower performance on the NSAGT, but not the WISC-R. The performance of children varying in test anxiety but equivalent in intelligence was then compared at different IQ levels with the hypothesis that high-test anxious children would perform less well at each level.

Academic achievement and self-concept of these children were also investigated, with the hypotheses that high-test-anxious children would be lower in both than low-test-anxious children of equivalent intelligence.

The Test Anxiety Scale for Children, the Defensiveness Scale for Children and the Piers-Harris Children's Self-Concept Scale were administered to all Standard 4 pupils at two white, English-language, co-educational schools in middle-class suburbs. Highly defensive

children were eliminated; the top and bottom 20% of the test anxiety distribution formed the experimental groups, high-test-anxious (HA;n=28) and low-test-anxious (LA;n=27) who were tested blind, in random order, on the WISC-R. NSAGT and achievement data were obtained from school records and subjects assigned to High, Medium and Low IQ levels based on NSAGT scores.

Analysis of variance indicated that HA children obtained significantly lower IQ scores independent of type of IQ measure. Hotelling's T^2 tests at High and Medium IQ levels (there were insufficient Low IQ subjects) yielded significant overall differences between HA and LA children when compared on subscales and Totals of the NSAGT and WISC-R, HA children scoring less, although different patterns of impaired performance were apparent at the two levels of intelligence.

These results were interpreted as supporting a cognitive-attentional theory of test anxiety, and that the equally impaired performance on both IQ measures indicated that HA children are not easily deceived by manipulations of the evaluative-stress dimension, probably as a result of the development of extreme sensitivity to social-evaluative cues over the early years at school. Previously contradictory research findings were reinterpreted to support this conclusion.

The subsidiary studies indicated that HA children achieved less well and had poorer self-concepts than LA children which was taken as

indicative of generally unsatisfactory school adjustment.

In view of the use of IQ data in education to determine ability-motivation discrepancy, it was suggested that IQ results of HA children would be better interpreted together with a measure of test anxiety.

The findings of this study appear to support an interactive model of the development of test anxiety in white, middle-class, elementary schoolchildren which stresses the importance of hard test data in the formulation of teacher and pupil attributions and expectations.

P R E F A C E

CONTEXT AND AIMS OF THE PRESENT STUDY

Test anxiety is an unpleasant, consciously experienced emotional state that has cognitive, physiological and behavioural concomitants. High test anxious children typically perform more poorly than low test anxious children in stressful evaluative situations, responding with a variety of cognitive and attentional processes that interfere with effective and successful task performance (Hill, 1972; I. Sarason, 1972a, 1978; Wine, 1971, 1981).

The first systematic study of test anxiety in children was a five-year longitudinal study by Seymour Sarason and colleagues at Yale University (Hill & Sarason, 1966; S. Sarason, Davidson, Lighthall, Waite & Ruebush, 1960; S. Sarason, Hill & Zimbardo, 1964). This followed earlier studies of test anxiety in college students (Mandler & Sarason, 1952; I. Sarason, 1958; S. Sarason, Mandler & Craighill, 1952). The decision to focus on a relatively specific anxiety was initially made in the hope that it would shed some light on the origin and effects of anxiety in other situations, eventually enabling

statements to be made on the general significance of anxiety. Test anxiety was selected as the initial focus because test situations were considered to be near-universal experiences for people in our culture. Such situations were perceived as having an important evaluative function and test performance frequently has important effects on the lives of individuals.

Sarason and his colleagues found that test anxiety bore a negative relationship to IQ and Achievement test performance, a finding that was generally confirmed by studies in older children and adults (reviewed by Ruebush, 1963). This led to the undertaking of numerous studies to investigate the cognitive and motivational aspects of debilitating test anxiety in both children and adults. Interest in test anxiety as a valid research subject in its own right has not only persisted over the past 20 years but actually intensified (I. Sarason, 1980). The reasons that led to its original choice: its universality and its potential for disruptive effects, make it of on-going concern to clinicians, educators and researchers.

The Sarason longitudinal study revealed that when children first started school, test anxiety was not significantly related to measures of IQ. However, by the middle of the elementary school years there was a significant low negative correlation of approximately -,2 which increased to -.3 to -,4 by the fifth and sixth grades (Hill & Sarason, 1966).

Furthermore, reductions in test anxiety were related to increased performance on measures of IQ. A slightly stronger but similar developmental pattern held for measures of academic achievement. The researchers surveyed the relevant literature and argued that test anxiety was the aetiologically significant variable on two main grounds. Firstly, that the negative correlation increases as the measure of intellectual performance becomes more "test-like" and decreases as the measure becomes more "game-like" (Lighthall, Ruebush, Sarason & Zwibelson, 1959; S. Sarason et al, 1960; Zwibelson, 1956). Secondly, that the negative relationship between test anxiety and IQ or Achievement is of equal strength across intelligence levels (Hill & Sarason, 1966). Even in a superior ability group of college students a negative relationship of -,2 between test anxiety and a test of mental ability was obtained (Mandler & Sarason, 1952).

This argument has not gone unchallenged. An alternative viewpoint that doing poorly on tests causes less intelligent children to become more anxious is supported by a study by Feldhusen & Klausmeier (1962), which found anxiety to be significantly negatively correlated with IQ only in the middle IQ group and with achievement measures only in the middle and low IQ groups. Their use of a general anxiety measure may, however, account for these findings as test anxiety scales have been found to predict intellectual performance more accurately (Albert & Haber, 1960). French (1962) came to the conclusion that the effects of both test and general anxiety on college entrance examination

performance were negligible on finding little difference under conditions labelled "pressure" and "relaxed" respectively. In more recent years, Milgram & Milgram (1976) reported a marked difference in levels of test anxiety in children of different intelligence, with "gifted" children having mean test anxiety scores only half as high as "average" children. The same researchers followed this up the following year by administering a humour comprehension IQ test to 177 children in grades 4 to 6 and found it bore the same negative relationship to test anxiety as did conventional IQ measures. They concluded a more complete explanation of the IQ-test anxiety relationship must take into account both native intelligence and anxiety level (Milgram & Milgram, 1977).

Hill (1972) had already argued that the complex relationship between the two variables was probably the result of reciprocal influences: increasing levels of test anxiety may hinder performance at the same time that increasingly poor levels of performance enhance test anxiety. Similarly, the experience of success in evaluative situations may lead to lowered text anxiety.

Few would deny that reciprocal influences may operate, but more detail is needed as to their nature and how they operate in order to propose an overarching theory which would account for these contradictory findings. The present study has a two-fold purpose: firstly, to conduct a literature review to highlight intrapersonal, familial and school factors that appear to elicit, reinforce or change the test anxious

response in strength and frequency in the elementary schoolchild. These factors are listed below:

FAMILIAL	INTRAPERSONAL	SCHOOL
Parental expectations	Cognitions	Characteristics of school life
	Attention	
Parent-child interactions	Achievement-motivation	Teacher expectations
	Self-efficacy/ Helplessness	
		IQ testing in education
	Self concept	

By synthesis of research findings it is hoped to construct a model of the development of test anxiety in the elementary schoolchild.

The second purpose is to focus on the test anxiety - intelligence relationship with the aim of seeking some clarification of the role played by test anxiety in that relationship. An empirical study will be conducted, comparing the performance of elementary schoolchildren who are high and low in test anxiety, on both a group, and an individual, measure of intelligence.

Throughout this study, the terms high anxious (HA) and low anxious (LA) refer to children who score at the extremes of the Test Anxiety

Scale for Children (TASC) (S. Sarason et al, 1960), a measure of debilitating test anxiety, or in the case of adults, an equivalent measure such as the Test Anxiety Questionnaire (TAQ) (Mandler & Sarason, 1952), or the Test Anxiety Scale (TAS) (I. Sarason, 1958). It should be noted that a broad definition of test anxiety is being employed. Persons high in one form of test anxiety, such as mathematics anxiety, may be free of anxiety in other evaluative situations since the cues which elicit anxiety depend on the individual's learning history; but on the whole it is considered that children who score high on the TASC are prone to experiencing test anxiety in a wide range of evaluative situations. The TASC measures broader concerns about school as well as concerns and worries about testing. Typically, HA persons tend to interpret a wide range of situations as evaluative (Wine, 1980).

It should also be noted that the elementary schoolchildren with whom this study is concerned are white, suburban, middleclass, English-speaking, South Africans. It is essential to thus contextualize the survey of the literature, the proposed model of the development of test anxiety in the elementary schoolchild, and the study itself, including discussion and conclusions. To do otherwise, and seek to generalize further, would be to ignore crucial limitations.

CHAPTER ONE

1 INTRAPERSONAL AND FAMILIAL FACTORS IN TEST ANXIETY

1.1 Contributions of Cognitive-Attentional Theory of Test Anxiety

Correlational studies over the years have reported a negative relationship between test anxiety and various types of ability tests in both children and adults. As such studies cannot indicate the direction of cause and effect, experimental evidence has been sought to confirm the hypothesis that high-test-anxious persons are not less intelligent, but are detrimentally affected by their level of anxiety. Consequently, much of the early research investigated the effects of test anxiety on cognitive task performance as a function of situational conditions varying in degree of evaluative stress. It was found that ego-involving instructions, task difficulty, evaluative feedback and the presence of an audience resulted in worse performance by HA subjects compared to LA subjects, although performance was comparable under non-stressful conditions (for reviews see Hill, 1972; Ruebush, 1963; I. Sarason, 1960; S. Sarason et al, 1960; Wine 1971).

Early investigators seemed to assume, often implicitly, that test anxiety level was equivalent to emotional arousal level, an assumption that reflected the mechanistic nature of the Hullian Drive theory on which it was based (Mandler & Sarason, 1952; S. Sarason, Mandler & Craighill, 1952). From the beginning, however, these theorists identified a class of task-interfering responses elicited by evaluative conditions which the Test Anxiety Questionnaire was designed to measure. These responses were described as being self rather than task centred, involving feelings of inadequacy and helplessness. I. Sarason (1958) restated the interfering response hypothesis, emphasizing that it is a habit interpretation of anxiety: while LA subjects habitually respond to evaluative threat with increased effort and attention, HA subjects respond with self-oriented personalized responses.

In 1966 S. Sarason recognised the overriding importance of cognitive factors in self-reported test anxiety. He viewed painful emotional reactivity as playing an indispensible part in its origins, but felt it was the cognitive consequences of anxiety in children that affected personality development.

> "It is these cognitive consequences - involving attitude formation, social perceptions, fantasy, judgemental processes and the like - which take on a kind of pattern of organization that will itself affect the nature of subsequent experience at the same time that it will be changed by it." (S. Sarason, 1966:78)

In 1971 Jeri Wine proposed the Direction-of-Attention Hypothesis which stated that the explanation for performance deficits of HA individuals on cognitive tasks under evaluatively stressful conditions lay in the different attentional focus of HA and LA persons in such conditions, with HA individuals dividing attention between self-preoccupied worry and task cues, while LA individuals focused more fully on task cues. Wine (1971) reviewed the test anxiety literature in light of this hypothesis with additional evidence being presented by I. Sarason (1976) and Wine herself (1980, 1981). Her conclusions are here summarised together with a brief account of relevant research findings.

1.1.a Test Anxiety and Self-Focussing

Test anxious persons are generally more preoccupied than less anxious persons; furthermore, these self-focused and task-irrelevant cognitions are specifically elicited by stressful evaluative conditions.

Evidence:

HA persons tend to describe themselves in devaluing terms on other paper and pencil measures (I. Sarason, 1960, 1975b). Many and Many (1975) found a significant negative relationship between test anxiety and self-reported self-esteem in a large-scale survey of children. HA elementary

schoolchildren were found to score significantly less on a measure of self-concept than LA fellow-pupils (Baddeley; 1982). High anxious persons also describe themselves negatively on oral interview situations (I. Sarason & Ganzer, 1962, 1963; I. Sarason & Koenig, 1965). Direct evidence that high test anxiety is associated with task-irrelevant, self-devaluing cognitions during task performance comes from post-task reports by subjects in four studies (Mandler & Watson, 1966; Marlett & Watson, 1968; Neale & Katahn, 1968; I. Sarason & Stroops, 1978). Interfering self-relevant thoughts were recorded in the course of a serial learning task by Ganzer (1968) during which HA subjects made many more self-deprecatory and task-irrelevant comments.

1.1.b Test Anxiety and Task Cue Utilization

Test anxiety reduces the range of task cues used in cognitive task performance, probably as a function of the division of attention between task-relevant and self-relevant variables.

Evidence:

Easterbrook's proposal (1959) that anxiety reduces the range of task cues utilized has been investigated in several test anxiety studies (see Geen, 1980).

In general they support Easterbrook's arousal-cue-utilization hypothesis as applied to test anxiety: as the level of test anxiety rises, so the range of cues utilized in task performance progressively narrows. Studies in children (Dusek, Kermis & Mergler, 1975, Dusek, Mergler and Kermis, 1976) using a different methodology, found that HA children learnt an incidental task best, an apparently contradictory finding. Wine (1980) offers the interpretation that attention to these incidental cues represents general task-avoidant behaviour, which is supported by findings that HA children glance away from a task much more often than LA children (Nottleman & Hill, 1977).

1.1.c Test Anxiety and Attention to Social-Evaluative Cues

HA persons are more attentive to social-evaluative cues than LA persons.

Evidence:

Studies supporting the above conclusion have been conducted in laboratory and naturalistic settings with both children and adults. Dependent measures included performance on cognitive tasks, oral interview behaviour and observed behaviour. The studied social-evaluative cues were success

and failure feedback, verbal reinforcement, cues presented via models, and presence of observers.

Results indicated that both success and failure feedback had a greater effect on subsequent performance in HA than LA subjects (Weiner, 1966; Weimer & Schneider, 1971). HA subjects were found to be very responsive to verbal reinforcement of specific response classes in oral interview situations (I. Sarason & Ganzer, 1962, 1963). Modeling had powerful effects on HA observers' subsequent performance and the nature of these depended on the characteristics of the model (I. Sarason, 1968, 1972b, 1973, 1975a; I. Sarason, Pederson & Nyman, 1968). The performance of HA subjects was adversely affected by the presence of observers (Cox, 1966, 1968; Ganzer, 1968; Geen, 1976), but facilitated if the observer's presence was defined as non-evaluative and helpful (Geen, 1977). HA children glanced more frequently at the experimenter than LA children (Nottleman & Hill, 1977). Finally, HA subjects conformed more to the opinion of others in making perceptual judgements (Meuniere & Rule, 1967).

1.1.d Cognitive and Physiological Components of Test Anxiety

While test anxiety is composed of both cognitive and physiological components, it is the cognitive component,

consisting of self-preoccupied worry, that interferes most directly with cognitive performance, is the more stable component, and serves as a trigger for heightened physiological reactivity.

Evidence:

Liebert and Morris (1967) analyzed test anxiety into the two components of Worry, defined as cognitive concern over performance, and Emotionality, or the autonomic arousal aspect of anxiety. They constructed a self-report situational measure which required subjects to report worry and emotionality in specific testing situations, as well as a more general measure (Morris & Liebert, 1969).

In a series of studies using the worry-emotionality distinction (Doctor & Altman, 1969; Liebert & Morris, 1976; Morris & Fulmer, 1976; Morris and Liebert, 1969, 1970; Morris & Perez, 1972; Spiegler, Morris & Liebert, 1968) it was found that in specific testing situations worry scores remained fairly constant over time, whereas emotionality scores peaked just before the testing situation and fell off rapidly thereafter. Performance feedback, a cognitive informational variable, reduced worry scores, but not emotionality scores. Most importantly, worry scores were negatively related to both performance expectancies and actual performance, while

emotionality scores bore no consistent relationship to either. Recent research (see Holroyd & Appel, 1980) indicates that although HA individuals tend to report higher levels of autonomic arousal than LA persons, actual tonic measures show no difference. It appears that the differences lie in contents of consciousness.

1.1.e Cognitive-Attentional Experimental and Treatment Manipulations

The HA individual's cognitive task performance is improved by experimental and treatment manipulations designed to enhance attention to task-relevant cues and reduce self-preoccupied worry.

Evidence:

Cognitively-based theoretical reviews of early test anxiety literature (I. Sarason, 1972a, 1975b, 1978; Sieber, 1969; Wine, 1971) have provided an impetus for exploring ways of improving the task performance of HA persons.

Sieber (1969) pointed out that test anxiety is associated with faulty short-term memory. She and her colleagues demonstrated that providing children with visual memory aids

improved their performance (Paulson, 1969; Sieber, Kameya & Paulson, 1970).

I. Sarason (1972b, 1975a, 1978) investigated pre-task manipulations including instructional variations and exposure to models intended to facilitate the performance of HA subjects. The combined results indicated that the cognitive functioning of HA persons was improved by means of instructions which directed attention away from self-preoccupied worry, which were task-oriented, and which gave information regarding appropriate problem-solving strategies.

Treatment approaches to test anxiety have not, on the whole, kept pace with theoretical and laboratory research advances in the field. Too often, they have evolved from interest in specific treatment techniques, such as systematic desensitization, rather than from an analysis of the nature and effects of test anxiety. They tend to reflect the older theoretical assumption of test anxiety as emotional arousal and usually seek to reduce this. Typically, they have a beneficial effect on self-report anxiety level, but little or no effect on cognitive performance. Only where procedures focus specifically on cognitive modification is cognitive change

reliably elicited (for reviews see Denny, 1980; Spielberger, Anton & Bedell, 1976).

1.2 Contributions of Motivational/Attribution Analyses

Attributional analyses of test anxiety, and reactions to success and failure, accord well with a cognitive theoretical approach. The first study to examine the attribution of causality made by subjects varying in levels of test anxiety was conducted by Doris and Sarason (1955), who found that HA subjects blamed themselves for failure more than did LA subjects. Since then, test anxiety theorists have not concerned themselves directly with attributional analyses but are now finding the work of theorists in the area of achievement motivation who have adopted an attribution approach to be of considerable interest and relevance since a high level of achievement motivation may be regarded as roughly equivalent to a low level of test anxiety.

Weiner (1966) investigated the interaction of anxiety, task difficulty and success and failure experiences. His results indicated that among subjects learning a difficult task with success feedback, HA subjects outperformed LA subjects. However, subjects outperformed LA subjects. However, subjects working on an easy task with failure feedback showed an opposite pattern of results. Initially, Weiner discussed these data in terms of a

theory of inertial motivation (Atkinson, 1964; Weiner, 1970), but since then Weiner and colleagues have reanalyzed the basis of achievement behaviour, proposing that achievement motivation differences may be related to differences in subjects' causal attributions (Weiner, Frieze, Kukla, Reed, Rest and Rosenbaum, 1971, Weiner, 1974). According to their classification system, success and failure may be attributed to four causal elements: ability, effort, task difficulty and luck. Ability and effort are defined as internal attributions or properties of the person. Task difficulty and luck are defined as external attributions or properties of the environment or situation. Weiner and colleagues also argued that ability and task difficulty are fixed and relatively stable over time, whereas effort and luck are subject to change.

In terms of this analysis, individual differences in causal attributions for success and failure mediate differences in achievement motivation, (and by implication, test anxiety) affecting achievement behaviour. Persons high in achievement motivation, or LA, attribute failure to lack of effort (an unstable internal factor), and subsequently direct more effort and attention to the task on hand. Persons low in achievement motivation, or HA, attribute their failure to a stable internal attribution, lack of ability, and give up on the task. The different responses made to success by individuals differing in levels of achievement motivation/test anxiety have proved less easy to explain. Why

success attributed to ability, a stable internal factor, should cause LA persons to expend less effort, while HA persons respond to success by trying harder even though they attribute it to the external factors of luck or task ease, has led Wine (1980) to offer an explanation combining responsibility attributions with task- self- and social -evaluative-cue analyses. She suggests that LA persons typically interpret success and failure feedback as task-relevant information: failure calls for the expenditure of more effort while success informs him he has proved himself and can relax. In contrast, the HA person is likely to interpret success and failure as social-evaluative cues which he interprets in terms of his generally negative self-concept. He will be pre-occupied with how he is being evaluated, not with the task itself. Failure confirms lack of ability and the hopelessness of additional effort, while success leads to greater effort in order not to disappoint the evaluator.

An additional theoretical construct from attribution theory that Wine (1980) considers to be useful to an understanding of the cognitive differences between LA and HA individuals is the actor-observer distinction advanced by Jones and Nidbett (1972). She suggests:

> "Highly test-anxious persons are self-observers in evaluative situations, attributing their typically inadequate performance to stable negative dispositions, whereas low-test-anxious persons may be described as actors matching their behaviour to shifting situational demands." (Wine, 1980:362)

1.3 Learned Helplessness in Children

A further area of research which has considerable relevance to test anxiety is learned helplessness in children. The original model of learned helplessness proposed that exposure to uncontrollable aversive outcomes results in "learned helplessness" which is characterised by a reduced incentive for responding, interference with the learning of new response-relief contingencies, passivity and depression. Subsequently, researchers became convinced that objective non-contingency might be less important than how this is experienced by the subject. Factors such as the subject's initial expectancies of control, the importance of outcome, and attributions of causality for outcome, received increased attention (Abramson, Seligman & Teasdale, 1978; Wortman & Brehm, 1975).

The relationship between attributions of causality and subsequent performance in children has been extensively investigated by Dweck and her colleagues (Diener & Dweck & Repucci, 1973). Their findings indicate that when attributions for failure are assessed, they rather reliably predict response to failure despite equivalent performance before failure. This points to the importance of cognitions about the causes and controllability of failure, rather than the failure experience itself, in determining whether or not performance decrements will follow. "Mastery" children (those who persisted following failure) placed far greater

emphasis on motivational factors which can be surmounted by one's own efforts. "Helpless" children (those who gave up following failure) placed relatively more blame for their failures on factors they could not control, such as lack of ability. Verbalization of thoughts during tasks following failure reflected these differences, helpless children manifesting negative and task-irrelevant cognitions while mastery children verbalized self-instructions and made self-monitoring comments aimed at successful task-completion. When helpless children were taught to change their attributions of failure to lack of effort instead of lack of ability, they showed an improvement in performance (Dweck, 1975).

