

**A STUDY OF THE VALIDITY OF
DISCRETIZED ANALOG SCALING (Discan)**

by

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Abstract

Discretized analog (Discan) scaling is a reliable and precise quantitative scaling methodology used to measure an individual's target complaints, feelings, beliefs, attitudes, symptoms or problems such as emotional distress and anxiety. Discan has been shown to be useful for various clinical and research applications. Discan has not been formally tested for validity, however, which is the purpose of the present study. A longitudinal design was used in which thirty five undergraduate students with elevated levels of anxiety and six clinical participants undergoing anxiety-management therapy were assessed weekly, eight times each. Scores on Discan anxiety and impulsivity scales were compared with scores on the State Trait Anxiety Inventory, State form (STAI-S) and the Basic Personality Inventory - Impulse Expression (BPI-ImE) scales. Results from Pearson's correlations, visual and qualitative analyses of the data provide support for the concurrent and discriminant validity of idiographic Discan scales.

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Thank you to the splendid town of Wolfville, for all four seasons wherein I found myself. To all of my dearest friends, thank you for taking my outreached hand. Together we choreographed the remarkable dance of sharing, song of wildflowers and ventured oceans of joy. You have all been a part of this journey. Finally, I owe a lifetime of gratitude to my wonderful mother, father and my sisters whose encouragement, support and love have helped to make this dream a reality. Thank you.

... Change all things you fashion with a breath of your own spirit.

-Kahlil Gibran, The Prophet, 1946

Introduction

A Study of the Validity of Discretized Analog Scaling

Shapiro (1961) pioneered work in the field of idiographic assessment of subjectively experienced dysfunctions. His idiographic measure of target-problems was called the Personal Questionnaire technique. This technique was used to assess change over the course of therapy and therapy outcome (Singh & Bilsbury, 1989a). It was one of the first attempts at contributing a tool or methodology with which to conduct idiographic single-case research designs that were soon to become so commonly recommended (Barlow & Hersen, 1984). Improvements upon Shapiro's Personal Questionnaire technique have led to the development of an idiographic measurement tool called *Discretized Analog Scaling* (abbreviated *Discan*) (Singh & Bilsbury, 1989a).

New tests, scales, questionnaires and other measures are developed regularly to fulfill the specific needs of researchers and practitioners (Silva, 1993). This practice creates an availability of an overwhelming number of measures from which to choose (Bech et al., 1993; Fischer & Corcoran, 1994). It is often found that a single measure is inadequate for assessing the area of interest and as a result, a battery of tests must be used. The cost of designing a new measure for every specific need is great both financially and in terms of time taken to develop and evaluate the instrument. Shapiro (1961) noted these and other drawbacks to designing new and specific measures for each evolving purpose, and as a result designed the Personal Questionnaire Technique from which evolved Discan (Singh & Bilsbury, 1989a).

Discan assessment seeks not to measure a single construct but, rather, attempts to provide a broad framework within which to measure any subjectively experienced state imaginable. This framework then is the device with which measurement occurs; the constructs to be measured are selected to meet the measurement needs of the clinician or researcher. In this way, Discan is not a new measure but is a new measurement technique. This feature makes Discan a unique type of assessment tool with wide applicability (Singh & Bilsbury, 1989a). It is important then to show that Discan is a sound device with which to make assessment of various constructs.

The purpose of this thesis is to attempt to examine the validity of Discan measurement scales. By comparing scales of known validity and reliability to Discan measures, it is possible to determine whether or not Discan can be used as a valid assessment tool. Through a series of single-case studies and group designs, an attempt will be made to determine whether Discan can be used validly to assess change over time. A description of Discan methodology and the methods of validation follow a discussion of some of the relevant philosophies, controversies and findings covered in the literature.

Reasons for Measurement in Psychology

Measurement methodology has been one of the most broadly discussed issues in the social sciences and this tradition continues today (Bech et al., 1993; Jones, 1971). Psychologists involved in research and practice rely upon assessment or measurement. Quantitative assessment has replaced the traditional narrative case report that once formed the basis of clinical evaluation (Burdock, 1982). Objectivity in measurement became important for a number of reasons, not the least of which was the development and

demands of pharmacotherapy (Engelsmann, 1982). The issue of adequate measurement inevitably must be considered, whether in pursuit of responsible intervention, observation or information concerning attributes of objects, organisms and events (Cone, 1988; Corcoran & Fischer, 1987; Jones, 1971).