Attributions for success made by helpless and mastery children also differed. Helpless children viewed success as irrelevant to their competence and unreplicable. Mastery children, however, took success as a sign of intelligence, believed it would continue, and did not change this view in the face of obstacles (Diener & Dweck, 1980).

Dweck and Wortman (1982) point to the parallels between the findings of the three research areas of achievement motivation, test anxiety and learned helplessness, from which a fairly consistent picture emerges of the maladaptive responder in the performance setting, characterised by high fear of failure, high test anxiety and helplessness.

1.4 Self-Efficacy

Bandura's theory of self-efficacy (1977) is a closely-related conceptual system. He, too, stresses the importance of cognitive factors, and his "expectations of self-efficacy" are essentially the same as self-attributions and expectations. In his system, efficacy expectations are differentiated from outcome response expectancies. An outcome response expectancy is defined as a person's estimate that a given behaviour will lead to certain outcomes, which is not the same as an efficacy expectation which is a person's conviction that he is able to successfully perform the behaviour required to bring about the outcomes. For example, two students may have identical beliefs in good grades resulting from scholastic skills (internal locus of control) but while Student A believes she has the requisite skills and so is high is self-efficacy, Student B may believe she lacks those skills and so be low in self-efficacy. Bandura (1977) specifically suggested that theorists of learned helplessness could profit from a consideration of this conceptual distinction. Abramson, Seligman and Teasdale did so, with the result that their reformulated model adopted an attributional approach (1978).

It would appear that lack of self-efficacy beliefs characterises the HA child; and effective therapy would need to address itself to this.

1.5 Aetiology of Test Anxiety/Familial Factors

S. Sarason et al (1960), working within a psychoanalytic framework, held that test anxiety, a personality characteristic, develops during the pre-school years and slowly stabilizes during the school years. They hypothesized that when parental standards are so unrealistically high that a child is unable to meet them, negative judgements ensue. These are internalized by the child who then feels hostile towards the rejecting parents. These hostile feelings make the child feel guilty, resulting in self-derogation and repression of hostility. In addition, the child's hostility towards overdemanding parents produces unconscious fantasies of parental retaliation and rejection as a consequence for the hostility. These fantasies represent a threat to the child's dependency needs and lead to both repression of the hostility and engagement of behaviours intended to obtain parental approval and satisfy their expectations. In so doing, the child risks losing his ability to function independently in problem-solving situations and seeks direction and support first from parents and subsequently from teachers and other adults.

Hill (1972) also assumed that test anxiety begins in early parent-child interactions, with parental criticism leading to a growing sensitivity to evaluation on the part of the child. As children grow older, Hill saw a shift in the primary locus of evaluative feedback to teachers and eventually to peers. He

suggested that LA children have generally enjoyed a history of success in evaluative situations, with generally positive interactions with adults, so developing a relatively higher motive to approach success than to avoid failure. HA children, on the contrary, are thought to have had a generally poorer history of success and somewhat more punitive interactions with important adults, developing in consequence a relatively higher motive to avoid failure and criticism than to approach success. Hill believed his position to be consistent with the S. Sarason et al (1962) position in emphasizing that evaluative reactions from adults underlie and enhance the effects of test anxiety, but differed from it in emphasizing social interaction and achievement histories without positing internal reactions such as guilt or hostility.

There is a long line of theorizing that holds a person's self-concept is largely an internalization of how he thinks others see him (see e.g. Gergen, 1971). As Mead wrote,

> "We are in possession of selves just in so far as we can and do take the attitudes of others towards ourselves and respond to these attitudes," (Mead, 1925:273)

Thus the generally negative self-concept held by HA children (Many & Many, 1975; I. Sarason, 1969) may be seen as suggestive of negative early parent-child interactions.

Actual evidence relating to the aetiology of test anxiety is sparse. S. Sarason et al (1960) reported as supporting their suppositions a study conducted by Davidson, Sarason, Lighthall, Waite and Sarnoff, in 1958. All the mothers, and 21 fathers, of 32 pairs of LA and HA children matched for grade level, sex and IQ were interviewed and required in addition to complete a rating scale of their children's personalities. Results indicated that fathers, but not mothers, differentiated between HA and LA children, rating LA children as more mature, responsible and optimistic but less generous and affectionate than HA children. S. Sarason et al (1960) suggested that fathers may be less defensive and/or more objective than mothers. Alternatively, perhaps fathers interact differently with their children in qualitatively different situations and so reach different judgements. It is also possible, perhaps, that the judgements of fathers of HA children were displaying that very tendency to excessively high standards they were hypothesized to hold.

Another study investigating parent-child relations supports the hypothesis that parents of HA children tend to be aversive to their children in problem-solving situations (Hermans, ter Laak & Maes, 1972).

While parents of LA children in the study offered effective problem-solving strategies without taking over, parents of HA

children ignored their children's bids for security, failed to offer task-relevant strategies, and tended if anything to teach them to engage in task-irrelevant or inappropriate behaviour. Since confidence and self-reliance need a secure early attachment in order to develop according to Bowlby (1969), HA children whose parents behaved in the above manner would appear to lack ideal conditions to develop self-efficacy.

The test anxiety literature has ignored later parent-child interactions in eliciting, reinforcing or changing the test anxiety response, yet it seems highly probable that familial factors continue to play an important part. Once again, the field of achievement motivation may supply findings that are applicable, since the HA child is often a poor achiever.

Supportive family relations appear to foster academic achievement. Christopher (1967) argued that academic achievement is functionally related to the perceived strength of the parent-child relationship and perceived parental attitudes toward achievement. Poor achievement appears to result from over-restrictive and domineering parenting (Kimball, 1953) with both babying and excessive punishment proving harmful. Parents of high achievers give their children more praise and approval, and foster a feeling of closeness between family members (Morrow & Wilson, 1961), and encourage participation in adult discussions (Christopher, 1967).

More direct study of parent-child interactions of school-going children who vary in their level of test anxiety is sorely needed.

1.6 Developmental Trends in the Stability of Test Anxiety

Once children have started school, test anxiety scores slowly stabilize in the later elementary school years. Children's first grade scores do not allow accurate prediction of fifth grade test anxiety level, but somewhat higher test-retest correlations are obtained over two-year testing intervals, averaging about 0,4 during the early school grades and 0,5 later (Hill & Sarason, 1966). There is an indication that TASC scores stabilize further in middle- and high-school years (Manley & Rosemeir, 1972).

There are indications that boys and girls differ in level of test anxiety and defensiveness as measured by the Defensiveness Scale for Children (S. Sarason, Hill & Zimbardo, 1964) in the later elementary school years although initially there are no differences. In general, girls admit to more test anxiety and are less defensive than boys by the fifth and sixth grades, although there is a decrease in defensiveness in both sexes over this period. (Hill & Sarason, 1966; Manley & Rosemeir, 1972). Interpretation of these trends is complicated; it may be that older children admit to more anxiety because they genuinely experience more anxiety, or they have become truly less defensive, or the extreme questions of the

defensiveness scale may strike them as unrealistic. Hill & Sarason (1966) offered the interpretation that sex-role socialisation may account for older boys admitting less anxiety than girls, for whom it is more socially acceptable. They proposed that girls may cope with anxiety by admitting it, while boys cope by denial. This hypothesis receives support from the emergence of a negative correlation between defensiveness and IQ and Achievement test scores in boys only, in the later elementary school years.

High-test-anxious girls manifest higher need achievement in the classroom than boys which may mean that the TASC measures a combination of drive and anxiety-related interfering responses in girls but only of the anxiety-related responses in boys (Davidson, 1959). On the whole, the general pattern of findings for boys is much clearer and more consistent than for girls (Ruebush, 1963).

CHAPTER TWO

2 SCHOOL FACTORS

It has always been assumed that the school setting is of major importance (together with intrapersonal and familial factors) in eliciting, reinforcing, or changing the test anxious response in strength and frequency. On completion of their longitudinal study, Hill and Sarason (1966) wrote,

> "It is obvious but important to state that the longitudinal findings are compelling evidence that 'something is going on' and that the school culture is part of that something ... The school is not merely an arena in which familial and intrapersonal characteristics are given an opportunity to become manifest. It is assumed that the behaviour of the child in school is actively and heavily influenced by the nature of his school experiences as well as by non-school factors." (Hill & Sarason, 1966:69)

In 1980, Phillips, Pitcher, Worsham and Miller were appealing for a school ecological perspective in test anxiety research, an indication that little had been done in the intervening 14 years to delineate which aspects of the school culture might be contributing to increasing levels of test anxiety.

The elementary school years embrace the time when children are acquiring skills vital to their society (Gardner, 1978), which in Western-style society are largely cognitive. Theories of instruction tend to focus on the cognitive skills of the individual child, how they develop, and how they should be fostered (e.g. Bruner, 1966). This overlooks the fact that schooling is a socialization process (Bronfenbrenner, 1970; Leff, 1978), and that the school itself is a complex social organization (Bidwell, 1965). Within the classroom, teachers instruct a group of children, and even when the focus is on one individual child, this takes place in context of the group and a set of relationships.

Much educational research has been carried out in college classrooms or in microteaching or other special situations, but the ordinary elementary classroom situation is quite different. Even those studies which do involve ordinary classrooms have often been conducted in connection with special experimental programmes, or with teachers in training. (Brophy & Good, 1974). In order to find out what children experience in the ordinary everyday classroom situation, this type of research is unhelpful. Nor is it feasible to obtain such information from teachers themselves. John Holt, a teacher, concluded after observing in a colleague's classroom that what really goes on in classrooms is not what teachers think:

> "A teacher is like a man with a powerful flashlight in his hand. Wherever he turns his light, the creatures on whom it shines are aware of it, and do not behave as they do in the dark." (Holt, 1964:21)

It would seem that the best way to find out the real characteristics of school life would be for an observer to remain in a classroom long enough to allow pupils and teacher to revert to their normal behaviour. This was the procedure followed by Dr Philip Jackson of the University of Chicago, whose book "Life in Classrooms" (1968) was written about his observations made during two years spent in four elementary classrooms.

2.1 Characteristics of School Life

Jackson (1968) noted that teachers, students and parents typically focus on the highlights of school experience, yet its true significance should be sought in the thousands of fleeting events that combine to form everyday humdrum routine. By the time a child is ready to move on to high school, he will have been exposed to such routine for about 7,000 hours, the equivalent to spending an hour in church on Sundays for 150 years. This environment is highly predictable, with little change over time occurring in physical objects, social relations and major activities. In addition, the child's attendance is involuntary.

Jackson (1968) believes that three fundamental, but less obvious, characteristics of school life form a 'hidden curriculum' which must be mastered by each student if he is to progress satisfactorily through school. They are the crowded nature of the classroom, the continued and pervasive spirit of evaluation within it, and the unequal division of power. Since failure to master this 'hidden curriculum' may underlie increases in test anxiety in the elementary schoolchild, it is worth looking at in greater detail.

Crowds

It has already been stated that the teacher is not teaching an individual but a class of children. In order to keep the class running smoothly she must carry out several functions. She will talk, decide who else may talk, allocate classroom resources, grant privileges, and keep time. This makes the classroom a busy place; Jackson (1965) found that an elementary schoolteacher may engage in as many as 1 000 personal exchanges daily. For pupils, the experience of being part of a crowd means experiencing considerable delay: they will have to wait their turn at the teacher's desk or to use equipment; they will also have to wait for others to finish assignments. Another consequence is the continual occurrence of distractions and interruptions, which pupils are expected to ignore; they are expected to act as if alone when surrounded by other they know well.

In addition, the work to which they are expected to devote their attention is not of their own choosing. Jackson (1968) concluded that children in class are supposed to disengage feelings from actions some of the time, yet still be capable of enthusiastic participation where appropriate, such as in group activities. Both impulsive action and apathetic withdrawal are regarded by the teacher as undesirable.

Evaluation

The experience of success and failure is not new to the child just starting school. Up until this time, however, formal evaluation of his abilities and achievements rarely occurs. Once in school, he will accumulate a semi-public record on which such evaluations will be documented over his entire school career.

Tests are the classic form of educational evaluation, and are encountered more frequently in the school environment than elsewhere. In addition to relatively informal class tests, examinations are written at various times in the school year. The culmination of these is an external examination at the end of the final year of school, the passing of which is crucial to career choice and admission to universities. Group intelligence testing is another classic form of educational evaluation which has important consequences for test anxiety. IQ testing will be considered in detail in Chapter 3.

Tests and examinations are not the only form of school evaluation as may be seen from the fact that evaluation also occurs in the lower standards where formal tests are almost non-existent. Jackson (1968) suggested that the complexity of the school evaluative process is better understood if it is broken down into various features. For example, evaluations may be seen as deriving from more than one source, the conditions of their communication may vary, they may have one or more referents, and they may range in quality on a continuum from intensely positive to intensely negative.

The chief source of classroom evaluation is the teacher, who is continuously involved in passing judgements on the work and behaviour of pupils. Peers sometimes participate in this process, and self-evaluation is a further source. Such evaluations may, or may not, be accurate.

Conditions of communication of evaluation vary. Some of the more important judgements, such as IQ test results, are kept solely for school personnel; others are shared only with parents. Those of which pupils are openly apprised are made with varying degrees of privacy. Particularly in the elementary school, many judgements are made publicly, and even where private communication is the aim, the crowded nature of the classroom makes this difficult to achieve.

While the chief referent of classroom evaluation is educational achievement, Jackson (1968) observed that evaluation is not confined to this, but also refers to children's adjustment to institutional expectations and possession of specific character traits.

Evaluations connote value, and most pupils experience judgements from both ends of a continuum from positive to negative. There is perhaps some effort made to modify harsh academic judgements but there are still many opportunities for negative evaluation such as disapproval of behaviour, accusations of lack of effort, or impatience when answers are not forthcoming. The present system of evaluation in education makes comparison ubiquitous: grading, streaming, and testing are all comparative, and teachers' comments frequently involve either explicit or implicit comparisons (Leff, 1978). In this milieu competition flourishes, and leads to some children believing themselves to be failures.

> "Perhaps they are thrown too early, and too much, into a crowded society of other children, where they have to think, not about the world, but about their position in it." (Holt, 1964:43)

Power

School is a place where the division between the weak and powerful is very clearly drawn (Henry 1963; Jackson, 1968; S. Sarason, 1971).

Jackson (1968) claimed that the difference in authority between teacher and pupils is the most salient feature in the social structure of the classroom, and its consequences relate to the broader conditions of freedom, privilege and responsibility as manifest in classroom affairs. In the same vein, S. Sarason (1971) recorded that "constitutional issues" in the classroom were always decided by teachers without reference to the opinions and feelings of pupils, and that teachers held complete power. He concluded that "authoritarian" and "democratic" teachers differed little in this respect, a conclusion shared by Jules Henry (1963), an anthropologist who directly studied the classroom. The consequence of the power structure in classrooms is that children develop strategies to meet or dodge the demands made of them. Such strategies are numerous, varied, and range from adaptive to restrictive and self-defeating (Holt, 1964; Jackson, 1968). They may persist into adulthood and the job situation to the detriment of the individual.

2.2 Teacher Attributions and Expectations

In the classroom, teacher and pupils act and interact within the demands of the school organization. A useful theoretical framework within which to view the process is attribution theory, which proposes that in our relationships with others our behaviour depends to a large extent on the impressions we form of them, our

interpretations of their past and present behaviour, and our predictions of what they will do in the future. Inferences about their internal states, such as motives, intentions, abilities and dispositions are made on the basis of overt behaviour. Such inferences are called attributions (Eiser, 1978). When we make attributions, we are thus categorizing behaviour in terms of why we suppose it happened in terms of our assumptions of the other person's wishes, motives, abilities, intentions, his awareness of what he is doing and his ability to do it, and the situational restraints that are operating. In so doing, we attempt to render the social environment more predictable and intelligible.

A key issue in attribution theory is whether people attribute a given act or event to personal causes (internal motivation) or to impersonal causes (situational restraints), which Kelley (1967) proposed they did on the basis of four criteria: distinctiveness, consensus, consistency over time and consistency over modality.

This offers a useful set of principles to account for the process by which teachers assess ability of their pupils. A teacher might judge as follows: if a child's academic performance is usually poor (low distinctiveness), but the majority of the class copes reasonably well (low consensus), in the past the child has usually done poorly, and this is consistent with his performance in all other intellectual tasks, especially IQ tests (high consistency),

then the teacher will almost certainly attribute this child's performance to lack of ability, a stable internal attribute which is likely to be regarded as unchangeable.

There is evidence that other factors also influence teachers' attributions. These include sex, physical appearance, socio-economic status, ethnic background and previous acquaintance with siblings, all of which may serve as sources of bias (see e.g. Braun, 1976; Brophy & Good, 1974 for reviews of research relating to sources of input to teacher expectancies).

Willis (1972) found that predictions regarding ability were being made with a considerable degree of confidence as early as the third day of the school year by first-grade teachers. They had had no prior contact with the children, who had not been to kindergarten nor taken tests. In some cases teachers had prior knowledge of family or siblings. Teachers commented in terms of manners, behaviour, and family problems. Mackler (1969) found that streaming, or tracking, began informally in kindergarten on the basis of such valued traits as politeness, passivity, listening and following instructions. Such early judgements are likely to remain relatively stable over time, partly due to primacy effects (Asch, 1946; Jones & Goethals, 1971; and with specific reference to education, Feldman & Allen, 1972, 1973; Murray, Herling & Staebler, 1972).

Decisions about the behaviour or performance of others in terms of internal or situational factors has important consequences, since we come to expect certain behaviour from them and act accordingly. This may in turn constrain their behaviour since their role in the interaction is determined. If such constraint is sufficiently strong or sustained, it may force others into behaving in ways that confirm our expectations. Attribution to stable internal characteristics of the other is much more likely to give rise to expectations and constraining behaviour on our part. Expectancies of this sort may thus act as self-fulfilling prophecies.

The incentive for much of the work on expectation effects came from laboratory animal studies by Robert Rosenthal (1966). He showed that in the absence of stringent precautions, an experimenter's expectations tended to bring about their own confirmation; this experimenter bias has since been accepted as a confounding variable to be controlled in research as far as possible. Rosenthal hypothesized that expectations in the classroom could produce a similar effect to that in the laboratory, and manipulated teachers' expectancies by identifying (at random) some of their pupils as academic 'spurters' on the strength of a 'special' test which was nothing more than an IQ test (Rosenthal & Jacobson, 1968). The researchers claimed that the children so identified made IQ gains the following year. Braun (1976) describes the study's impact:

> "The Rosenthal and Jacobson study stimulated an immediate flurry of interest in both lay and academic circles. Reaction to the study ranges from unquestioning acceptance of the phenomenon as akin to ESP to scathing scepticism." (Braun, 1976:187)

The controversy still continues. A number of serious methodological flaws were pointed out by fellow psychologists (Elashoff & Snow, 1971), and replication studies have failed to yield similar results. However, in a thoughtful review of the Pygmalion study, as it was known, and subsequent research, Brophy and Good (1974) conclude that it would be inappropriate to dismiss the study on this basis, since most replication studies have involved weaker treatments than the original. Moreover, some or all of the teachers involved in them failed to acquire the desired expectations, and many were aware of the nature of the experiment due to the widespread publicity received by the original study. In addition, Brophy and Good are of the opinion that since subsequent research has revealed that the presence of expectancy effects appears to depend on teacher and student variables, no findings in this field should be evaluated on the basis of group data. For example, the negative findings in the Pygmalion study for teachers in grades three to six should not be used to invalidate the positive findings for grades one and two.

Of the many studies of teacher expectancy effects undertaken since 1968, some have utilized experimentally-induced expectancies (e.g. Beez, 1968; Cornbleth, Davis & Button, 1972; Jeter & Davis, 1973); others have utilized expectancies formed naturalistically in the classroom situation (e.g. Brophy & Good, 1970; Brophy, Evertson, Harris & Good, 1973; Douglas, 1964; Mackler, 1969). The naturalistic studies have been more successful in showing evidence of teacher expectancy effects than the experimental studies, on the whole. The latter have shown mixed, mostly negative results, while the former have shown mostly positive results. Teachers appear to reject test scores that are too discordant with their own experience of children (Brophy & Good, 1974; Wilkins & Glock, 1973), and their behaviour relates to their self-generated expectancies (Dusek & O'Connell, 1973). They also vary in their susceptibility to input factors. Braun (1976) reviewed relevant studies and concluded that teacher information and personality were prime factors controlling the influence of expectancy cues. He suggested that suggestibility, positive attitudes to test data, sex of teacher, and the ways they reduce dissonance were important variables. Added advantages of naturalistically-formed expectations are greater generalizability to other classrooms, and the opportunity to study low expectations which could not be experimentally induced without raising serious ethical implications.

The most common type of study utilizing naturalistically-formed teacher expectations has involved the effects of streaming or tracking in schools. Mackler (1969), already mentioned in connection with teacher attributions, found that teachers assigned children to streams very early on in the first grade on very little objective evidence, and that there was little mobility between the streams on the basis of subsequent performance. At the end of the first grade the difference in achievement between the highest and lowest streams was seven months. By third grade, the gap had increased to twenty months. Thus, where pupils had been streamed inappropriately, the rigid streaming system served to define and - it may be argued - limit the pupils' potential. Similar results have been reported by other researchers (e.g. Barker-Lunn, 1970; Húsen & Svensson, 1960; Pidgeon, 1970).

One of the most striking studies of streaming was conducted in Britain by Douglas (1964). He found that many eight-year-olds had been placed in higher or lower streams than their measured ability would indicate, stream placement being influenced by such factors as socio-economic-status, personality traits and behaviour. Three years later, on re-testing, children's test scores showed that those placed in upper streams had improved, while those placed in lower streams had deteriorated. In upper streams, those children whose ability was relatively low had shown most improvement, while in the lower streams it was the brighter children who

showed greater-than-average deterioration. Douglas noted that transfers between streams were rare, and concluded:

> "Once allocated, the children tend to take on the characteristics expected of them and the forecasts of ability made at the point of streaming are to this extent self-fulfilling." (Douglas, 1964:115)

Allocation to a particular stream may determine the subsequent level of achievement by restricting learning opportunities. Even in schools with no official streaming policy, children are usually allocated to learning groups within classes which may have considerable consequences. Rist (1970) found that kindergarten children were grouped according to teacher estimates of ability, and allocated to one of three tables in the classroom. The bottom group was placed at the table furthest away from the teacher, received less attention and had difficulty in hearing. This differential treatment was perpetuated as the children progressed to first and second grade. Group placement also assigns status within the classroom social microcosm. Rist (1970) described the development of a caste system in which top group, high status children learned to convey disrespect for low status, bottom group children. In another study, children and teachers showed preference for children who belonged to the top reading group, with five out of the six teachers in the study expressing negative feelings towards those in the lower reading groups (McGinley & McGinley, 1970).

Brophy and Good (1974) reviewed several studies that demonstrated differential teacher-pupil interaction, some teachers showing a pattern of favouritism of high-expectancy pupils and inappropriate teaching of low-expectancy pupils. Low-expectancy pupils were more likely to receive less verbal response from teachers, (Willis, 1970), more criticism and less praise in equivalent situations than high-expectancy pupils, (Brophy & Good, 1970), and were called upon less often in class (Good & Denbo, 1973). In the early grades, differences between high and low expectancy student-teacher interaction tended to be qualitative, but in later grades became quantitative (Brophy, Evertson, Harris & Good, 1977).

These patterns of differential behaviour were not universal among teachers and appeared to reflect rigid and inappropriate attributions and expectations which in turn appeared to reflect more general teacher expectancies such as belief in the unchangeability of students' abilities, and their potential to benefit from teaching. Brophy and Good (1974) concluded that expectations in the classroom are normal, ubiquitous, and in themselves neither bad nor good. What is crucial is their degree of accuracy and flexibility which depends on the attributions on which they are based. Attributions are typically logical inferences based on observations and should incorporate all available information, but this is by no means always the case. Teachers

differ in the general accuracy of their interpersonal attributions and susceptibility to bias, and in their readiness to be open to correction when contradictory evidence presents itself. In the classroom, teachers rapidly make attributions and form expectations from available records and their own observations. This is unavoidable. If they are accurate and continually updated to keep pace with student development they can be beneficial. If, however, they are inflexible and inappropriate they may act as self-fulfilling prophecies by being translated into teacher behaviour that limits learning opportunities and conveys to children certain messages that serve to lower their self-attributions and expectations.

Children may be seen as varying in degree of vulnerability to expectancy cues from teachers. Because a teacher's credibility is likely to be high with pupils, especially those in early grades, the expectancy cues she emits via her behaviour are very probably read and internalized to some degree. But their potency to affect self-concept and general motivation to the necessary degree to act as self-fulfilling prophecies is hypothesized by Braun (1976) to be a function of the already existing self-image of the child. If he already perceives himself as competent in learning situations, he will require many cues from highly credible sources to alter this image. Similarly, if he has come to hold a negative view of his capabilities, he will be highly resistant to change (Gilham, 1967;

Glock, 1972). The age of the child is also a relevant factor, with expectancy effects showing up most readily in the first grade (Brophy & Good, 1970; Rosenthal & Jacobson, 1968). It may be hypothesized that the child who starts school does not, as yet, possess a view of his academic abilities, and this may be gradually formed on the basis of data received from teachers. The already existing self-concept, formed on the basis of parent-child interactions, will influence how school data are processed. It appears probable that it will be either confirmed or revised on the basis of this new information. Each successive year at school would tend to reinforce the academic aspect of the self-concept; there is good evidence that global self-concept and academic achievement bear a positive relationship in schoolchildren (Purkey, 1970; Wylie, 1974).

This chapter has reviewed research relating to certain characteristics of the school environment: its crowded, evaluative nature, the inequality of power that exists within it, and teacher expectancy effects that sometimes operate in classrooms. All of these may be hypothesized to interact with the intrapersonal and familial factors already considered in relation to test anxiety.

It is highly probably that the HA child is handicapped in mastering the "hidden curriculum" of the classroom as delineated by Jackson (1968). It may well serve to trigger off increased

levels of test anxiety, attended by cognitive and attentional deficits which depress performance on intellectual tasks, leading to lowered expectations on the part of the teacher. If a teacher is prone to rigid and inflexible expectations, a self-fulfilling prophecy may be set in motion, since the HA child is highly susceptible to social-evaluative cues and his already fragile self-concept will readily accept that others may evaluate him negatively.

CHAPTER THREE

3 INTELLIGENCE TESTING IN EDUCATION

> "The major impact of the (IQ) tester's success was probably on the educational system; but we do not even know the dimensions of this effect, to say nothing of its consequences." (Samelson, 1977:280)

The major focus of this study is the test anxiety-intelligence relationship in elementary schoolchildren. As the above quote implies, no consideration of the school environment would be complete without a consideration of IQ testing in education, its history and current status, and the implications for test anxiety.

3.1 Historical Perspective

The origins of IQ testing may be traced to the interest in, and scientific study of, individual differences which took place in university laboratories towards the close of the nineteenth century (Freeman, 1939). Although these early experiments with college students had little practical application to educational problems, they laid the necessary foundation.

The year 1905 saw the beginning of educational interest in mental tests with the success of Binet and his co-workers in developing an individual scale for the measurement of intelligence in children on an empirical basis (Binet & Simon, 1905). This first test of intelligence was not constructed along theoretical lines, but with the practical view of developing a fairly objective standard procedure for screening out from the Parisian regular school system those children who were unable to benefit from it. By this pragmatic criterion, his results were very successful. His scale, revised in 1908 and 1911, included a wide variety of tasks designed to tap his common-sense definition of intelligence as "Judgement, otherwise good sense, initiative, practical sense, the faculty of adapting oneself to circumstances" (Binet, 1905). It yielded a total score expressed as a mental level corresponding to the age of normal children whose performance the score equalled. Thus a child whose chronological age was eight might have a mental level of only six. In subsequent translations and adaptations, the term Mental Age came to be substituted for Binet's more neutral term of mental level.

The Binet-Simon scale attracted world-wide attention, and translations and adaptations appeared in many languages. In America, the most famous revision was developed at Stanford University under the direction of L.M. Terman in 1916 and became known as the Stanford-Binet. This was the first test to make use

of the Intelligence Quotient (IQ), the ratio between the mental and chronological age, first proposed by Stern (1912). This took into account the fact that an absolute difference of one year means something different at different ages, with the greatest absolute change usually occurring in the early years. Terman's use of the IQ index firmly established its use in all future intelligence tests until it, in turn, was replaced by the deviation IQ used by Weschler (1939) in the construction of his test of adult intelligence. Here the strategy of age-grading was abandoned in favour of a score giving the relative position of an individual compared with his peers in terms of the properties of the normal curve (Maloney & Ward, 1976).

The Binet test and its adaptations were individual scales requiring highly trained examiners; moreover, since they necessitated oral responses from the subject and manipulations of material, they could not be adapted to group administration in schools. With World War 1, however, came a development that was to have profound consequences for testing in education. In 1917, when America entered the war, the National Research Council composed of a group of the leading psychologists of the day, devised two group intelligence tests known as Army Alpha for routine general testing, and Army Beta, a non-language scale for illiterates and foreign-born recruits.

The express purpose of these tests (which permeated later educational thinking) was:

a To aid in segregating and eliminating the mentally incompetent.

b To classify men according to their mental ability.

c To assist in selecting competent men for responsible positions.

(Yerkes in Samelson, 1977:276)

As Samelson (1977) points out, these IQ tests were assumed to measure native ability rather than the results of school training, and the high correlation of IQ and achievement was taken to indicate that achievement is the result of high intelligence and not vice versa.

The army tests enabled nearly 2 million men to be classified with considerable success. At the end of the war, the tests were released for civilian use, serving as models for a proliferation of group intelligence tests devised for all ages and types of persons (Anastasi, 1976). School systems and colleges, especially, took up group testing as a basis for pupil classification, guidance and college admissions (Cronbach, 1975). Terman, whose individual adaptation of the Binet-Simon test was already widely used and who was a member of the National Research Institute which

developed the army tests, was explicit on the application of testing in education,

> "Teachers must learn to use tests, otherwise the universal grading of children according to mental ability must remain a Utopian dream."
> (Terman, 1919:291)

The National Research Council was given a grant of 25 000 dollars of Rockerfeller money from the General Education Fund to develop a group test for children. The resultant National Intelligence Test was eventually given to some 7 million children during the 1920s (Samelson, 1977).

> "The test technology became an accepted and increasingly influential feature of American life. The momentum of tests overrode all criticism."
> (Cronbach, 1975:1)

In Britain, mass intelligence testing in the schools became an accepted part of life, especially in the years 1930-1950. In South Africa, government schools followed suit in 1932 with the introduction of the South African Group Test for white children between the ages of ten and eighteen. This test was updated in 1965 to become the New South African Group Test, also for whites. A new update is scheduled for 1985.

As Cronbach (1975) states, virtually everyone favoured testing in schools; it promised to aid the bright child who was being held

back, as well as helping the slow child who was struggling to keep up. It was also seen as appropriate to a period when the resources available for the development and nurturance of human potential were quite scarce (Gordon & Terrell, 1981).

Interestingly, the army itself was more cautious, and after World War I it dropped its IQ testing programme despite its apparent success. According to Kevles (quoted in Samelson, 1977), the War Plans Division, in an early concern over labelling effects, did not want men of low mentality to be officially identified since such a practice could result in their becoming objects of public ridicule and the butt of practical jokes. This, it was felt, would not be conducive toward military efficiency. When the Army General Classification Tests were produced for World War II, one of the first decisions of army psychologists was to not call them intelligence tests. This might explain why intelligence testing in World War II received much less attention than in World War I.

Early test construction was not guided by an explicit theoretical base. There was, however, a latent implicit theory on which there was a fairly general agreement. Its basic assumptions included:

1 Intelligence is a recognizable attribute which is responsible for differences among children and adults in their learning, reasoning, and other cognitive capacities and is essentially stable over time.

2 Although not measurable in the same sense as physical attributes, the practice of sampling appropriate mental tasks, and standardizing scores against the distribution in the general population will yield IQ's which can be accepted as quantitative measures of level of intelligence.

3 Intelligence is essentially innate, being determined by the genes that a child inherits from his parents. It matures with age, irrespective of environmental influences, reaching its maximum around 15 years and then stays constant until senility sets in. An IQ obtained from a reliable test in childhood may thus be taken to indicate the individual's educational and vocational level in later years.

(Vernon, 1979)

The last assumption was contrary to the notions of Binet himself, who labelled as "brutal pessimism" the idea that the intelligence of an individual is a fixed quantity which cannot be augmented.

The idea that intelligence tests provided a fixed measure of innate intelligence was arrived at by the major translators and adaptors of his test in America: Lewis Terman of Stanford, Henry Goddard

at the Vineland Training School in New Jersey, and Robert Yerkes at Harvard.

These three pioneers of the testing movement were members of various eugenic societies and organizations, holding that IQ testing could be used to detect the genetically inferior. Kamin (1974) quotes from a number of their early writings to illustrate their socio-political views. One such example is as follows:

> "Children of this group (IQ's in the 70-80 range) should be segregated in special classes ... they cannot master abstractions, but they can often be made efficient workers ... There is no possibility at present of convincing society that they should not be allowed to reproduce, although from a eugenic point of view they constitute a grave problem because of their unusually prolific breeding."
>
> (Terman, 1916, quoted in Kamin, 1974:6)

The idea of a fixed mental level "that could be measured with accuracy and ease" (Burt, 1933) combined with notions of heritability of intelligence went relatively unchallenged until the 1960s. Some voices of criticism were raised before this, however. When the army data from testing in World War I were made public, they provided amunition for both the eugenics movement and racism directed against immigrants. Lippmann (1923) spoke up against the sweeping assumptions that were being made, objecting in particular to the claim that tests measured innate ability, and thus could predict who would benefit from education. He also

objected to the comparison of ethnic groups, arguing that early experience in the home might account for much of the correlation of IQ with social class - a surprisingly modern view. Bagely (1925) objected to the determinism that arose from the practice of sorting children into academic streams on the basis of test results. From 1945 to 1953, Davis, a sociologist, contended that existing tests underestimated the abilities of children of the working class (Cronbach, 1975).

These challenges received little attention at the time they were issued although they anticipate later concerns such as the nature-nurture debate and the effects of class bias, classification, and labelling. Cronbach (1975) argues that the then zeitgeist favoured testers. This is no longer the case: virtually all the major assumptions concerning IQ testing generally agreed upon fifty years ago are today hotly contested by psychologists, and the testing movement itself is widely criticised and distrusted (Vernon, 1978). In Britain, there has been a decline in group testing with the virtual demise of the 11+ examinations. In America, anti-testing sentiment has gathered enough support to affect policy regarding testing in some instances, leading some states to ban the use of IQ tests for the purpose of tracking minority students in state-supported schools (Gordon & Terrell, 1981). Civil rights leaders, especially, have become more and more vocal concerning political and economic abuse of standardized

testing. Parents have successfully challenged in the courts the allocation of their children to special classes or schools on the basis of low IQ test results.

Cronbach (1975) traces this change in attitude to three major factors: post World War II concern for the part played by test scores in determining life chances, especially in regard to gaining access to prestigious colleges or evading the draft; challenges to traditional concepts in child psychology in the 1960s with growing emphasis on the role played by environmental factors in the development of the intellect; finally to increasing national concern with the conditions of blacks during the same period. Gordon and Terrell (1981) also discuss the changed social context of testing, pointing out that in the past three decades a commitment to democratic access to human developmental resources has been repeatedly voiced, rendering inappropriate the meritocratic approach with its emphasis on the identification of talent, an approach which had influenced the development and use of IQ tests.

It would be exceedingly naive, however, to believe that psychological testing will therefore be abolished or even much changed. There is good reason to believe, on the contrary, that it is firmly entrenched in the very fabric of society, and the field of education in particular. Vernon (1979) clearly expects

intelligence testing to continue in schools although he concedes it should be called something else:

> "Lastly, let us ask, what of the future? I shall be neither surprised not sorry if group tests of children's intelligence disappear, particularly within elementary or primary schools. There is likely to be much less criticism by educationalists and parents of instruments called Verbal or Non-verbal reasoning tests - that is the name adopted for the Moray House series many years ago."
>
> Vernon, 1979:11)

As a matter of interest, the Moray House series was in its hey-day at the height of IQ testing in Britain.

Reschly (1981) believes that abandoning the term IQ in favour of a more accurate descriptor such as school ability or academic aptitude, would help to dispel such myths as intelligence being unitary, fixed and predetermined, that are bound to the term IQ. He believes a name change would not be merely cosmetic, but would reduce damaging misconceptions and imply that environment also played an important part in intellectual development, thus removing some of the polemics from the nature-nurture debate.

3.2 Use of IQ Scores in Schools

As yet, the term IQ is the one most commonly used in schools, and

while psychologists may be hotly contesting the old IQ myths, there is no guarantee that teachers, who are seldom trained in the interpretation of IQ scores, are doing the same.

Vernon (1979) is of the opinion that the belief that IQ tests measure innate ability and educational tests measure acquired knowledge is still far too commonly held by many teachers, and even by some educational psychologists.

Goslin (1967) found that 47% of a national sample of American elementary schoolteachers considered intelligence and scholastic aptitude test scores to be the most accurate measure of a student's intellectual ability. He regarded as striking the general acceptance of IQ tests as accurate measures of intellectual potential by both secondary and elementary schoolteachers.

Fifteen years later, Fields and Kumar (1982) found little change in attitude, with 42% of the teachers in two school districts in Ohio holding the opinion that group IQ scores were helpful "in knowing a student's potential and/or determining ability-motivation discrepancy" (pg 38). These teachers also found test results useful in assignment of students to groups, in planning teaching, and in talking to parents.

Attitudes of South African teachers to IQ data must remain largely a matter for speculation since research does not seem to have addressed itself to this precise question. It seems probable that teachers in this country utilize IQ scores in much the same way as do American teachers.

The prevailing system of entering pupils' achievement and IQ scores, together with their ranking on each, on the class schedules, lends itself to the practice of looking for ability-motivation discrepancies. If such discrepancies exist, the labels 'underachiever' and 'overachiever' are applied, using the IQ score as the ultimate gauge of achievement. The use of these labels is unquestioned although their farcical nature is clearly evident in that 'overachiever' essentially asserts that some children achieve more than they are capable of (Zigler & Trickett, 1978).

Group IQ tests in South Africa are administered and scored by educational psychologists in provincial government employ, unlike the position in the Fields and Kumar study where 80% of the teachers had administered and scored the tests themselves. While there are undoubted advantages to a test being administered and scored by a psychologist, the resultant score may carry additional weight, since it has the flavour of an independent, expert, objective assessment.

Lastly, government schools are racially segregated and in general each serves its local community. Each has therefore a relatively

homogenous group of children, in terms of socio-economic status and cultural background. Differences between children in terms of IQ scores within such a school may be less likely to be attributed to environmental factors, and it may be speculated that a tendency might exist to perceive them as reflecting individual differences in innate ability.

3.3 Stability and Instability of the IQ

The use of IQ scores as the ultimate gauge of achievement implies that what the IQ test measures is stable, and immune to the environmental, emotional and motivational factors that are readily acknowledged to have an effect on achievement. That this is not so is attested to by a considerably body of research, ably reviewed by Anastasi (1976). In examining typical findings of longitudinal studies of intelligence, Anastasi inquired into the conditions making for both the stability and the instability of the IQ.

Correlational studies show that in an actuarial (applicable to group prediction) sense, IQ's tend to be quite stable. One explanation offered for this is the overlap hypothesis (Anderson, 1940) which maintains that "since the growing individual does not lose what he already has, the constancy of the IQ is in large measure a matter of the part-whole or overlap relation" (pg 394). Anastasi (1976) offers two additional explanations, the environmental stability

which characterizes the developmental years of most individuals, and the role of prerequisite learning skills on subsequent learning.

Individual studies, as opposed to correlational studies, reveal large upward or downward shifts in IQ. Anastasi (1976) cites research showing that some of these sharp rises or drops in IQ have occurred in response to major environmental changes in a child's life, such as drastic changes in family structure or home conditions, fostering, serious or lengthy illness, and therapeutic or remedial programmes. She further points out that even children whose environment does not change may show large increases or decreases on re-testing, indicating that they are developing at a faster or slower rate than the standardization sample of that test.

In general, culturally disadvantaged environments lead to IQ losses and superior environments to IQ gains. IQ changes are seldom random or erratic, but follow consistent upward or downward trends over several consecutive years. Parental concern with educational achievement, and parental socio-economic-status, were significantly related to changes in IQ, as was the amount of formal schooling the individual himself had completed between test and re-test (Anastasi, 1976).

Personality characteristics have also been associated with acceleration and deceleration, as have child-rearing practices. During the school years, IQ gains were associated with high achievement drive, competitive striving, and curiosity about nature (Kagan, Sontag, Baker & Nelson, 1958). Comparison of child-rearing practices within the same sample revealed that parents of children with rising IQ's typically presented "an encouraging and rewarding atmosphere, but one with some structure and enforcement of policies" (McCall, Applebaum & Hogarty, 1973). The extent to which the parents deliberately trained the child in various mental or motor skills which were not yet essential was also associated with rising IQ's in the same study.

Another study compared accelerators and decelerators in terms of coping or defence mechanisms in dealing with problems or frustrations (Haan, 1963). Accelerators made significantly more use of coping mechanisms representing an objective, constructive, realistic approach, which decelerators utilized defence mechanisms characterized by withdrawal, denial, rationalization and distortion.

3.4 Implications for the HA Child

These findings lend considerable support to the argument advanced by S Sarason et al (1960) that a high level of test anxiety leads to

a decline in IQ. The emotional and motivational characteristics of the HA child, and his motive to avoid failure (Hill, 1972), his helpless response to problems (Dweck & Wortman, 1982), his negative self-concept (Wine, 1980), and his parents' style of child-rearing (S Sarason et al, 1960), would appear to characterize the decelerator.

If the HA child does score below his true potential on an IQ test, then the use teachers make of IQ scores in detecting motivation/ability discrepancies could prove to be a considerable disadvantage to him, leading to an explanation of poor achievement in terms of low ability (Fields & Kumar, 1982). Such a stable, internal attribution is more likely to set in motion a self-fulfilling prophecy (Brophy & Good, 1974; Eiser, 1978) to which the HA child may be particularly vulnerable because of his susceptibility to social -evaluative cues and negative self-image (Wine, 1982).

Anastasi (1976) believes that prediction of subsequent intellectual status could be improved if measures of the individual's emotional and motivational characteristics, and of his environment, were combined with initial test scores. This could be particularly helpful in testing in education.

CHAPTER FOUR

4 RATIONALE

In this chapter the rationale for the study will be discussed, leading to the formulation of specific hypotheses to be tested. It is considered that the reviewed research has yielded a clearer picture of the complex interaction of factors that leads to the development and maintenance of test anxiety and, by synthesis of findings, makes it possible to propose a model of the development of test anxiety in the elementary schoolchild. It is a contextual model, recognising the child as a social being, acting and interacting in the social groups of home and school; also, it defines the role played by hard test data, especially IQ scores.

4.1 Model of the Development of Test Anxiety in the Elementary Schoolchild

Pre-school: Early parent-child interactions appear to predispose a child to the development of test anxiety (Hill, 1972; S Sarason et al, 1960). Cues indicating negative parental evaluations resulting

from unrealistically high expectations are read and internalized by the child, while lack of support and constructive help in problem-solving give the child little chance to develop a sense of self-efficacy or to outgrow dependency (Hermans, ter Laak & Maes, 1972).

School Entry and Junior Primary (ages 6 to 9)

HA children have been perceived as less mature and responsible than LA children (Davidson et al, 1958); their parents may fail to teach effectual problem-solving or gratify their dependency needs (Hermans, ter Laak & Maes, 1972), so that a HA child may enter school with the characteristics of immaturity, irresponsibility, attention-seeking, and ineffectual problem-solving skills. Such a child is not likely to make a good initial impression on the teacher, and these primacy effects are likely to be persistent (Asch, 1946). His group placement will probably reflect this negative impression, regardless of his actual ability, and mere placement in a group will convey to him a considerable amount about himself and determine his classroom status and peer interaction (McGinley & McGinley, 1970). The teacher may behave in such a way as to convey low expectations and limit his learning opportunities (Brophy & Good, 1970). Formal assessment in the form of grades or symbols on report cards provides additional feedback to the child and his parents. All these data will be incorporated into the child's already existing cognitive structures which determine the meaning

to him of evaluative situations (Meichenbaum & Butler, 1980). Since they will tend to confirm his early experiences, the negative valence and intensity of evaluative situations is likely to increase, leading to greater anxiety and a poor self-concept. Task interfering responses, consisting of an habitual replay of negative cognitions arise in response to evaluative cues (Wine, 1971, 1980, 1982) and increase in strength and frequency.

The characteristics of the school, its crowded nature, ubiquitous evaluation, and the power invested in the teacher (Jackson, 1968) contribute to an environment which may be inimical to the HA child.

Senior Primary (ages 10 to 12)

Hard test data become available to teachers, parents and pupils with the introduction of formal examinations in Standard 2. In government schools additional hard test data become available to teachers with the administration of Junior Level of the New South African Group Test in Standard 3. Such hard test data are important bases of teacher expectancies, especially when they confirm impressions based on classroom behaviour (Dusek, 1980; Dusek & O'Connell, 1973). It is suggested that the HA child's performance, by this time, may be depressed on both measures due to the debilitating effects of test anxiety (S Sarason et al, 1960), leading to an explanation of his poor achievement in terms

of low ability. Even in a superior ability child, cognitive and attentional deficits may result in an IQ score in line with unremarkable achievement so that his true potential goes unrecognised. There is some evidence that teachers reject scores that are too discordant with their classroom experience (Brophy & Good, 1974; Wilkins & Glock, 1973), but the low salience of the HA child, who by this time seeks to avoid failure (Hill, 1972) provides the teacher with little reason to disbelieve test scores.

In this model, IQ scores play an important role, leading teachers to attribute causality of performance to native ability, a stable internal characteristic (Kelley, 1967). It is suggested that teacher expectations formed on this basis are more likely to be fixed and rigid and, in the case of the HA child, inappropriate, than if attributions to emotional, motivational or situational factors had been made, which could be regarded as potentially amenable to intervention.

When teacher expectations are rigid, inappropriate and acted out in behaviour, they may operate as self-fulfilling prophecies (Brophy & Good, 1974). Most children will encounter at least one teacher in their primary school career who is prone to arriving at fixed and rigid expectancies and who teaches inappropriately as a result. With each such experience, the HA child is at risk of

experiencing a further eroding of self-confidence, motivation and level of aspiration, as well as a greater degree of test anxiety.

By Standard 5, when another group IQ test is administered, there may well be a further decline in the score of the HA child, providing additional confirmation of teacher expectancies. By this time, the HA child has probably become 'helpless', defeated by failure (Dweck, 1975). If he succeeds, he attributes this to external factors, not his own efforts or ability (Diener & Dweck, 1980). Teachers may reinforce this kind of attribution by responding to his success with surprise or even doubt (Brophy & Good, 1974).

The parents of HA schoolchild are probably also anxious about his lack of achievement; however, it is suggested that they continue to act aversively, failing to teach constructive study habits or task-related skills. One may surmise that they hold unrealistically high expectations, but tend to accompany them with the underlying message, "You can't measure up". There may be over-rigid discipline, or too few set limits (Kimball, 1953), but either way there is probably little discussion or sharing within the family. Overall, it may be hypothesized that the HA child lacks emotional security at both home and school, and is dominated by fear of failure and criticism as a result.

4.2 Aims and Hypotheses of the Study

The foregoing model argues that hard test data in the schools, including group IQ scores, are affected by the cognitive and attentional deficits that attend high levels of test anxiety. It further argues that this has important consequences in terms of teacher-child interactions.

Specific interest in the effects of test anxiety on measures of intelligence stems from an earlier study of test anxiety in elementary schoolchildren (Baddeley, 1982).

Results of this study indicated a significant difference between high and low anxious children on the variables of achievement, intelligence and self-concept, with HA children scoring less on all three. No significant difference was evident, however, between the two groups in achievement when the variance due to IQ was removed. A possible explanation was offered, that the New South African Group Test for intelligence - the IQ measure utilised - is highly "test-like" and in terms of the Sarason et al (1960) hypothesis is very likely to arouse test anxiety in susceptible children. Their IQ scores may therefore have reflected the debilitating effects of test anxiety in the same way as their achievement scores.

Studies investigating the effects of test anxiety in the classroom situation have failed to consider possibility that IQ measures and the conditions of their administration may themselves elicit test anxiety. For example, Boor (1972) sought to explain the negative correlation he obtained between test anxiety and classroom performance in terms of the "confounding variable" of intelligence as the correlation dropped to zero when he partialled out the factor of intelligence. Unlike Boor, Daniels and Hewitt (1978) found that a strong negative correlation between test anxiety and classroom performance remained even after IQ was partialled out, but in their study, too, there was an implicit assumption that measures of IQ escape from the effects of test anxiety.

The present study has been undertaken to look more closely at the effect of test anxiety on IQ test performance in elementary schoolchildren. Two IQ tests will be used: a group test, the New South African Group Test, Junior Level (1965) and an individual measure, the Wechsler Intelligence Scale for Children - Revised (1974). If test anxiety can be shown to have different effects on these tests, then this would support the S Sarason et al (1960) argument that test anxiety is the more important variable in the negative test anxiety-intelligence relationship. Both measures are administered under standardised conditions, and it is considered that these instruments will be acceptable as typical of the types of IQ measures schoolchildren are likely to encounter.

The Wechsler Intelligence Scale for Children - Revised was chosen in preference to the New South African Individual Scale because the latter instrument is used in the school clinics and it was felt that it would be preferable to avoid giving children practice on it in case they subsequently needed clinic assessment.

A problem researchers and clinicians encounter in use of the WISC or the WISC-R is that of lack of standardisation on South African children. Since it cannot be assumed that norms for children in this country would be the same as for American children, IQ scores yielded by the WISC or WISC-R cannot be regarded as meaningful in terms of overall intelligence. However, they do provide an opportunity to test performance on a variety of intellectual tasks. It is considered that lack of standardisation is not a problem that affects this study, since the aspect of the WISC-R that is of interest is the comparative performance on this measure of HA and LA children who will participate in the study.

The surveyed research literature suggests that HA children are likely to perform below their true capability on the New South African Group Test (NSAGT) for the following reasons: it is administered under strict examination-like conditions by a school psychologist who is usually a total stranger and who maintains an impersonal, evaluative, relationship with the children (Geen, 1980); the subtests are strictly timed, and since they are both

speed and power tests they contain more items than the children can hope to finish as well as items beyond their present ability. This could give rise to mounting levels of frustration and anxiety (Anastasi, 1976). The individual works alone and unaided in the group situation with the questions mediated by the printed symbol or word once the practice examples have been dealt with, and no provision is made for gratification of dependency needs. Furthermore, the group situation could prove distracting, especially if others are perceived as working more swiftly. It is hypothesized that HA working under these conditions will suffer from lack of task-focused attention and manifest progressively disintegrating coping strategies to the detriment of their performance (Dweck & Wortman, 1982; Wine, 1980).

The chosen individual measure, the Wechsler Intelligence Scale for Children - Revised (WISC-R) is hypothesized to yield a performance score less affected by test anxiety although it is clearly a test and not a "game". In this respect it may be seen as a weaker treatment condition than that employed in the Zwibelson (1956) study, which utilized the Davis-Eels games. However, performance on an individual IQ measure has not yet been compared with that on a group measure in terms of their anxiety-provoking properties. It would seem that there are theoretical reasons for expecting facilitated performance on the individual measure by HA children. The one-to-one testing

situation with an examiner who seeks to establish rapport should help to gratify dependency needs (Hill, 1972); it should also help to cut down on distractions and so focus attention which is often diverted from the task on hand in the HA child (Wine, 1980). Items are given within a difficulty range which is appropriate to the testee's ability level (Anastasi, 1976). Timing does not occur on every subtest and in the hands of a trained examiner need not be obtrusive.

In this study, the WISC-R will be administered to all subjects by the same examiner, who is trained in its administration. She will be blind as to the level of test anxiety and intelligence level of the subjects and order and practice effects will likewise be controlled. Subjects will be told that results will not be made available to school personnel but are for research purposes only. Furthermore, she will be familiar to the children, having previously administered anxiety, defensiveness, and self-concept questionnaires in their classrooms.

The main part of the study will be a comparison of the performance on the NSAGT and on the WISC-R in two groups of elementary schoolchildren, those falling at the upper and lower extremes of the test anxiety distribution. As it has been suggested in the literature that performance in high intelligence, HA children is not affected (Feldhusen & Klausmeier, 1962),

further analysis of the main study data will be undertaken with children allocated to three levels of intelligence, High (120-145); Medium (100-119); Low (84-99) on the basis of their NSAGT scores. Each level will be analysed separately to determine what, if any, differences are to be found between HA and LA children on the Verbal, Non-Verbal and Total Scales of the two IQ tests; and the subtests of the WISC-R if differences become apparent on that measure.

Experimental Hypotheses of the Main Study:

1 The scores of HA children will be lower than the scores of LA children on the NSAGT.

2 The scores of HA children will be equal to the scores of LA children on the WISC-R.

This hypothesizes that there will be an interaction between level of test anxiety and type of IQ measure.

Further Main Study Hypothesis:

3 At each level of intelligence, there will be a significant difference between HA and LA children, with HA children obtaining lower scores on the Sub-scales and Totals of the NSAGT but not the WISC-R.

Two subsidiary studies will be conducted:

Subsidiary Study A will investigate the effects of level of test anxiety and level of intelligence on academic achievement. It is expected that findings will confirm those of Hill and Sarason (1966) that achievement is lower in HA than LA children matched for intelligence level, rather than the Feldhusen and Klausmeier (1962) findings that high IQ, HA children's achievement was equivalent to that of high IQ, LA children.

Experimental Hypothesis:

> HA children will show lower academic achievement scores than LA children at equivalent levels of intelligence.

This hypothesizes a test anxiety main effect, not an interaction between test anxiety and intelligence level.

Subsidiary Study B will investigate the effects of level of test anxiety and intelligence on self-concept. Since a negative view of the self appears to accompany raised levels of test anxiety (Wine, 1980), it is expected that HA children will obtain a lower score on a measure of self-concept at equivalent levels of intelligence.

Experimental Hypothesis

> HA children will score less on a self-concept scale than LA children at equivalent levels of intelligence.

This hypothesizes a main effect of test anxiety, not an interaction between test anxiety level and intelligence level.

CHAPTER FIVE

5 METHOD

5.1 Subjects

The subjects in this study were drawn from a population of 175 white, English-speaking Standard 4 pupils at two elementary schools in middle-class suburbs of Cape Town. The average age was 11 years 3 months with a range from 10 years 3 months to 12 years 9 months; no child was excluded on the basis of age or of having failed a standard since it was of interest to investigate whether HA children differed from LA children in these respects. No attempt was made to control for variables in their home situations other than to exclude those for whom English was not their home language. In order to be eligible for inclusion in the study, children had to be present for the administration of test anxiety, defensiveness and self-concept questionnaires in the classroom (that is, no late administration of questionnaires was undertaken to those who were absent for some reason), and a group IQ test score had to be available for them. This reduced the numbers to 162. A further six children were eliminated as

their defensiveness scores were more than two standard deviations above the mean, and whose scores on self-report instruments could therefore be regarded as suspect (Dusek, 1980). One child was eliminated as his test anxiety questionnaire was invalidated by his method of answering contrary to instructions; another child did not answer the test in a serious manner, so was also eliminated. The remaining pool from which subjects were drawn was 154 children, 76 girls, 78 boys.

Experimental groups in test anxiety research are commonly the top and bottom quartiles of the test anxiety distribution. As this study involved individual IQ testing during school hours, it was decided to reduce this percentage to 20%, the contribution from each school to be on a pro rata basis. Initially the top ten scorers on the TASC at School A and the top twenty scorers at School B made up the HA group, while the bottom ten scorers on the TASC at School A and bottom twenty at School B made up the LA group. In the course of the study these numbers were reduced to 28 for the HA group and 27 for the LA group as a result of children leaving the schools. Boys and girls had an equal chance of inclusion. The literature has shown a consistent tendency for girls to be more high anxious than boys which may be due to the fact that it is more socially acceptable for girls to admit to anxiety than for boys (S Sarason et al, 1960). It was therefore not unexpected to find that the final grouping consisted

of HA n = 28, 17 girls and 11 boys; LA n = 27, 12 girls, 15 boys. Since HA girls have shown a somewhat less predictable interfering effect of test anxiety than have boys, (Ruebush, 1963), it was considered that the effect of having more girls than boys in the HA group might be to obscure the effect of test anxiety. Unfortunately, the difficulty of obtaining sufficient subjects of both sexes at each IQ level precluded the inclusion of sex as a variable. Its possible confounding effects were, however, not ignored, and will be considered in the Discussion section (also see Appendix F).

5.2 Instrumentation

5.2.1 Test Anxiety Scale for Children (TASC) (S Sarason et al, 1960) Appendix A

The TASC is a group-administered paper and pencil test consisting of 30 items to which a child responds by circling the appropriate answer on an answer sheet as the experimenter reads the questions. The items were selected to be consistent with Freud's (1949) definition of anxiety as a conscious, unpleasant experience, but are limited to reactions to evaluative and test-like situations. Twelve of the items specifically mention the word "test"; others ask about "worry" over classroom performance. The anxiety score is the number of "yes" responses.

The TASC is internally consistent, and has a test retest reliability after 4 months of .55 to ,78 with an average of .67. The variances of the two administrations showed no difference, and the second administration of the scale displayed comparable correlations with IQ and a general anxiety scale as did the first administration (S Sarason et al, 1960). The reliability coefficients drop after a two-year interval, averaging about .40 during the early grades and .50 during the later ones (Hill, 1972). These changes are thought to reflect a meaningful change in anxiety status (Hill & Sarason, 1966). Normative data means and variances are available for American, English, Australian and Norwegian elementary schoolchildren. Test anxiety scores increase linearly with grade and girls obtain significantly higher scores than boys (Ruebush, 1963). S Sarason et al (1960) reported a modest positive correlation between social class as reflected by fathers' occupational level, and test anxiety (+ ,12, $p < 001$), but subsequently found no significant difference in fathers' occupations of HA and LA subjects, or found that the fathers of LA boys completed significantly more grades of school than fathers of HA boys. They concluded that, overall, there is little evidence to suggest that test anxiety is related to social class.

Ruebush (1963) and Hill (1972) review validity studies of the TASC. There are several types of direct evidence concerning

the validity of TASC as a specific measure of anxiety in test-like situations. A small but systematic positive relationship obtains between TASC scores and teacher ratings of anxiety ($r = .2$, $p < 0{,}001$); that this relationship is small probably reflects lack of reliability in teacher ratings as revealed by the amount of variability of teacher ratings within and between classrooms (S Sarason et al, 1960).

Test anxiety level rises with grade, a relevant finding in terms of the increased exposure to test situations experienced by children as they advance in school (S Sarason et al, 1960). TASC scores were higher in British children than in American children when the 11+ examinations were crucial determinants of British children's educational futures, although general anxiety scores were similar (Sarnoff, Lighthall, Waite, Davidson & Sarason, 1958). High test-anxious children show more negative affect in the test-like condition of a recorded interview (Barnard, Zimbardo & Sarason, 1961), rate school concepts more negatively in a semantic differential task (Barnard, 1963 in Ruebush, 1963), and show a decrease in reaction time to emotional but not to neutral words in a word association test (Doris, Sarason & Berkowitz, 1963). Moderate but consistent positive correlations of .45 to .77 obtain between the TASC and the General Anxiety Scale for Children (GASC) (S Sarason et al, 1960).

Early investigations of TASC construct validity were concerned with the relationship between TASC scores and various group administered tests. Moderate and consistently significant negative correlations of -.4 between TASC scores and IQ scores, and -.5 between TASC and Achievement scores have developed by the end of the elementary school years, and TASC scores predict intelligence and achievement scores significantly better than do GASC scores (Hill & Sarason, 1966).

There is considerable evidence that the TASC is a multidimensional instrument. The initial factor analytic studies were conducted on 633 children in grades four, five and six. Four factors emerged, Test Anxiety, Generalized School Anxiety, Recitation Anxiety and Physiological Arousal (Dunn, 1964). A subsequent study in 866 children from grades four, five, seven and nine revealed a Test Anxiety factor and a Manifest Dream Anxiety factor that were consistent for sex and grade level (Dunn, 1965). Dunn (1964, 1965) concluded that, in general, the TASC measures different sets of concerns concerning tests and broader school concerns, yielding overall a measure of school anxiety. Consistent with this conclusion is a correlation of .82 (corrected r = .61, Phillips, 1978) between the TASC and a test of school anxiety for elementary schoolchildren (Phillips, 1966).

Feld and Lewis (1969) factor analyzed TASC data from 7551 second-grade children; their findings support the view that the TASC is multidimensional, measuring four major factors with wide individual differences among anxious children with regard to which factor(s) detected their anxiety. The most prominent, labelled The Test Anxiety factor measured children's reactions and feelings about school tests, and included most of the items that referred to "tests" specifically. The Somatic Signs of Anxiety factor involved items dealing with physiological reactions, while the Poor Self-Evaluation component concerned those items dealing primarily with children's derogation of the themselves relative to other children. Least important was a fourth factor labelled Remote School Concern which assessed children's worries about school while at home. Comparison of these four factors with those reported by Dunn revealed a high degree of similarity (Feld & Lewis, 1969). In both studies, the Test Anxiety Factor accounted for most variance. Dusek (1980) concludes that there appears to be some stability to the factor structure of the TASC across grade and sex.

Feld and Lewis (1969) found moderate positive correlations between scores on the four factors, and they suggested that they reflect individual differences in the way children express anxiety, and the types of school situations that elicit it.

The above-mentioned studies involved middle-class children. A study of 287 boys and 266 girls in grade three from the lower class compared factor structure with that reported by Feld and Lewis (1967) (Rhine and Spaner, 1973). The same four factors emerged, which would appear to support the S Sarason et al (1960) conclusion that test anxiety did not appear to be related to social class. However, measures of factor structure similarity revealed a sex-social class interaction: while comparisons across social class revealed very similar factor structures between middle-class boys and girls and lower class girls, and between middle-class boys and lower-class boys, the factor similarity for lower-class boys and middle-class girls was only moderate except for the Test Anxiety factor. Rhine and Spaner (1973) suggested that lower-class boys may have more negative views of school due to qualitatively poorer interactions with teachers, which could alter the meaning of the TASC items for them relative to their peers.

In common with most studies of test anxiety in children this study has not attempted to identify sub-groups of children in terms of these factors. High-test-anxious children were identified by their responses to the entire 30-item instrument.

5.2.2 The Defensiveness Scale for Children (DSC) (S Sarason et al, 1964) Appendix B

This was developed in order to deal with the problem of defensiveness against admitting anxiety. It is composed of 11 Lie Scale items to which nearly every child reasonably answers "yes" (e.g. "Do you every worry?") plus three items designed to pick up negative response set, plus 24 items that measure a child's willingness to admit to a wide range of feelings and emotions that, it is assumed, nearly every child has experienced. It is administered in exactly the same way as the TASC, and the child's defensiveness score is the sum of the "no" responses. The split-half reliability of the scale is .82 (Ruebush & Waite, 1961).

The correlation between the TASC and total defensiveness score is about -,5 (Hill & Sarason, 1966). Highly defensive children tend to admit less anxiety. The validity of the self-report of anxiety of highly defensive children is therefore suspect, and the DSC is usually administered with the TASC for research purposes, with children who score more than two standard deviations above the mean being eliminated. This gives the researcher a measure of control, albeit imperfect, over the validity of the scores of the low-anxious subjects included in the research (Dusek, 1980). The DSC was utilized in the above way in this study.

5.2.3 The Piers-Harris Children's Self-Concept Scale (Piers & Harris, 1969) Appendix C

This is a self-report instrument, administered in a group setting with pencil and paper. It was designed for research into the development of children's self-attitudes and correlates of these attitudes. The "self-concept" as assessed by this instrument is in accord with the phenomenological approach and is assumed to refer to a set of relatively stable self-attitudes (Piers, 1977). It consists of 80 declarative sentences worded at the Standard 3 reading level. Examples include "I am dumb at most things" and "I can be trusted", and are both descriptive and evaluative. The child answers "yes" or "no" according to how he generally feels. Items are scored in a positive or negative direction according to a favourable self-assessment. Thus a high score indicates a favourable self-concept. In the normative sample of 1138 children the mean was 51.84 with a standard deviation of 13.87.

Test-retest reliability of ,77 is considered by Wylie (1974) to be satisfactory for research purposes, and a correlation of ,43 has been reported between self-rating on the Scale and teacher and peer ratings of socially effective behaviour (Piers & Harris, 1969)

5.2.4 New South African Group Test (National Bureau for Educational and Social Research, 1969)

This is a group intelligence test designed for screening use in white pupils, with three levels:

Junior	(ages 8 - 11 years) 2 forms
Intermediate	(ages 10 - 14 years 11 months) 1 form
Senior	(ages 13 - 17 years 11 months) 2 forms

The Junior level of this test had been given to the children in this study in 1982, their Standard 3 year at school, by the school psychologists in their areas.

Each series of NSAGT consists of Nonverbal and Verbal tests as follows:

Nonverbal		Verbal	
Test 1	Number series	Test 2	Classification of pairs of words
Test 3	Figure Analogies	Test 4	Verbal Reasoning
Test 5	Pattern Completion	Test 6	Analogies of Words

There are 30 items in each test, the first five of which serve as practice examples. Each item is of the multiple choice type with a set of 5 possible answers. Verbal, Nonverbal and total IQ scores for each child in the study were obtained from school records.

The test was standardised in 1964 on a sample representing all white pupils in South Africa. At the Junior level, the sample was constituted of 2923 Afrikaans-speaking and 1525 English-speaking children. The following controls were applied:

1 A control for the ratio of Afrikaans to English speaking pupils (2:1).
2 Geographical location: taking account of the size of school populations, pupils in White schools (provincial, private and provincial-aided) in all four provinces and South West Africa were used in the sample.
3 Urban-rural distribution was controlled.
4 Physically and mentally handicapped children were omitted.
5 Random sampling of ten pupils for each age group in the school was instituted.

Norms were calculated independently for the two language groups. The test has a mean of 100 and a standard deviation of 15. The standard error of measurement is reported to be 2,5 IQ points for the Junior series and 3.0 IQ points for the Intermediate series.

The reliability of the test calculated by means of the K-R21 formula for verbal, non-verbal and total scores ranges from .89 to .96 for both groups in the Junior series. Validity in predicting school success is shown by a correlation of ,86 and

.81 respectively for the Junior verbal and non-verbal scores with a Silent Reading Test. Reliability and validity for the other levels of the NSAGT are equally satisfactory. The requirement of the NSAGT that the child be able to read, may result in the confounding of reading ability and intelligence.

5.2.5 Wechsler Intelligence Scale for Children - Revised.

(Wechsler 1974)

This is an individual intelligence test which aims to probe intelligence in as many ways as possible, and thus consists of 12 tests, 6 on a Verbal Scale and 6 on a Non-Verbal Scale. All 12 tests were administered to the standardization sample but only 10 of the WISC-R tests are considered mandatory. The IQ's are calculated on the basis of 5 Verbal and 5 Non-Verbal tests as follows:

Verbal	Non-Verbal
1 Information	2 Picture Completion
3 Similarities	4 Picture Arrangement
5 Arithmetic	6 Block Design
7 Vocabulary	8 Object Assembly
9 Comprehension	10 Coding

(The tests are administered in the order indicated by the numbers)

Digit Span (Verbal) and Mazes (Non-Verbal) were not used in establishing the IQ tables, but have been retained as alternatives should one of the above tests be invalidated or cannot be given. It is not permissible to make such a substitution because of poor performance on one of the other tests. It is, however, permissible to give all 12 tests to gain additional qualitative information. They must not be included in calculating the child's IQ.

Raw scores on each subtest are first transmuted into normalized standard scores within the child's own age group. Tables of such scaled scores are provided for every 4 month interval between the ages of 6.0 and 16.11 years. Subtest scores are added and converted into a deviation IQ with a mean of 100 and a standard deviation of 15. Verbal, Non-Verbal and Full Scale IQ's can be computed.

The test was standardised for American children by means of a stratified sampling plan, based on 1970 U S census, which ensured that the normative sample included representative proportions of children with respect to geographic region, urban-rural residence, occupation of head of household and race (white-non white). The total sample consisted of 2200 children, 200 in each of 11 age groups, half male and half female. Bilinguals were included if they could speak and understand English.

Institutionalized mental retardates and severely emotionally disturbed children were excluded. As has already been stated, the WISC-R has not been standardised for South African children thus it is not possible to designate a South African child's position with regard to his own age group. However, the test does permit a measure of intellectual performance under standardised conditions which is sufficient for the purposes of this study. Slight changes were made to the content of the Information Subtest to bring it more closely in accord with the general knowledge of S A children.

Anastasi (1976) reports that reliability is satisfactory. Average split-half reliabilities for Verbal, Non-Verbal and Full Scale IQ's are ,94 ,90 and ,96 with corresponding re-test coefficients of ,93 ,90 and ,95. Some practice effect was observed on re-test, with mean gains of 3½ IQ points on the Verbal Scale, 9½ on the Non-Verbal Scale and 7 on the Full Scale. Subtest reliabilites are generally satisfactory. The Standard Error of the Full Scale IQ is approximately 3 points.

The WISC-R manual does not include a discussion of validity and fails to evaluate the normative tables of standard score equivalents in terms of the criterion of age differentiation (Anastasi, 1976). Earlier investigators found the concurrent validity coefficients of the WISC and achievement tests of

other academic criteria of intelligence to be around ,5 and ,6 (Littell, 1960; Zimmerman & Woo-Sam, 1972) with the Verbal Scale showing a higher correlation than the Non-Verbal Scale.

The WISC-R manual reports correlations with the 1972 Stanford-Binet IQ's within homogenous age-groups. The mean correlation of Full Scale IQ S is ,73 and again Verbal Scales show higher correlation than Non-Verbal Scales at ,71 versus ,60.

The WISC-R manual includes various intercorrelations of subtests and composite scores. Correlations between Verbal and Non-Verbal Scales range from ,60 to ,73 indicating that while the two parts have much in common there is still cause to retain both.

A factorial analysis of the WISC-R scores of the standardisation sample at 11 age levels yielded evidence of 3 major factors at each age level (Kaufman, 1975). These factors correspond to Verbal Comprehension (5 verbal tests), Perceptual Organization (Block Design and Object Assembly), and Memory (or Freedom from Distraction).

5.2.6 Academic Achievement

Academic achievement was calculated as a single score for each child from the 1982 Class Schedules by summing marks obtained in the December class examinations for English, Mathematics and Content Subjects (History, Geography, General Science and Health Education). The total marks obtained were expressed as a percentage.

5.2.7 Age

The age of each subject was expressed as a deviation score in months from the median age for Standard 3 in the Cape Province as of December 1 1981 (11y 01m). These deviation scores were then numbered from 1 (-8) to 23 (+14). At the time of the study, the range of subjects' ages was from ten years, seven months to twelve years, six months.

5.3 DESIGN OF THE STUDY

5.3.1 Main Study

This was a blind study with the administrator of the WISC-R unaware of intelligence or anxiety levels of the children she tested.

A 2 x 2 factorial design with repeated measures on factor B was used. The variables were as follows:

Factor A Level of Test Anxiety based on TASC scores

Level 1 score on TASC 21 - 30 (HA)

Level 2 score on TASC 0 - 10 (LA)

Factor B Type of IQ Measure

Level 1 New South African Group Test (NSAGT)

Level 2 Wechsler Intelligence Scale for Children - Revised (WISC-R)

Dependent Variable: IQ scores on both IQ measures.

5.3.2 Subsidiary Studies I and II

A 2 x 2 factorial design was used for both subsidiary studies. The variables were:

Factor A Level of Intelligence based on NSAGT scores

Level 1	IQ range 120 - 145	High (HIQ)
Level 2	IQ range 100 - 119	Medium (MIQ)
Level 3	IQ range 84 - 99	Low (LIQ)

It should be noted that these IQ levels do <u>not</u> correspond to the usual High, Medium and Low classifications of IQ tests. They were determined with reference to the sample of children

who participated in the study (mean 113.34, SD 14.51) because they fell into either the HA or LA groups on the basis of their TASC scores. Their NSAGT scores were unknown until after they were tested on the WISC-R; thus, determination of IQ levels above was based on practical considerations.

Factor B Level of Test Anxiety, two levels, as in Main Study.

The Dependent Variable for Subsidiary Study I was Achievement scores based on 1982 December Examination results as detailed under 5.2.6.

The Dependent Variable for Subsidiary Study II was scores on the Piers-Harris Children's Self-Concept Scale (see 5.2.3).

5.4 PROCEDURE

5.4.1 Stage 1:

Administration of the Test Anxiety Scale for Children, Defensiveness Scale for Children, and Piers-Harris Children's Self-Concept Scale. This stage was timed for the fifth week of the school year when it was estimated that the children would have settled into their new classes reasonably well. The scales were administered by the Experimenter to the children in their classrooms during the morning of a normal school day. Teachers were not present. Children were told that the

purpose of the questionnaires was to find out how they thought and felt, and that there were no right or wrong answers. They were assured that their answers would be held in confidence. Appendix A gives actual instructions on the TASC.

Testing took place in two sessions. In the first, lasting some 35 minutes, the DSC was administered first, followed immediately by the TASC; in the second session two days later, lasting 20 minutes, the Piers-Harris Self-Concept Scale was administered. Classes were tested separately, with no opportunity for children from one class to discuss the questionnaires with children from other classes before hand. Testing at School A was completed within a week, and testing at School B was completed the following week.

As this was a blind study in order to control for expectation effects on the part of the Experimenter, all Stage I completed questionnaires were delivered to an assistant for scoring, ranking, and selection of subjects.

5.4.2 Stage 2:

Grouping of subjects.

The assistant eliminated children who scored more than two standard deviations above the mean on the DSC, those for whom

no NSAGT scores were available (names supplied by teachers), and the two children whose answer sheets were invalidated. Two groups were then formed on the basis of TASC scores: the top 20% formed the HA group, and the bottom 20% formed the LA group. In forming these groups it was necessary to randomly select subjects from a larger number of children who obtained the same cut-off score. For example, the cut-off score for the HA group was 21 out of 30; four children obtained this score and only one was needed to complete the group. Similarly, seven children scored 10 out of 30, the LA group cut-off point, and only two of them were needed.

The assistant compiled two lists, one for each school, of HA and LA children in random order to control for practice effects on the part of the WISC-R administrator who could be expected to become progressively more practiced as she administered the test to 55 children.

5.4.3 Stage 3:

The Experimenter administered the WISC-R to the children as listed, spending alternate days at each school. In both she was provided with a small room offering privacy and reasonable freedom from noise. In order to control for fatigue effects, and to ensure that testing did not continue into break-time, two

children only were tested each morning, the first from 8.30 to 10.00 a.m. and the second from 10.30 till noon. The children received no advance notice of testing, being summoned by the Experimenter from their classrooms. Immediately after testing, they returned to their classrooms and normal activities. Protocols were scored immediately and on completion of the study each was re-checked to ensure that there was no difference in scoring between those which fell early or late in the study. At all times standardised conditions of administration and scoring as laid down in the WISC-R handbook were adhered to.

5.4.4 Stage 4:

NSAGT scores and achievement scores were obtained from school records, and subjects assigned to intelligence levels on the basis of their NSAGT scores.

CHAPTER SIX

RESULTS AND INTERPRETATIONS

6.1 MAIN STUDY

The dependent variable was analysed by means of a 2-way ANOVA with repeated measures on Factor B. F-ratios were computed to test the significance of the effects due to Factors A and B and their interaction, A x B, where different samples of subjects were allocated to levels of Factor A (Test Anxiety) but each received both levels of Factor B (Type of IQ measure). The F max statistic was computed to test for homogeneity of variances between subjects and within subjects.

TABLE 1 MEANS AND STANDARD DEVIATIONS : MAIN STUDY

	B1(NSAGT)	B2 (WISC-R	
A1 HIGH ANXIOUS	108.29 (12.27) n=28	103.68 (10.76)	A1 105.99
A2 LOW ANXIOUS	118.52 (15.29) n=27	112.96 (11.24)	A2 115.74
	1 113.41	B2 108.32	

FIGURE 1 CELL MEAN PROFILES : MAIN STUDY (A at B)

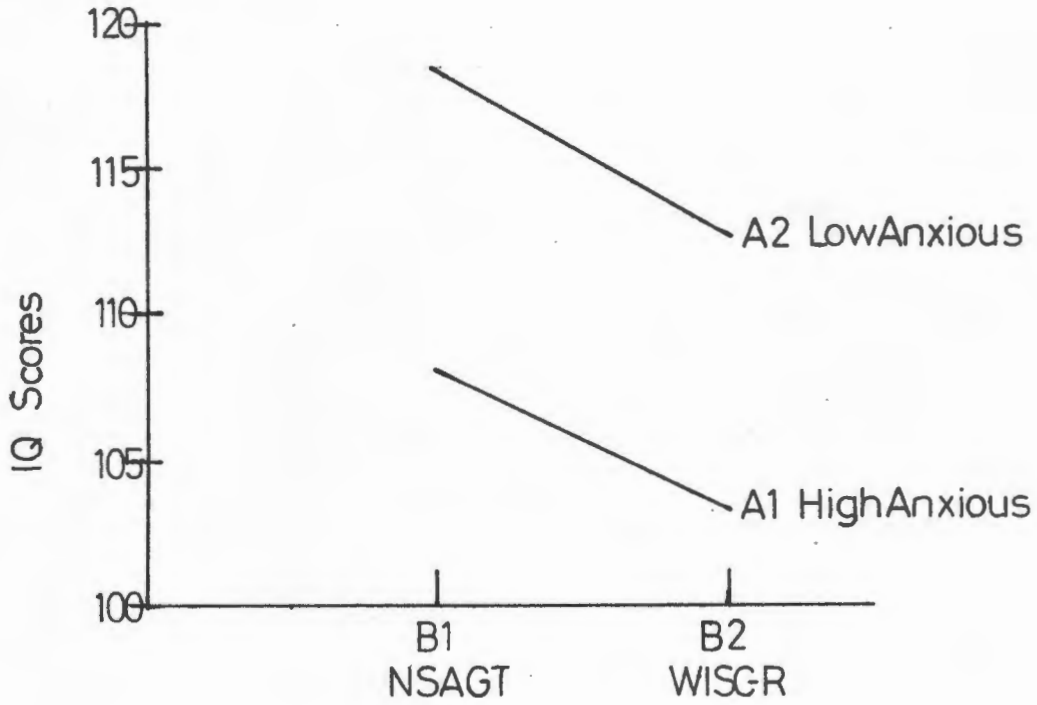

FIGURE 2 CELL MEAN PROFILES : MAIN STUDY (B at A)

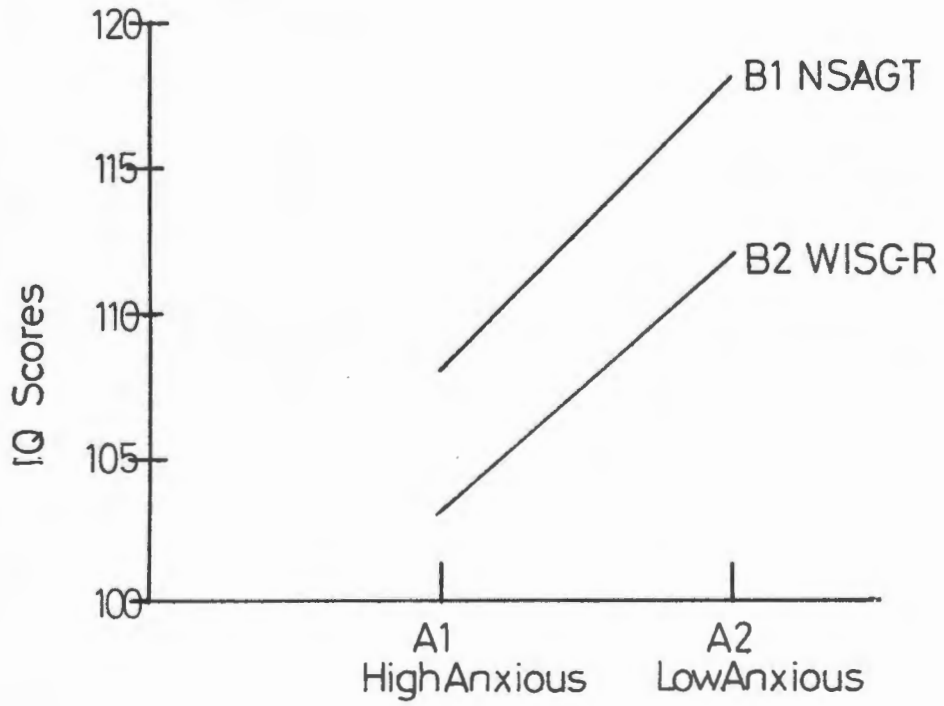

TABLE 2 ANOVA SUMMARY TABLE : MAIN STUDY

SOURCE	SS	DF	MS	F RATIO	
BETWEEN SUBJECTS					
A (Anxiety)	2617.9856	1	2617.9856	9.4771239	$p < 0,01$
Subj. W.G.	14640.859	53	276.24263		
WITHIN GROUPS					
B (IQ measure)	709.83729	1	709.83729	19.628331	$p < 0,01$
AB	6.1478693	1	6.1478693	.17000011	
B x SWG	1916.6875	53	36.163915		

F MAX (SUBJ W.G) = 1.4562482 DF 2, 26 (Not Significant)
F MAX (B x SWG) = 1.2952169 DF 2, 26 (" ")

The above ANOVA summary table indicates that there is no interaction between Test Anxiety and Type of IQ Measure. There is, however a significant A Main Effect ($F=9.477$; $p < 0,01$) and also a significant B Main Effect ($F = 19.628$; $p < 0,01$). Both factors have only two levels and may thus be interpreted directly by comparing treatment means. The A Main Effect indicates that the IQ scores of HA children were significantly lower than those of LA children, an effect which did not depend on type of IQ measure. The B Main Effect indicates that subjects in this study, both HA and LA, obtained lower scores on the WISC-R than on the NSAGT.

6.1.2 Hotelling's T^2 Tests

Further data analysis was conducted by means of Hotelling's T^2 tests comparing 6 variables: Verbal, Non-Verbal and Total scores on the WISC-R and Verbal, Non-Verbal and Total scores on the NSAGT, in the two groups, HA and LA at the High IQ level and the Medium IQ level. It was not possible to perform this test at the Low IQ level since in order to obtain valid results the number of variables must not exceed the number of subjects. Raw data of low IQ subjects may be found in Appendices D and E.

TABLE 8: Means and Standard Deviations High IQ Level

	WISC-R			NSAGT		
	Verbal	Non-V	Total	Verbal	Non-V	Total
HIGH ANXIOUS	112.86 (4.78)	114.43 (11.77)	115.29 (8.56)	123.14 (4.6)	124.29 (9.84)	125.29 (4.68)
LOW ANXIOUS	123.75 (8.31)	114 (11.5)	121.58 (9.26)	128.67 (8.68)	133.58 (7.05)	132.5 (6.69)

TABLE 9: Vector of Mean Differences and Standard Errors

Mean	-10.89	0.43	-6.3	-5.5	-9.3	-7.21
Standard Error	1.67	2.66	2.07	1.72	1.87	1.49
t	-6.52	0.16	-3.04	-4.33	-4.97	-4.84
t^2	42.51*	0.026	9.26	18.76	24.73	23.42

T^2 27.64 * F ratio 3.25* df 6,17

T^2crit 0,05 = 25.467 (*)

There was a significant difference between HA, HIQ and LA, HIQ children overall, as indicated by the T^2 of 27.64 ($p < 0,05$). Inspection of the t^2 of each variable reveals that only the WISC-R Verbal Scale is significant ($p < 0,05$), while the Non-Verbal Scale and Total Scale of the NSAGT almost reach significance. In each case, HA, HIQ children score less than LA,HIQ children. On the variable of the Non-Verbal Scale of the WISC-R, their performance is almost identical in respect of means and standard deviations. The largest standard deviations are to be found in this variable, indicating that there was considerable variation in performance on this Scale in both HA and LA children of high intelligence. Of interest is the fact that the difference between the groups is considerably less on the WISC-R Total, being well below significance level (t^2 9.26), whereas on the NSAGT Total the difference is close to the 5% significance level ($t^2 = 23.42$).

TABLE 10: Correlation Matrix of High Anxious, High IQ Group

	WISC-R			NSAGT		
	Verbal	Non-V	Total	Verbal	Non-V	Total
Verbal	1000					
Non-V	846	1000				
Total	935*	979*	1000			
Verbal	289	33	147	1000		
Non-V	430	603	559	-251	1000	
Total	584	633	647	308	841	1000

r crit 0,05 = ,879 (*); 0,01 = ,99 (**)

At this level, the only significant correlations are in the WISC-R, where the Verbal and Non-Verbal Scales are each highly positively correlated with the Total Scale (V x T, $r = +,935$ $p < 0,05$; N-V x T, $r = +,979$ $p < 0,05$) indicating that the Total score of children high in anxiety and intelligence tended to be in accord with their score on either the Verbal or Non-Verbal Scales. The correlation between the two subscales of the WISC-R is lower but also almost reaches significance ($r = +,846$). None of the NSAGT variables relate significantly to each other although there is an almost significant positive relationship between the NSAGT Non-Verbal Scale and Total ($r = +,841$). The only negative correlation, which is low and not significant, is between Verbal and Non-Verbal on the NSAGT ($r = -,251$) and indicates a degree

of discrepancy between performance on the two scales. The Verbal Scale on the NSAGT bears the least degree of relationship to the other Scales, which suggests that performance on this scale by high anxious, high IQ children bore little relationship to their performance on other scales. Taken together, these correlations appear to indicate greater consistency of performance on the WISC-R than the NSAGT by such children.

TABLE 11: Correlation Matrix of Low Anxious, High IQ Group

	WISC-R			NSAGT		
	Verbal	Non-V	Total	Verbal	Non-V	Total
Verbal	1000					
Non-V	343	1000				
Total	763*	869**	1000			
Verbal	326	483	507	1000		
Non-V	432	870**	833**	416	1000	
Total	414	786**	765*	853**	821**	1000

r crit, o,o5 = .631 (*); 0,01 = ,765 (**)

Many more significant positive relationships are to be found among the variables in the low anxious, high IQ group which suggests more consistent performance. These children's Total performance on the WISC-R relates positively very significantly to their performance on the Non-Verbal Scale (r = +,869**)

and significantly to that on the Verbal Scale of the test (r = +,763*). The same is true of their performance on the NSAGT, with both subscales relating positively very significantly to the Total (V x T, r = +,853**; N-V x T, r = +,821**). Furthermore, their performance on both Non-Verbal Scales is positively related very significantly (r = +,870**) while the two Totals are also positively related (r = +,765). The lowest correlation in the matrix is to be found between the two Verbal Scales (r = +,326) which suggests that in LA, HIQ children these scales are not measuring the same ability. The Verbal Scales also relate only moderately and non-significantly to the Non-Verbal Scales of both tests (WISC-R V x NSAGT N-V, r = +,432; NSAGT V x WISC-R N-V, r = +,483).

TABLE 12: Correlation Matrix Both Groups Combined

	WISC-R			NSAGT		
	Verbal	Non-V	Total	Verbal	Non-V	Total
Verbal	1000					
Non-V	451	1000				
Total	786**	905**	1000			
Verbal	321	366	420	1000		
Non-V	398	744**	705**	204	1000	
Total	443	732**	729**	757**	785**	1000

r crit 0,05 = ,482 (*); 0,01 = ,606 (**)

In the two groups combined, the significant positive correlations found in the Low Anxious group are again found, all reaching the 1% level of significance. High IQ children who attained a certain level of performance on the WISC-R Non-Verbal Scale were most likely to attain the same level in the Total of that test (r = +,905**), and their Verbal Performance was also related to the Total although less strongly (r = +,786**). Positive correlations of similar strength are to be found between the NSAGT Verbal and Total (r = +,757**), Non-Verbal and Total (r = +,785**) and between the two Totals (r = +,729**) and two Non-Verbals (r = +,744**) and WISC-R Total and NSAGT Non-Verbal (r = +,705**). These results indicate a tendency on the part of high IQ children to perform with reasonable consistency on both intelligence tests. No correlation is lower than that between Non-Verbal and Verbal on the NSAGT (r = +,204).

A further comparison of the performance of HA and LA, HIQ children was undertaken by analysis of the subtests of the WISC-R.

TABLE 13: Means and Standard Deviations WISC-R Subtests High IQ Level IQ

	Verbal					Non-Verbal				
	I	S	A	V	C	PC	PA	BD	OA	Cod
High Anxious	11 (1)	12.86 (1.57)	11 (2.08)	11 (.58)	15 (2.38)	10.57 (3.05)	10.29 (2.21)	14.14 (2.61)	14.29 (2.69)	11.14 (3.02)
Low Anx.	13.33 (1.23)	15.67 (1.97)	13 (2.04)	12.42 (2.61)	14.92 (1.93)	11.83 (1.9)	10.92 (3.2)	13.58 (2.23)	12.83 (2.95)	11.08 (2.61)

TABLE 14: Vector of Mean Differences and Standard Errors

Mean	− 2.33	− 2.81	− 2	−1.42	.08	− 1.26	− .63	.5	1.45	.06
Standard Error	.26	.42	.47	.49	.48	.54	.66	.54	.66	.63
t	** − 8.96	** − 5.98	** −4.26	** − 2.9	0.17	− 2.33	− 0.955	0.93	2.2	0.09

** $p < 0,01$

KEY

Verbal Scale	Non-Verbal Scale
I Information	PC Picture Completion
S Similarities	PA Picture Arrangement
A Arithmetic	BD Block Design
V Vocabulary	OA Object Arrangement
C Comprehension	Cod Coding

Only the t-scores of the above WISC-R subtests are of relevance since there were too few subjects to permit a meaningful Hotelling's T^2 test to be performed with 10 variables. Results indicate that HA children scored significantly less on the subtests Information, Similarities, and Vocabulary. ($p < 0,01$). The Non-Verbal Scale does not differentiate between HA and LA HIQ children according to the earlier Hotelling's T^2 test, therefore the t-scores on these subtests were not considered.

TABLE 15: Means and Standard Deviations Medium IQ Level

	WISC-R			NSAGT		
	Verbal	Non-V	Total	Verbal	Non-V	Total
High Anxious	101.2 (6.01)	97.6 (8.98)	99.4 (7.21)	103.73 (6.04)	109 (7.15)	106.27 (5.06)
Low Anxious	110.27 (3.82)	106.64 (4.88)	109.18 (4.12)	110.27 (8.96)	111.09 (9.21)	111.64 (6.90)

TABLE 16: Vector of Mean Differences and Standard Errors

Mean	-9.07	-9.04	-9.78	-6.54	-2.09	-5.37
Std Error	1.02	1.48	1.2	1.45	1.58	1.16
t	−8.89	−6.11	−8.15	− 4.51	− 1.32	− 4.63
t^2	79.07*	37.32*	66.42*	20.34*	1.75	21.43*

T^2 = 31.97* F = 4.22** df 6, 24

T^2crit 0,05 = 19.92 (*)

Once again, there is a significant difference between the HA and the LA groups (T^2 = 31.97; $p < 0,05$). Contributing to this difference are the variables of Verbal, Non-Verbal and Total of

the WISC-R and Verbal and Total of the NSAGT. In each case, HA,MIQ children performed significantly less well than their LA counterparts. Only in the Non-Verbal Scale of the NSAGT did the two groups perform in an equivalent manner ($t^2 = 1,75$). The t^2 of the WISC-R variables (V = 79.07*; N-V = 37.32*; T = 66.42*) are considerably higher than those of the NSAGT Verbal (20.34*) and Total (21.43*) which indicates that HA, MIQ children performed less well on the WISC-R than the NSAGT, compared to LA,MIQ children.

TABLE 17: Correlation Matrix High Anxious, Medium IQ Group

	WISC-R			NSAGT		
	Verbal	Non-V	Total	Verbal	Non-V	Total
Verbal	1000					
Non-V	544	1000				
Total	858**	894**	1000			
Verbal	481	265	398	1000		
Non-V	359	359	417	43	1000	
Total	596*	409	560*	754**	679*	

r crit 0.05 = 0.553 (*)

0.01 = 0.684 (**)

Correlations among the variables in the HA,MIQ group between the Verbal and Non-Verbal Scales of the WISC-R and its Total are high, positive and significant at the 1% level

(WISC-R V x T, r = +,858**; N-V x T, r = +,894**).

A certain level of performance on either subscale is thus related to a similar level of Total performance. The subscales of the WISC-R are moderately correlated and just fail to reach significance in relation to each other, (r = +,544) but the WISC-R Verbal Scale bears a significant moderate positive relationship to the NSAGT Total (r = +,596*). In this group, the NSAGT Verbal is more positively related to the NSAGT Total (r = +,754**) than is the Non-Verbal Scale (r = +,679*). The Totals of the two tests are moderately positively related (r = +,560*). Showing the least relationship to each other are the Verbal and Non-Verbal Scales of the NSAGT (r = +,043). It appears that HA, MIQ children tended to show more consistent performance on the WISC-R than on the NSAGT where there may be discrepancy between their Verbal and Non-Verbal scores. It will be recalled that this was also the case for HA, HIQ children.

TABLE 18: Correlation Matrix Low Anxious, Medium IQ Group

	WISC-R			NSAGT		
	Verbal	Non-V	Total	Verbal	Non-V	Total
Verbal	1000					
Non-V	252	1000				
Total	784*	794*	1000			
Verbal	366	332	465	1000		
Non-V	-160	263	84	-26	1000	
Total	118	458	393	590	780*	1000

r crit 0,05 = 0,666 (*)
0,01 = 0,798 (**)

There are few significant relationships between performance on the various subscales and Totals among LA, MIQ children. Again, there is an indication that performance on the WISC-R showed greater consistency, with significant positive relationships obtaining between Verbal and Total (r = +,784*) and Non-Verbal and Total (r = +794*). The Non-Verbal Scale of the NSAGT relates significantly in a positive direction with the NSAGT Total (r = +,780), but correlates non-significantly in a negative direction with both the NSAGT Verbal (r = -,26) and the WISC-R Verbal (r = -,160) Subscales. The way a LA, MIQ child performed on the Non-Verbal Scale of the NSAGT obviously gave no indication of his or her performance on the Verbal Scales. Low correlations between this subscale are also found between it and WISC-R Non-Verbal (r = +,263) and WISC-R Total (r = +,084) which, although in a positive direction, again indicate little or no relationship between performances.

TABLE 19: Correlation Matrix Both Groups Combined, MIQ

	WISC-R			NSAGT		
	Verbal	Non-V	Total	Verbal	Non-V	Total
Verbal	1000					
Non-V	485*	1000				
Total	842**	876**	1000			
Verbal	400	258	381	1000		
Non-V	158	302	281	3	1000	
Total	386	388	460*	657**	735**	1000

r crit 0,05 = 0,413 (*)
0,01 = 0,526 (**)

When both MIQ groups are combined, Verbal and Total of the WISC-R are very significantly positively related (r = +,842**), as are Non-Verbal and Total (r = +,976**), while Non-Verbal and Verbal are positively related at the 5% significance level (r = +,485*). The sub-scales of the NSAGT are also positively correlated very significantly to the NSAGT Total (V x T, r = +,657**; N-V x T, r = +,735**) but the two subscales are not related to each other (V x N-V, r = +,03). Apart from its correlation with the NSAGT Total, the NSAGT Non-Verbal Scale does not relate significantly to any other variable. The above correlations indicate that MIQ children tended to perform more consistently on the WISC-R, their performance on each subscale relating to the Total score, while on the NSAGT there was a greater tendency for their Total score to reflect performance on one of the subscales.

TABLE 20: Means and Standard Deviations WISC-R Subtest Medium IQ Level

	Verbal					Non-Verbal				
	I	S	A	V	C	PC	PA	BD	OA	Cod
High Anx.	9.6 (1.64)	11.13 (2.07)	9.33 (1.95)	10.4 (1.59)	10.87 (1.6)	8.93 (2.74)	9.47 (2.33)	10 (3.44)	10.93 2.79)	9.53 (2.26)
Low Anx.	12 (1.41)	11.45 (2.02)	11.45 (2.34)	11 (1)	12.82 (1.99)	10.45 (1.75)	9.73 (2.1)	13.36 (2.01)	12 (2.05)	9.73 (2.61)

TABLE 21: Vector of Mean Differences and Standard Errors

Mean	-2.40	-.321	-2.12	-.6	-1.95	-1.52	-.26	-3.36	-1.07	-.194
Standard Error	.304	.397	.416	.27	.348	.466	.438	.575	.492	.474
t	−7.899 **	−.809	−5.098 **	−2.22 *	−5.616 **	−3.26 **	−.595	−5.85 **	−2.169 *	−.41

* $p < 0,05$
** $p < 0,01$

KEY

Verbal Scale	Non-Verbal Scale
I Information	PC Picture Completion
S Similarities	PA Picture Arrangement
A Arithmetic	BD Block Design
V Vocabulary	OA Object Arrangement
C Comprehension	Cod Coding

Previous analysis indicated that both Verbal and Non-Verbal Scales of the WISC-R revealed a significant difference between HA and LA medium IQ children. Inspection of the t-scores of the WISC-R subtests, above, shows that there were differences on the Information, Arithmetic and Comprehension at the 1% level of significance and Vocabulary at the 5% level on the Verbal Scale, while on the Non-Verbal Scale, Picture Completion and Block Design showed differences which were significant at the 1% level and Object Assembly at the 5% level. In all these subtests, HA children scored less than LA children of medium IQ.

6.2 Subsidiary Study I (Effect of Intelligence and Test Anxiety on Academic Achievement)

The dependent variable was analysed by means of a 2-way ANOVA. F ratios were computed, as was the F max statistic.

TABLE 22: Means and Standard Deviations Substudy I

	HIGH ANXIETY (B1)	LOW ANXIETY (B2)	
HIGH IQ (A1)	72 (7.095) 7	80.909 (7.726) 11	$\bar{A1}$ 76.455
MED IQ (A2)	67.067 (7.805) 15	76.75 (8.635) 12	$\bar{A2}$ 74.909
LOW IQ (A3)	65 (8.343) 6	65.25 (4.573) 4	$\bar{A3}$ 64.63
	$\bar{B1}$ 68.022	$\bar{B2}$ 73.97	

FIGURE 4: Graph of Cell Mean Profiles

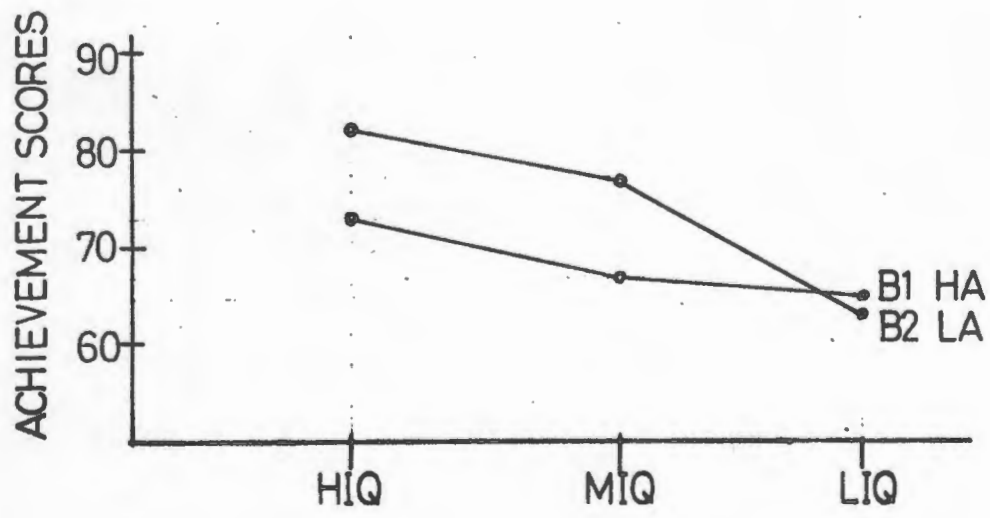

TABLE 23: ANOVA Summary Table Substudy I

SOURCE	SS	DF	MS	F	
A (Intelligence)	1067.691	2	533.845	8.77	$p < 0,01$
B (Test Anxiety)	397.726	1	397.726	6.534	$p < 0,05$
AB	253.303	2	126.651	2.81	
	2982.843	49	60.874		

F MAX = 3.565 DF 6,6 Not significant

The interaction between Intelligence and Test Anxiety is not significant. There is, however, an A main effect ($F = 8.77$; $p<0.01$) and a B main effect ($F = 6.534$; $p < 0.05$). This indicates that both Intelligence and Test Anxiety affect academic achievement, but that the effect of each does not depend on the levels of the other factor. As there are only two levels of Factor B, they may be compared directly. The treatment means indicate that children with high test anxiety do not achieve as well as children with low test anxiety. Factor A (Intelligence) has three levels, so a Scheffé's multiple comparison for unequal n was performed on the A treatment means.

TABLE 24: Scheffé's Comparisons for Unequal N Substudy I

	A1	A2	
A2	1.70		DF 3;52
A3	7.18 **	3.17 *	* $p < 0,05$ ** $p < 0,01$

Scheffé's comparisons indicate that there is no significant difference in achievement between children of high and medium IQ levels. (Scheffé's: 1.70) There is a significant difference between medium and low IQ children (Scheffé's: 3.17) and a highly significant difference between high and low IQ children in terms of their scholastic achievement (Scheffé's: 7.18**).

6.3 Subsidiary Study II Effect of Intelligence and Test Anxiety on Self-Concept.

Again, the dependent variable was analysed by means of a 2-way ANOVA. F ratios and the F max statistic were computed.

TABLE 25: Means and Standard Deviations Substudy II

	HIGH ANXIETY (B1)	LOW ANXIETY (B2)	
HIGH IQ A(1)	54.57 (12.75) 7	63.67 (6.96) 11	$\overline{A1}$ 59.12
MED IQ (A2)	48 (12.19) 15	61.27 (13.62) 12	$\overline{A2}$ 54.64
LOW IQ (A3)	48 (10.73) 6	53.25 (15.65) 4	$\overline{A3}$ 50.63
	$\overline{B1}$ 50.19	$\overline{B2}$ 59.4	

FIGURE 5: Graph of Cell Mean Profiles Substudy II

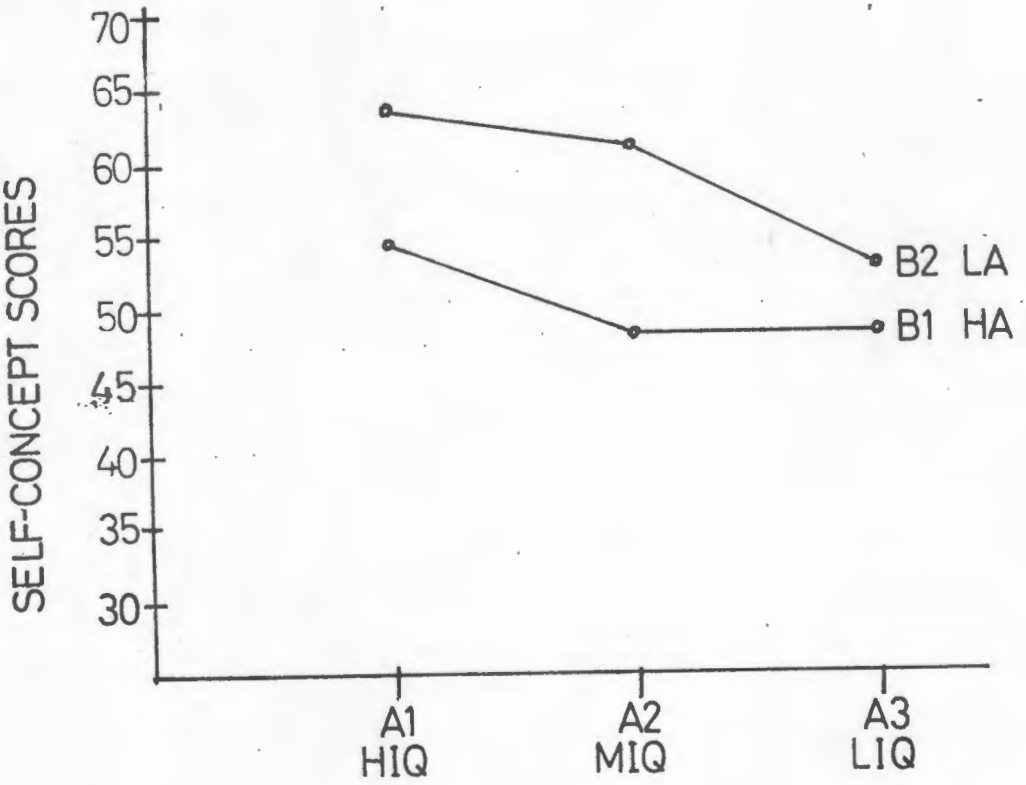

TABLE 26: ANOVA Summary Table Substudy II

SOURCE	SS	DF	MS	F	
A (Intelligence)	541.38	2	270.69	1.963	
B (Test Anxiety)	952.93	1	952.93	6.912	$p < 0,05$
AB	120.31	2	60.34	.438	
WITHIN	6755.31	49	137.86		

F MAX = 5.06 DF 6;6 Not significant

The AB interaction is not significant, indicating that Intelligence and Test Anxiety do not interact in their effect on self-concept. Intelligence has no effect on self-concept but Test Anxiety does have a significant effect ($F = 6.912$; $p < 0,05$). HA children thus have a poorer self-concept than LA children regardless of intelligence level.

6.4 Relationship of Variables

In order to obtain an overall view of the relationships between relevant variables in the two groups of subjects when combined, a simple correlation matrix was undertaken with the following six variables:

The NSAGT, the WISC-R, the TASC, the Piers-Harris Self-Concept Scale, the DSC, Academic Achievement, Age and Sex.

TABLE 27: Simple Correlation : Means and Standard Deviations

VAR NO		MEAN	SDEV
1	NSAGT	113.33928	14.51308
2	WISC-R	108.17857	11.762976
3	TASC	15.33928	9.491195
4	S-C	54.857142	12.924154
5	DSC	9.464285	4.06745
6	ACH	72.196428	9.56588
7	AGE	8.214285	5.0153
8	SEX	1.535714	.50323

VARIABLE 1 = New South African Group Test (NSAGT)

VARIABLE 2 = Wechsler Intelligence Scale for Children (WISC-R)

VARIABLE 3 = Test Anxiety Scale for Children (TASC)

VARIABLE 4 = Piers-Harris Self-Concept Scale for Children (S-C)

VARIABLE 5 = Defensiveness Scale for Children (DSC)

VARIABLE 6 = Academic Achievement (ACH)

VARIABLE 7 = Age as deviation score (see 5.2.6)

VARIABLE 8 = Sex (Girls scored 2, boys scored 1)

Inspection of the means and standard deviations of these variables indicates that this combined group of HA and LA children displays bright-average intelligence on the NSAGT (Mean = 113.34, SD 14.51), and a somewhat lower mean score on the WISC-R, with less variation (Mean 108.18, SD 11.76). The TASC mean and standard

deviation (15.339; 9.491) reflects the composition of this combined group, drawn from the two extremes of the TASC distribution. The self-concept mean score and standard deviation is close to that of the Piers-Harris normative sample (54.86, SD 12.92 vs 51.84, SD 13,87). As a group, these children obtain a mean achievement score that is slightly above their standards (the average of School A was 71.6%; that of School B was 68%, and of this group, 72,2%), and their deviation score mean age of 8,2 is almost exactly that of the standard average (as represented by the score of 8, or 11 years, three months). Both sexes are equally represented.

TABLE 28: Simple Correlation Matrix

	NSAGT	WISC-R	TASC	S-C	DSC	ACH	AGE	SEX
VAR	1	2	3	4	5	6	7	8
1	1000							
2	816**	1000						
3	-254	-330*	1000					
4	308*	296*	-462**	1000				
5	70	124	-487**	269	1000			
6	525**	508**	-453**	496**	26	1000		
7	-368**	-348**	-90	98	4	-145	1000	
8	154	-13	201	12	-364**	163	-75	1000

r crit 0,05 = ,279*

0,01 = ,361**

The correlation matrix reveals that test anxiety is moderately and significantly negatively correlated with self-concept (r = -,462**)

and academic achievement (r = -,453**), which is as expected. Test anxiety bears a low negative correlation to both IQ measures (NSAGT x TASC, r = -,254; WISC-R x TASC, r = -,330*). Contrary to expectations, the negative relationship between test anxiety and the individual IQ measure is thus somewhat the stronger, and reaches the 5% level of significance. These relationships indicate that the HA child tends to have a lower self-concept, achieves less well, and scores somewhat less on an IQ test, than the LA child.

The IQ measures are very significantly and strongly positively related to each other (r = +,816**) and very significantly moderately positively correlated to academic achievement (NSAGT x ACH, r = +,525**; WISC-R x ACH, r = +,508**). There is therefore a strong tendency in this group for children to perform very similarly on the two IQ measures in terms of rank order, but their academic achievement is somewhat less consistent with their IQ performance although there is a tendency for high achievers to score high on IQ measures and vice versa.

Low positive significant correlation between self-concept and the IQ measures (NSAGT x S-C, r = +,308*; WISC-R x S-C, r = +,296*) and a higher positive significant correlation between self-concept and academic achievement (r = +,496**) indicates that, not unexpectedly, there is a trend for children's views of themselves

to be more closely related to classroom performance for which they receive feedback than to IQ measures for which they receive no indication how they have performed.

There is a low positive, but non-significant, correlation between sex and test anxiety (r = +,201) which as girls were scored 2 and boys 1 indicates that girls have slightly higher levels of test anxiety than boys, which is in accordance with previous research findings. Also in accordance with previous findings is that a significant number of boys are more defensive than girls (Sex x DSC, r = -,364++). Sex has a very low positive correlation with achievement (r = +,163) and the NSAGT (r = +,154) indicating a very slight tendency for girls to achieve better than boys and score more on the group IQ test. Sex is not related to the WISC-R, self-concept nor age as shown by correlations below approximately ,10. Age is very significantly and moderately related to IQ scores, with younger children tending to score high (NSAGT x Sex, r = -,368; WISC-R x Sex, r -,348), but is not related to test anxiety, self-concept or defensiveness.

The moderate, highly significant negative relationship between test anxiety and defensiveness (r = -487++) is the same as that usually found in research of this nature (Dusek, 1980) indicating that the highly defensive child tends to admit to less test anxiety.

Means and Standard Deviations of IQ data for boys and girls separately are given in Appendix F and will be discussed in Chapter 7.

CHAPTER SEVEN

7 DISCUSSIONS AND CONCLUSIONS

It was predicted in the main study that HA children at three levels of intelligence would perform less well than LA children on the NSAGT, a group measure of intelligence, but show comparable performance on an individual IQ measure, the WISC-R. It was suggested that such results would support the Sarason et al (1960) (Hill & Sarason, 1966) argument that test anxiety is the aetiologically significant factor in the negative relationship commonly found between test anxiety and intelligence in children. Since the results will be discussed in reference to this argument, it is useful to recap it here. The Sarason argument rests on two main grounds: firstly, intelligence tests correlate differently with the TASC, the more "test-like" tests showing stronger negative correlations with test anxiety; secondly, children matched for intelligence level but varying in level of test anxiety perform differently on intellectual tasks, the HA children performing less well than LA children, even in intellectually superior groups.

The evidence failed to provide unequivocal support for the above argument. In the 2-way ANOVA there was no interaction between level of anxiety and type of IQ measure. Instead, test anxiety showed a main effect in lowering IQ test scores of HA children, an effect which did not depend on type of IQ measure. Contrary to the hypothesis that the WISC-R would show a weaker negative relationship, or no relationship, to test anxiety, the simple correlation matrix revealed that the WISC-R was significantly negatively related to test anxiety to a greater degree than the NSAGT. However, this study supported the premise that children matched for intelligence level but differing in level of test anxiety perform differently on intellectual tasks: HA subjects obtained lower scores than LA subjects, at the High and Medium IQ levels, as shown by the Hotellings T^2 tests.

The most probable explanation for these results is that the two intelligence tests did not differ in their capacity to arouse test anxiety. It appears that the WISC-R, given under standardised conditions, was as anxiety-provoking as the NSAGT to HA children in spite of the advantages of the one-to-one testing situation and efforts to establish rapport between tester and testee, with the result that the performance of such children was impaired. In the light of the known susceptibility of HA children to social-evaluative cues (Wine, 1980), this is, perhaps, not surprising. Indeed, it may have been naive to assume that a well-established pattern of

cognitive and attentional responses would not come into operation in HA children in what was clearly an evaluative situation.

An alternative explanation, that less able children have become test anxious as a result of poor performance, is not very credible in this group of HA children whose mean NSAGT score is 108.27 (SD 12.27). Of these, 7 fall in the High IQ level, 15 in the Medium IQ level and only 6 obtained less than 100. Thus there is no overrepresentation of low IQ children to account for the difference. At the same time it should be noted that it was never disputed by Sarason et al (1960), and is not disputed here, that some HA children have become so as a result of their inability to perform successfully at intellectual tasks of various kinds especially at lower intelligence levels. The contention is that in the majority of HA children, the direction of cause and effect is the opposite, with test anxiety as the major aetiological factor.

Manipulation of the evaluative-stress dimension of IQ tests has in the past been confined to group tests (e.g. Lighthall, Ruebush, Sarason and Zwibelson, 1959; Milgram and Milgram, 1977; Sarason et al, 1960; Zwibelson, 1956). The Zwibelson (1956) study, for example, compared the relation of the TASC to the Davis-Eels Games and the Otis tests, the former being much less "test-like" than the latter, having no time limits nor reading requirements, and having substantial provision for praise and reassurance. Yet

even in this study the difference between Test Anxiety vs Otis-Beta r of -.24 and the Test Anxiety vs Davis-Eels r of -.14 was only significant at the 10% level, although there was a difference which was significant at the 5% level between Test Anxiety vs Otis-Alpha r of -.28 and the Test Anxiety vs Davis-Eels r of -.14. Lighthall et al (1959) found that LA children gained more over time on the Otis Beta than HA children, but HA children gained significantly more over time on the Davis-Eels than the LA children, indicating that the performance of HA children appears to have been facilitated on the latter test. Quite possibly, the performance of LA children was lowered by the very qualities of the Davis-Eels Games that facilitated HA children's performance: there is considerable evidence to show that manipulations designed to eliminate evaluative stress have a detrimental impact on the performance of LA individuals (I Sarason, 1972). Such a situation could make the Davis-Eels Games as unsatisfactory for educational testing purposes as a test that arouses high levels of test anxiety in susceptible children. On balance, it would appear that the attempt to minimise evaluative stress by using the Davis-Eels Games is not particularly effective in facilitating performance in HA children and may be detrimental to the performance of LA children.

Another attempt to determine the effect of evaluative stress on test performance was French's (1962) study comparing performance of

high school students on the Scholastic Aptitude Tests under "regular" and "relaxed" conditions. When he found no difference between the two, he concluded that test anxiety did not affect performance. However, an alternative explanation might be that his treatment condition was too weak to alleviate anxiety. This is very probable, since his "relaxed" condition consisted of informing students that results would not be sent to colleges, but would be sent to their schools - not a particularly reassuring condition. Although French was looking at performance on a general achievement battery, not an IQ test, the SAT falls between course-oriented achievement tests and IQ tests proper, and therefore his findings may reasonably be included in this discussion.

Milgram and Milgram (1977) investigated the effects of test content and context on the anxiety/intelligence relationship by administering a group intelligence measure, comprehension of cartoons, presumed to be free of anxiety-provoking cues, to 177 elementary schoolchildren in Tel Aviv, together with two widely-used conventional group intelligence tests. The "anxiety-free" test correlated with the conventional tests at around .50, as highly as the latter did with each other. Results showed that a negative relationship obtained between test anxiety and the Humour Comprehension Test of the same magnitude as between test anxiety and the other group IQ measures (-.22 for boys and -.24 for

girls). There appeared to be evidence that the children did not find the Humour Comprehension test anxiety-provoking: they reported high funniness ratings and appeared to enjoy taking the test.

Milgram and Milgram concluded that their results supported the less widely-held view that less intelligent children are more test anxious than more intelligent children regardless of the test stimuli used in measuring intelligence. They cited as additional support their earlier findings that mean anxiety scores for average children were twice as high as for children with IQ's of 140 (Milgram & Milgram, 1976). They did, however, suggest that intelligence level and anxiety level were aetiological variables in dynamic interaction. They left open the question why test context did not affect the magnitude of the anxiety-intelligence relationship and recommended further research.

Reinterpretation of the above results is, however, possible. They may indicate that the high anxious children were not deceived as to the true purpose of the Humour Comprehension Test which was to evaluate them, and responded with the pattern of cognitive and attentional deficits which accompany raised levels of test anxiety. Such deficits may have a considerable effect on humour comprehension, which depends partly on appreciation of visual cues. Research on cue utilization, reviewed earlier, indicates that

HA children display reduced or altered cue utilization, which could appreciably lower their scores on such a measure. It is thus possible to reinterpret the findings of the Milgram and Milgram (1977) study as indicating an ineffectual treatment condition. Moreover, these researchers' comparison of mean test anxiety scores in average and gifted children (1976) is misleading. Such mean scores do not indicate the scores of individual high IQ children, some of whom might have suffered debilitating levels of test anxiety. Indeed, the fact that such a gifted group was test anxious at all is an unexpected finding if intelligence is the major aetiological variable.

There appears to have been a tendency on the part of researchers to interpret findings bearing on the test anxiety-intelligence relationship as supporting the major role of either one or the other variable. It is suggested that it is possible to reinterpret all these findings as supporting a cognitive-attentional theory of debilitating test anxiety, which is more reliably elicited in evaluative situations than anticipated.

This leads to the conclusion that by mid-childhood it may be impossible to test a HA child's intellectual abilities in a way that does not arouse levels of test anxiety high enough to impair performance. S Sarason and colleagues found that intelligence and test anxiety were not related in first grade, but that a significant

low negative correlation developed by the middle of the elementary school years, increasing to -.3 to -.4 by the fifth to sixth grade (Hill and Sarason, 1966). Thus, while the effects of test anxiety appear not to impair IQ test performance in the child who has just started school, this may be because test anxiety is not yet reliably elicited in the IQ testing situation, which such a young child may not perceive as evaluative. Children rapidly learn the significance of various kinds of formal tests, however, and as hypothesized in the proposed model of the development of test anxiety (Chapter 4:1), an interactive process may lead to increasing levels of test anxiety and progressive impairment of performance.

It would appear that any attempt to vary educational IQ testing with the aim of reducing evaluative stress would be unsuccessful, especially since IQ tests are required to be administered under standardized conditions. If accurate assessment of IQ in HA schoolchildren is not possible, it becomes very important to obtain some measure of test anxiety to be read in conjunction with IQ data. The Test Anxiety Scale for Children, which is simple, quick, and economical to administer in the classroom situation, appears to be an ideal adjunct to educational testing as currently conducted in our schools, and deserves serious consideration.

While the ANOVA revealed only that the effect of test anxiety was to lower performance on both the NSAGT and the WISC-R, further

statistical analyses showed that the differences between HA and LA children were not the same on the two tests, nor were they the same at different levels of intelligence. As there were too few children in the low IQ level to furnish valid results, discussion will be confined to high and medium IQ levels.

At the high IQ level, the variable which contributed the most to the significant overall difference between HA and LA children was the Verbal Scale of the WISC-R. HA children performed much less well than LA children on this scale with significantly lower scores on the subtests Information, Similarities, Arithmetic and Vocabulary. The Information subtest is the "icebreaker" and so may be particularly prone to the effect of anxiety; moreover, the questions on this subtest are similar to testing of school subject material so it may cue evaluation anxiety in children with a record of poor school performance. The Similarities subtest measures the ability to abstract and questions are scored 0,1 or 2 according to the level of abstraction achieved. Accordingly, a score might consist of mostly 1's which would indicate fairly mediocre calibre, or it might be made up of an unpredictable proportion of credits which would indicate more potentialities and possibilities. As might be expected, high anxious, high IQ children displayed the latter pattern, a possible consequence of their anxiety. The Arithmetic subtest is thought to be affected by poor attention and distractibility caused by the invasion of anxiety into the thinking

process (Glasser & Zimmerman, 1967). The Vocabulary subtest, related as it is to learning ability and educational achievement and opportunity, is a good indicator of scholastic performance. The results of Substudy A indicated clearly that high anxious high IQ children achieved less well than low anxious high IQ children, so that lower performance on Vocabulary seems not unexpected.

The Non-Verbal Scale of the WISC-R did not differentiate between HA and LA high IQ children; the mean score of both groups was virtually identical and both showed the greatest degree of variation on it. On the NSAGT there was a difference that almost reached significance on the Non-Verbal Scale, with HA children scoring less. A slightly lower but similar difference existed on the Verbal Scale. Interestingly, there was considerably less difference between the Total scores of HA and LA high IQ children on the WISC-R than on the NSAGT, a finding that is in line with the original hypothesis that HA children would perform better on the individual IQ measure. On the whole, HA high IQ children performed somewhat more consistently on the WISC-R than on the NSAGT, but much less consistently than their low anxious counterparts.

The medium IQ level displayed a different pattern. Here, HA children performed significantly less well than LA children on the Verbal, Non-Verbal and Total of the WISC-R, and the Verbal and

Total of the NSAGT. Only on the Non-Verbal of the NSAGT did they achieve comparable results. Scrutiny of the subtests of the WISC-R revealed that on the Verbal Scale HA medium IQ children scored less on Information, Arithmetic, Comprehension and Vocabulary, while on the Non-Verbal Scale they did less well on Picture Completion, Block Design and Object Assembly. Information, Arithmetic and Vocabulary subtests have already been considered in relation to HA high IQ children. The Comprehension subtest is thought to give some knowledge of a child's coping ability as well as his interest in coping. While low scores may have a number of meanings, perhaps the one which is most relevant to this discussion is over-dependency, a trait thought to be characteristic of HA children, the evidence for which has been reviewed. Picture Completion calls for visual indentification of familiar items, and the further capacity to identify and isolate essential from non-essential details. Attention and concentration are therefore important elements in the test. High levels of test anxiety appear to impair both as well as leading to changes in cue utilization which could also affect performance on this test. Low performance on Block Design could be attributable to problems with perception, abstraction, visual-motor reproduction or spatial orientation. However, anxiety could lead to excessive activity or failure to become aware of errors. Object Assembly calls for the ability to see spatial relationships, as does Block Design, but on this subtest the child does not match a pattern but

has to work out in advance what he is constructing. Anxiety could result in lack of flexibility or readiness to give up and aimless behaviour to offset feelings of helplessness.

Overall, differences between HA and LA medium IQ children increased on the WISC-R compared to the NSAGT, with somewhat more consistent performance being evidenced on the WISC-R by both.

It is necessary to consider what the effect of sex as a variable might have been had there been sufficient subjects to permit its inclusion. The means and standard deviations of IQ data of boys and girls separately (and both sexes combined) have been included in Appendix F. From these certain trends may be discerned.

Firstly, all the HA,HIQ subjects were girls (n = 7), while half of the LA, HIQ subjects were girls (n = 6). It appears that while there was a difference between them on the NSAGT, with the HA girls scoring less, this difference disappeared on the WISC-R although there was more variation in performance on the part of

the HA girls. This appears to support the original hypothesis that performance of HA children would be facilitated on an individual IQ measure. Since there were no HA, HIQ boys, it is impossible to speculate what their performance would have been, but LA,HIQ boys maintained high performance on the WISC-R, dropping much less than LA,HIQ girls. It appears that the inclusion of sex as a variable at the high intelligence level might have led to somewhat different results, interpretations and conclusions.

A possible explanation for the different anxiety and performance pattern of high intelligence boys and girls might lie in a study which analyzed the contingencies of evaluative feedback in the classroom (Dweck, Davidson, Nelson & Enna, 1978). It was found that negative feedback for boys centred around conduct and nonintellectual aspects of work, which together with teachers' motivational attributions for boys' failure, made failure more indicative of nonintellectual factors. Negative feedback for girls, however, was very specifically addressed to intellectual inadequacies on their academic work, and their motivation was not called into question. Failure feedback thus appeared to be an objective assessment of their ability. Essentially the opposite pattern occurred with positive feedback, being interpreted as an assessment of ability by boys. Over time this could lead to impaired self-confidence, raised levels of anxiety and lower

performance even in high ability girls. Dweck and Wortman (1982) suggest that this may be why girls lose their earlier edge over boys and fall progressively behind them in achievement over the school years.

While sex may be seen as a confounding variable in this study at the high IQ level, this does not appear to be the case at the middle and low IQ levels. Comparison of the means and standard deviations for boys and girls separately, given in Appendix F, page 1, with those given for both sexes together in Appendix F, page 2, show virtually no differences. It may therefore be concluded that at these IQ levels sex does not appear to confound the results and its inclusion as a variable would not have altered the interpretations and conclusions as offered.

Before leaving the main study to consider the subsidiary studies, there is one further point of interest that emerged in administration of the WISC-R. As this test is not standardised for South African children, it cannot be compared directly with the NSAGT in regard to IQ scores although both have a mean of 100 and a standard deviation of 15. However, it is worth noting that results of this study indicate a narrower range of scores on the WISC-R, with the means of the low and high IQ groups being 99.17 and 118.43 respectively on the WISC-R, whereas the comparable figures for the NSAGT were 94.5 and 128.6. In general, it appears to be

more difficult to obtain a high score on the WISC-R, especially one over 130, while more children obtained such a score on the NSAGT. The administrator of the WISC-R observed that there were three children who were clearly outstanding in performance on the test. They were also remarkable for their general poise and maturity. The WISC-R thus appears to differentiate among high IQ children in a way that the NSAGT does not do.

Turning now to the subsidiary studies, it may be said that both yielded clear-cut results in the expected direction. Academic achievement was affected by both intelligence level and level of test anxiety although the effect of each did not depend on the levels of the other. HA children did not achieve as well as LA children, a finding which supports the body of test anxiety literature. However, there was an indication that HA, low IQ children achieved slightly better than their LA counterparts, which could indicate that their actual level of ability was higher. This was not significant, probably as a result of the few children in the low IQ level, but could be cautiously interpreted as a trend. The effect of intelligence on achievement was that there was no significant difference between children of high and medium IQ. There was, however, a highly significant difference between high and low IQ children, and a significant difference between medium and low IQ children. The findings suggest that above a certain level IQ may not be as important as other factors, such as freedom

from anxiety and diligence in obtaining a good level of achievement in the elementary school. The correlation matrix, which yielded a positive and highly significant but only moderate correlation of the NSAGT with achievement would appear to lend support to this conclusion.

The effect of level of intelligence and test anxiety on self-concept was included in this study because it was considered to be an indication of the self-attributions and expectations of the HA child. Results were as expected: intelligence did not have an effect on self-concept scores, but test anxiety had an overall effect, HA children having poorer self-concepts than LA children. The findings lend some support to the hypothesis that views of the self are based on feedback received from others, and therefore relate more closely to academic achievement (as shown in the correlation matrix), which is direct feedback. IQ scores are not divulged to the children and it seems their effect may be more subtle, operating through the medium of teacher attributions and expectations. The effect of anxiety on self-concept might be conceptualised as follows: anxiety lowers achievement, achievement lowers self-concept, which in turn increases anxiety and so on in a self-defeating circle. At the same time, anxiety lowers IQ scores, which results in lower teacher expectations which are communicated in various ways and serve to further lower self-esteem. The moderate, positive and very significant

relationship between self-concept and achievement shown in the simple correlation matrix (Table 28) indicated that the way children performed scholastically, played an important part in the way they felt about themselves, although the Piers-Harris Self-Concept scale includes questions about children's feelings on much wider aspects of themselves. This moderate, positive and significant relationship has been found in several correlational studies of children's self-concepts and academic achievement (e.g. Bledsoe, 1967); Brookover, Thomas & Paterson, 1964; Epps, 1969; Rosenberg & Simmons, 1973).

Before reaching final conclusions based on the findings of this study, it is important to evaluate it and suggest ways it could have been improved. The major defect was that there were too few subjects to permit equal allocation to the various levels of intelligence and anxiety. This insufficiency was most marked at the low IQ level for both HA and LA groups, and also the HA, high IQ group, where, in addition, the 7 subjects were all girls.

This had various consequences. One of the assumptions of the ANOVA, the homogeneity of variance, may be violated where there are unequal cell sizes, such as existed in the subsidiary studies. While Young and Veldman (1963) have shown that even considerable departures from homogeneity of variance have relatively little influence on the ANOVA, it was decided to compute

the F max statistic as a check. It was not significant in any of the statistical analyses, therefore it may be concluded that homogeneity of variance was not violated, and that the computed F ratios may be accepted as valid. A major consequence of insufficiency of subjects was that IQ data at the low IQ level could not be analysed by means of a Hotelling's T^2 test, although showing a slight trend towards improved performance on the WISC-R by HA subjects. Yet another consequence was the confounding effect of sex at the HA, high IQ level. An increase of subjects would have permitted inclusion of sex as a variable.

In this study, allocation of subjects to IQ level did not occur until Stage 4, after completion of testing on the WISC-R. This made it impossible to include additional subjects in those cells where there were very few. It would have been preferable for the assistant to allocate subjects to IQ level at the same time that selection was performed on the basis of the TASC, maintaining precautions to preserve the blind nature of the study. It would appear, however, that this would have made little difference in this study, as the opportunity to obtain further subjects was limited due to the size of the population they were drawn from (the Standard 4 classes). It was not possible to increase the population by including other grades because of developmental trends in test

anxiety. The only solution would have been to include the Standard 4 classes of other schools, matched for social class, who would have been prepared to participate. For various reasons, this was not feasible at the time this study was undertaken but would have been an undoubted improvement.

It is considered that the variable of social class may be relevant to the study of test anxiety, and for this reason matching of schools on this variable was done, as a cross sectional study involving class would have been beyond the scope of the present study. However, the choice of middle-class schools led to a problem concerning levels of IQ. As the mean IQ of these middle-class subjects was NSAGT 113.34, with a standard deviation of 14.51, it is apparent that they are, on the whole, of above-average intelligence. This leads to a problem in obtaining sufficient low IQ subjects. Even adjusting the levels of IQ to allow for the higher mean IQ did not solve the problem (there were 18 "high" IQ's; 27 "medium" IQ's and only 10 "low" IQ's).

It becomes apparent that a large population of Standard 4 children from white, English-language, middle-class, suburban schools would be needed in order to obtain eight subjects in each cell at three levels of IQ, two levels of test anxiety, and two levels of sex, in the subsidiary studies; or 24 in each cell in a test anxiety x type of IQ measure x sex design, which would have improved the Main Study.

This would involve 48 boys and 48 girls. It is possible that five schools would yield this number of subjects, and testing on the WISC-R could then take place on one day per week at each school, lasting some 10 weeks.

A more general problem that merits discussion is that any research conducted in the schools is an intrusion into a highly structured system. Even this study, which involved little time in actual classrooms, was disruptive in that children were called out of class, a room had to be provided, and an "outsider" was present. This was tolerated by school personnel with unfailing co-operation and courtesy, but led to a tendency on the part of the researcher to make decisions that caused as little disruption as possible, sometimes to the detriment of the study. For example, it was decided to limit the HA and LA groups to the top and bottom 20% of the test anxiety distribution, instead of the more usual 25% so that fewer children would have to be called from class. This was a mistake, as inclusion of another 16 children would have had little more potential for disruption of classes, yet would have helped the study. It appears that researchers need to strike a balance between the needs of the school and the needs of the study, being aware that while it is a serious mistake to be over-intrusive, so, too, is it an error to be over-diffident.

The shortcomings of the present study do not appear to invalidate the main conclusion reached, which is that HA children show impaired performance on measures of intellectual functioning as well as poorer achievement and self-concept. This lends support to the proposed model of the development of test anxiety which posits the interaction of intrapersonal, familial and school factors. Hard test data are seen to be important as bases for teacher and pupil expectancies and the effect of test anxiety in lowering such data thus has far-reaching consequences.

The conclusion has also been reached that HA children are so susceptible to social-evaluative cues by the later elementary school years that they are not deceived by manipulations of the evaluative-stress dimension. Thus there would appear to be little usefulness in attempts to change the system of formal evaluation in education. If marks were accumulated for this purpose on daily classroom assignments as is often recommended, HA children would probably rapidly shift their focus of anxiety to these activities, thus increasing the number of stressful situations, with resultant distress.

It has been suggested that inclusion of the TASC in the battery of educational tests would furnish teachers with useful information to be read in conjunction with IQ and achievement measures and lead to less rigid expectancies. In addition to this, it would seem to

be useful to engage in constructive dialogue with teachers to enable them to perceive the role they may be playing in the development and maintenance of test anxiety. This, naturally, would be in addition to a remediation programme aimed at cognitive restructuring in HA children themselves, and intervention to improve parent-child relationships.

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APPENDIX A

The test anxiety scale for children (TASC)

My name is _____. I'm going to be asking you some questions—questions different from the usual school questions for these are about how you feel and so have no right or wrong answers. First I'll hand out the answer sheets and then I'll tell you more about the questions. . . .

Write your name at the top of the first page, *both your first and your last* names. . . . Also write a B if you're a boy or a G if you're a girl. (For the fourth, fifth, and sixth grades, "Write the name of the school you attended last year and year before last year.")

As I said before, I am going to ask you some questions. No one but myself will see your answers to these questions, not your teacher or your principal or your parents. These questions are different from other questions that you are asked in school. These questions are different because there are no right or wrong answers. You are to listen to each question and then put a circle around either "yes" or "no." These questions are about how you think and feel and, therefore, they have *no* right or wrong answers. People think and feel differently. The person sitting next to you might put a circle around "yes" and you may put a circle around "no." For example, if I asked you this question: "Do you like to play ball?" some of you would put a circle around "yes" and some of you would put it around "no." Your answer depends on how *you* think and feel. These questions are about how you think and feel about school, and about a lot of other things. Remember, listen carefully to each question and answer it "yes" or "no" by deciding how you think and feel. If you don't understand a question, ask me about it.

Test Anxiety Scale for Children

1. Do you worry when the teacher says that she is going to ask you questions to find out how much you know?
2. Do you worry about being promoted, that is, passing from the _____to the _____grade at the end of the year?
3. When the teacher asks you to get up in front of the class and read aloud, are you afraid that you are going to make some bad mistakes?
4. When the teacher says that she is going to call upon some boys and girls in the class to do arithmetic problems, do you hope that she will call upon someone else and not on you?
5. Do you sometimes dream at night that you are in school and cannot answer the teacher's questions?
6. When the teacher says that she is going to find out how much you have learned, does your heart begin to beat faster?
7. When the teacher is teaching you about arithmetic, do you feel that other children in the class understand her better than you?
8. When you are in bed at night, do you sometimes worry about how you are going to do in class the next day?
9. When the teacher asks you to write on the blackboard in front of the class, does the hand you write with sometimes shake a little?
10. When the teacher is teaching you about reading, do you feel that other children in class understand her better than you?
11. Do you think you worry more about school than other children?
12. When you are at home and you are thinking about your arithmetic lesson for the next day, do you become afraid that you will get the answers wrong when the teacher calls upon you?
13. If you are sick and miss school, do you worry that you will do more poorly in your schoolwork than other children when you return to school?
14. Do you sometimes dream at night that other boys and girls in your class can do things you cannot do?
15. When you are home and you are thinking about your reading lesson for the next day, do you worry that you will do poorly on the lesson?

16. When the teacher says that she is going to find out how much you have learned, do you get a funny feeling in your stomach?
17. If you did very poorly when the teacher called on you, would you probably feel like crying even though you would try not to cry?
18. Do you sometimes dream at night that the teacher is angry because you do not know your lessons?

In the following questions the word "test" is used. What I mean by "test" is any time the teacher asks you to do something to find out how much you know or how much you have learned. It could be by your writing on paper, or by your speaking aloud, or by your writing on the blackboard. Do you understand what I mean by "test"—it is any time the teacher asks you to do something to find out how much you know.

19. Are you afraid of school tests?
20. Do you worry a lot *before* you take a test?
21. Do you worry a lot *while* you are taking a test?
22. *After* you have taken a test do you worry about how well you did on the test?
23. Do you sometimes dream at night that you did poorly on a test you had in school that day?
24. When you are taking a test, does the hand you write with shake a little?
25. When the teacher says that she is going to give the class a test, do you become afraid that you will do poorly?
26. When you are taking a hard test, do you forget some things you knew very well before you started taking the test?
27. Do you wish a lot of times that you didn't worry so much about tests?
28. When the teacher says that she is going to give the class a test, do you get a nervous or funny feeling?
29. While you are taking a test do you usually think you are doing poorly?
30. While you are on your way to school, do you sometimes worry that the teacher may give the class a test?

APPENDIX B

THE DEFENSIVENESS SCALE FOR CHILDREN (DSC)

*1. Do you love to play sports best of all?
*2. Should girls be just as brave as boys?
*3. Do you ever worry about knowing your lessons?
4. Do you sometimes dream about things you don't like to talk about?
5. Are you sometimes afraid of getting into arguments?
6. When someone scolds you does it make you feel badly?
**7. Do you ever worry about what people think of you?
8. When you get mad do you ever tell anyone else about it?
9. Do you sometimes feel like hurting someone?
**10. Do you ever worry that you won't be able to do something that you want to do?
11. Do you like to play in the snow?
12. Are you sorry for some of the things you have done?
13. When one of your friends won't play with you, do you feel badly?
**14. When you were younger, were you ever scared of anything?
15. When someone makes you mad, do you ever tell them about it?
16. Do you feel cross and grouchy sometimes?
17. Are there some people that you don't like?
**18. Have you ever been afraid of getting hurt?
19. Since you started school, have you ever felt like crying?
20. Do you feel it's important to think about how you can get people to like you?
21. Do you like to go to the beach in the summertime?
**22. Do you ever worry about something bad happening to someone you know?
23. Sometimes when you get mad, do you smash something?
24. When you hurt somebody's feelings, does it make you feel badly?
25. Do you wish your teacher paid more attention to you?
**26. Do you ever worry about what is going to happen?
27. Do you sometimes have arguments with your mother and father?
**28. Are you ever unhappy?
29. Are there some things you just don't like to talk about?
30. If you think someone doesn't like you, does it bother you?
31. Do you like to go on trips with your mother and father?
**32. Has anyone ever been able to scare you?
33. Do you feel terrible if you break something which belongs to somebody else?
34. Do you lose your temper sometimes?
**35. Have you ever had a scary dream?
36. When you are worried about something, do you like to talk about it?
37. Does it bother you if the teacher chooses someone else instead of you to do something for her (or him)?
**38. Do you ever worry?
39. When you've done something wrong, is it hard for you to say you're sorry?
40. Is it hard for you to tell someone you're scared?

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* Filler items not scored but included to help control for "warm-up" effects.
** Items of the Lie Scale for Children (LSC).

APPENDIX C

THE PIERS - HARRIS
CHILDREN'S SELF CONCEPT SCALE

THE WAY I FEEL ABOUT MYSELF

NAME.....

AGE.....GIRL OR BOY.....

STANDARD.....SCHOOL.....

DATE.....

Here are a set of statements. Some of them are true of you and so you will circle the yes. Some are not true of you and so you will circle the no. Answer every question even if some are hard to decide, but do not circle both yes and no. Remember, circle the yes if the statement is generally like you, or circle the no if the statement is generally not like you. There are no right or wrong answers. Only you can tell us how you feel about yourself, so we hope you will mark the way you really feel inside.

1. My classmates make fun of me.....yes no

2. I am a happy person.....yes no

3. It is hard for me to make friends.....yes no

4. I am often sad.....yes no

5. I am clever.....yes no

6. I am shy.....yes no

7. My looks bother me.....yes no

8. I get nervous when the teacher calls on me.....yes no

9. When I grow up, I will be an important person....yes no

10. I get worried when we have tests in school.....yes no

11. I am unpopular.....yes no

12. I am well behaved in school.....yes no

13. It is usually my fault when something goes wrong.yes no

14. I cause trouble to my family.....yes no

15. I am strong.....yes no

16. I have good ideas.....yes no

17. I am an important member of my family.....yes no

18. I usually want my own way.....yes no

19. I am good at making things with my hands.....yes no

20. I give up easily.....yes no

21. I am good at school work.....yes no

22. I do many bad things.....yes no

23. I can draw well.....yes no

24. I am good at music.....yes no

25. I behave badly at home.....yes no

26. I am slow in finishing my school work.....yes no

27. I am an important member of my class.....yes no

28. I am nervous.....yes no

29. I have pretty eyes.....yes no

30. I can give a good talk in front of the class.....yes no

31. In school I am a dreamer.....yes no

32. I fight with my brother(s) and sister(s).....yes no

33. My friends like my ideas.....yes no

34. I often get into trouble.....yes no

35. I am obedient at home.....yes no

36. I am lucky.....yes no

37. I worry a lot.....yes no

38. My parents expect too much of me.....yes no

39. I like being the way I am.....yes no

40. I feel left out of things.....yes no

41. I have nice hair.....yes no

42. I often put my hand up to answer questions.....yes no

43. I wish I were different.....yes no

44. I sleep well at night.....yes no

45. I hate school.....yes no

46. I am among the last to be chosen for games.....yes no

47. I am sick a lot.....yes no

48. I am often nasty to other people.....yes no

49. My classmates at school think I have good ideas.....yes no

50. I am unhappy.....yes no

51. I have many friends.....yes no

52. I am cheerful.....yes no

53. I am dumb about most things.....yes no

54. I am good looking.....yes no

55. I have lots of energy.....yes no

56. I get into a lot of fights.....yes no

57. I am popular with boys.....yes no

58. People pick on me.....yes no

59. My family is disappointed in me.....yes no

60. I have a pleasant face.....yes no

61. When I try to make something, everything seems to go wrong.....yes no

62. I am picked on at home.....yes no

63. I am a leader in games and sports.....yes no

64. I am clumsy.....yes no

65. In games and sports, I watch instead of play.....yes no

66. I forget what I learn.....yes no

67. I am easy to get along with.....yes no

68. I lose my temper easily.....yes no

69. I am popular with girls.....yes no

70. I am a good reader.....yes no

71. I would rather work alone than with a group.....yes no

72. I like my brother (sister).....yes no

73. I have good figure.....yes no

74. I am often afraid.....yes no

75. I am always dropping or breaking things.....yes no

76. I can be trusted.....yes no

77. I am different from other people.....yes no

78. I think bad thoughts.....yes no

79. I cry easily.....yes no

80. I am a good person.....yes no

Score:_____

APPENDIX D : RAW DATA

HIGH ANXIOUS, HIGH IQ

	NSAGT			WISC-R								
Subj	V	NV	T	V	NV	T	TASC	S-C	DSC	ACH	AGE	SEX
1	123	139	132	119	124	124	24	62	4	76	1	2
2	118	118	120	108	108	109	22	51	10	70	12	2
3	131	120	128	114	118	118	30	44	5	66	5	2
4	119	121	121	112	112	113	27	61	14	61	1	2
5	125	118	123	106	92	100	24	50	4	77	1	2
6	120	138	130	113	126	121	27	76	0	82	10	2
7	126	116	123	118	121	122	24	38	11	72	4	2

LOW ANXIOUS HIGH IQ

8	131	133	134	114	112	115	6	72	15	94	10	2
9	121	139	131	137	121	133	9	55	7	87	11	1
10	142	144	144	131	138	139	10	58	16	88	3	1
11	123	139	132	119	121	123	9	69	16	78	12	2
12	138	129	134	137	106	125	5	75	8	90	10	1
13	135	145	143	127	131	133	6	63	7	73	2	1
14	128	133	132	128	108	121	6	67	11	71	3	1
15	123	133	129	122	104	115	8	64	12	75	5	2
16	120	127	125	112	106	110	9	54	10	81	17	2
17	126	130	130	122	102	114	8	68	14	74	7	2
18	141	130	136	118	114	118	4	64	6	79	8	2
19	116	121	120	118	105	113	5	55	15	70	8	1

HIGH ANXIOUS, MEDIUM IQ

20	105	112	108	102	115	109	25	20	10	61	5	1
21	105	103	104	101	105	102	23	45	11	83	7	1
22	100	119	108	100	105	102	25	40	4	65	7	2
23	105	103	104	96	91	92	25	42	6	69	6	1
24	102	99	101	95	78	86	22	57	5	78	10	2
25	101	101	101	103	101	102	22	51	10	55	4	1
26	94	109	101	103	95	100	23	58	6	61	8	1

KEY

Continued ...

NSAGT = New South African Group Test

WISC-R = Wechsler Intelligence Scale for Children - Revised

TASC = Test Anxiety Scale for Children

S-C = Piers-Harris Self Concept Scale for Children

DSC = Defensiveness Scale for Children

ACH = Achievement

	NSAGT			WISC-R								
Subj	V	NV	T	V	NV	T	TASC	S-C	DSC	ACH	AGE	SEX
27	113	113	114	115	106	112	22	45	7	71	4	2
28	95	105	100	96	96	96	24	33	4	65	13	2
29	112	118	116	113	106	111	22	46	4	79	12	2
30	106	103	104	101	93	97	30	45	3	60	6	2
31	105	108	106	103	92	98	24	60	12	65	3	2
32	106	106	106	94	98	95	25	45	10	64	6	1
33	95	123	107	98	91	94	25	67	11	68	12	2
34	112	113	114	98	92	95	27	47	15	62	9	1
				LOW ANXIOUS, MEDIUM IQ								
35	105	109	107	108	111	110	8	54	15	68	14	1
36	98	108	103	107	95	101	6	76	11	90	10	2
37	96	125	115	108	111	110	3	57	14	75	3	1
38	114	113	115	111	108	110	6	63	13	83	4	1
39	115	120	118	108	111	110	5	75	13	82	5	1
40	126	110	119	108	108	109	8	37	7	78	3	2
41	106	94	100	112	105	109	4	71	16	74	14	1
42	113	97	105	114	109	113	5	78	5	90	9	2
43	116	118	118	119	108	116	8	41	5	79	2	2
44	106	113	110	106	101	103	7	62	13	62	12	1
45	118	115	118	112	106	110	4	60	14	70	13	1
				HIGH ANXIOUS, LOW IQ								
46	96	98	98	114	98	107	24	44	9	73	4	2
47	93	102	98	109	102	106	21	55	9	74	3	1
48	93	84	88	101	87	93	22	37	8	61	7	2
49	81	78	84	96	77	85	25	58	5	68	23	1
50	93	101	97	119	112	118	22	59	11	62	11	1
51	93	98	96	103	90	96	28	35	5	52	20	1
				LOW ANXIOUS, LOW IQ								
52	89	84	86	98	86	91	1	62	15	65	10	1
53	102	96	99	108	91	100	1	30	12	65	10	1
54	94	102	98	102	112	107	4	63	11	69	12	2
55	99	97	99	92	93	92	10	58	9	58	21	2

APPENDIX E : RAW DATA

WISC-R Subtests

HIGH ANXIOUS, HIGH IQ

Subj	I	S	A	V	C	PC	PA	BD	OA	Cod
1	11	14	11	11	19	12	11	9	16	18
2	10	12	9	11	15	12	9	14	15	13
3	11	14	11	12	14	11	11	13	17	11
4	11	14	11	11	13	9	11	11	14	13
5	10	14	8	11	12	10	5	7	9	11
6	11	10	13	10	17	12	12	9	17	16
7	13	12	14	11	15	15	11	15	12	12

LOW ANXIOUS, HIGH IQ

8	13	13	11	10	15	19	12	10	14	10
9	13	17	16	14	19	12	9	15	17	12
10	14	18	15	13	15	14	14	16	18	15
11	11	17	16	9	13	10	14	14	16	11
12	15	14	15	19	16	13	10	13	12	7
13	15	15	12	14	16	15	14	15	15	13
14	14	19	11	13	16	12	14	10	11	9
15	14	15	12	12	15	11	10	11	10	11
16	13	13	12	10	12	10	6	13	13	13
17	12	17	13	11	15	13	5	12	10	12
18	12	16	10	12	15	8	11	18	12	11
19	14	14	13	12	12	12	14	12	10	6

HIGH ANXIOUS, MEDIUM IQ

20	10	14	7	10	11	13	10	14	18	6
21	10	8	9	10	14	11	12	13	8	10
22	10	10	9	10	11	7	11	12	14	10
23	7	11	8	11	10	5	10	10	9	10
24	9	10	10	8	9	5	4	8	8	10
25	11	11	11	9	11	4	10	15	12	10
26	10	10	9	12	12	9	10	11	10	7

KEY

Verbal Scale	Non-Verbal Scale
I Information	PC Picture Completion
S Similarities	PA Picture Arrangement
A Arithmetic	BD Block Design
V Vocabulary	OA Object Arrangement
C Comprehension	Cod Coding

Continued ...

	Verbal					Non-Verbal				
Subj	I	S	A	V	C	PC	PA	BD	OA	Cod
27	11	15	12	13	12	11	8	12	10	14
28	7	12	6	12	10	13	8	11	8	8
29	11	14	10	13	13	9	13	10	10	13
30	9	10	11	9	12	8	10	11	10	7
31	10	10	12	10	11	10	8	3	12	12
32	8	10	6	11	10	10	11	6	14	8
33	8	13	9	10	9	10	11	4	9	10
34	13	9	11	8	8	9	6	10	12	8
	LOW ANXIOUS, MEDIUM IQ									
35	12	10	9	11	15	8	13	13	15	9
36	13	12	8	10	13	8	6	12	12	9
37	13	12	12	10	10	11	11	13	10	13
38	12	12	13	11	11	12	9	13	13	9
39	10	10	12	12	13	9	11	15	13	10
40	12	11	11	12	11	10	10	13	15	8
41	15	9	9	12	15	13	10	14	12	5
42	12	16	10	12	12	11	10	9	12	15
43	11	12	16	11	16	12	6	17	12	9
44	10	9	13	9	14	9	11	13	9	9
45	12	13	13	11	11	10	10	15	9	11
	HIGH ANXIOUS, LOW IQ									
46	13	14	11	10	14	11	6	12	12	8
47	12	12	12	12	10	10	10	12	12	8
48	10	8	9	11	13	8	7	9	9	8
49	9	9	8	8	13	8	5	10	8	2
50	10	15	15	11	15	10	15	11	12	11
51	8	10	11	12	12	9	10	10	7	7
	LOW ANXIOUS, LOW IQ									
52	7	9	10	11	12	9	5	7	8	11
53	10	14	9	10	14	8	11	10	9	6
54	10	13	9	9	11	9	12	14	12	12
55	6	12	6	8	12	9	7	11	12	7

APPENDIX F

MEANS AND STANDARD DEVIATIONS FOR GIRLS

	HIGH ANXIOUS			LOW ANXIOUS	
	NASGT	WISC-R		NSAGT	WISC-R
HIGH IQ	125.29	115.29		131	115.833
(n=7)	(4.68)	(8.86)	(n=6)	(3.9)	(4.36)
MED IQ	107	99.5		111.25	109.75
(n=8)	(5.68)	(8.68)	(n=4)	(8.42)	(6.5)
LOW IQ	93	100		98.5	99.5
(n=2)	(7.=7)	9.899)	(n=2)	(0.71)	(10.61)

MEANS AND STANDARD DEVIATIONS FOR BOYS

	HIGH ANXIOUS			LOW ANXIOUS	
	NSAGT	WISC-R		NSAGT	WISC-R
HIGH IQ				134	127.33
(n=0)			(n=6)	(8.83)	(9.5)
MED IQ	105.43	99.29		111.86	108.86
(n=7)	(4.54)	(5.77)	(n=7)	(6.62)	(2.61)
LOW IQ	93.75	101.25		92.5	95.5
(n=2)	(6.55)	(14.88)	(n=2)	(9.19)	(6.36)

APPENDIX F (continued)

MEANS AND STANDARD DEVIATIONS
BOTH SEXES COMBINED

	High Anxious		Low Anxious	
	NSAGT	WISC-R	NSAGT	WISC-R
HIGH IQ (n=7)	125.29 (4.68)	115.29 (8.56)	132.50 (n=12) (6.69)	121.58 (9.26)
MED IQ (n=15)	106.27 (5.06)	99.40 (7.21)	111.64 (n=11) (6.90)	109.18 (4.12)
LOW IQ (n=6)	93.50 (5.99)	100.83 (11.79)	95.50 (n=4) (6.35)	97.50 (7.51)

2 1 JAN 1985