Assessment and measurement methodologies are continually sought by professionals for numerous reasons. Barlow, Hayes and Nelson (1984) pointed out that collecting quantified measures of clients' problems and progress can be useful for any and all of the following general reasons. The first is to improve or enhance treatments and interventions. Measuring problems has been shown to contribute to the actual improvement of clients because it provides clients and therapists with feedback about the changes that occur over time. Monitoring therapeutic change allows therapy or treatment changes to be made when and if necessary. Measurement of client-specific problems can help in treatment and goal formulation. A second reason for collecting measures is to enhance clinical science, research methods and the general body of relevant information that is accumulated as a result of this process. A third and final reason that quantitative measures are useful is that of accountability. In fact, managed mental health care is one of the most recent advocates of the development and use of sound assessment or measurement methodologies (Barlow et al., 1984; Wise, 1994). As a result of these reasons, there is a need for measures or instruments that can accommodate all aspects of the concerns of the clinician or researcher. In order to illustrate this further, some of these concepts are addressed in more detail in the following sections.

Measuring Outcome to Demonstrate Accountability and Quality of Care

Although there have been many controversies and difficulties surrounding it, the concept of managed health care has become increasingly prominent in the psychological literature (Barlow et al., 1984; Callan & Yeager, 1991; Hoyt & Austad, 1992). Managed health care was developed as a means of assisting health care professionals to cope with the demands of spiraling health care costs and the public demand for high value care and accountability (Schyve & Prevost, 1990).

Changes in the health care system have introduced new challenges for psychologists (Broskowski, 1995). The practice of psychotherapy is no longer independent of the scrutiny of economic providers (Austad & Hoyt, 1992). Mental health providers have been called upon to demonstrate the necessity of treatments for particular clients in order to obtain sufficient funds to support the costs of the services provided (Mirin & Namerow, 1991; Schyve & Prevost, 1990). Treatments for inpatients must be demonstrated as “active” rather than “custodial” (Mirin & Namerow, 1991). Psychologists must demonstrate the effectiveness of short-term therapies as opposed to costly, ongoing long-term treatments (Austad & Hoyt, 1992). Furthermore, it may be just as important to monitor changes during the therapy process as well as outcome variables (Barlow & Hersen, 1984; Fauman, 1990; McAuliffe, 1979). In order to meet these demands, mental health professionals must demonstrate empirically the effectiveness and quality of care through the use of well designed outcome studies using adequate assessment tools (Austad & Hoyt, 1992; Mirin & Namerow, 1991; Schyve & Prevost, 1990).

Mental health professionals maximize the value of psychological care by demonstrating the usefulness and effectiveness of psychotherapeutic treatments (Austad & Hoyt, 1992; McAuliffe, 1979). There is a need to determine aspects of care that are important, and to measure them quantitatively (Barlow et al., 1984; Fauman, 1990). Quality of care and treatment outcome have become increasingly important measures of health care service (Broskowski, 1995; Fauman, 1990; Mirin & Namerow, 1991; Sabin, 1991; Schyve & Prevost, 1990; Sederer & St. Clair, 1990). As a result, the development and use of reliable and valid methods for establishing treatment outcome and quality assurance criteria is crucial (Fauman, 1990).

Treatment Outcome Measurement

Evaluating the outcome of psychotherapy has long been a topic of concern among mental health professionals (Garfield, Prager & Bergin, 1971; Luborsky, 1971). The development of clinically meaningful outcome measures for psychotherapy has challenged clinicians and researchers for many generations (DeWitt, Kaltreider, Weiss & Horowitz, 1982; Kline, 1957). Rigorous scientific criteria with which to evaluate clinical changes or improvement are constantly sought by professionals hoping to demonstrate the value of their therapies to their clients and independent evaluators (Corcoran & Fischer, 1987; Schyve & Prevost, 1990; Sederer & St. Clair, 1990). These measures often consist of a battery of some of the most popular tools, including measures of affect, personality and other similar constructs. Endless lists of assessment tools can be consulted in order to choose a measure that best suits the purposes of the research or clinical practice (Bech et al., 1993; Fischer & Corcoran, 1994). Despite the plethora of existing scales, however,

clinicians and researchers continue to develop new scales and seek scales that are more psychometrically sound and specific or suited to their particular purposes (Silva, 1993). In fact, the psychological literature concerning issues such as treatment outcome, accountability and managed care has indicated that there is a need for new measurement tools that can assess change over the course of therapy in clients' symptoms, target problems, therapeutic goals and outcomes (Engelsmann, 1982; Schyve & Prevost, 1990).

Regardless of their purposes, designing assessments or measures that meet the high demands of today's scientific standards continues to be a challenge (Cone, 1988; Engelsmann, 1982; Silva, 1993) and the psychometric properties of measures are often unknown or inadequately established (Johnson & Bolstad, 1973). Assuring that measures are psychometrically adequate means testing for reliability and validity, and possibly a number of other psychometric attributes: responsiveness, accuracy, and utility (Cone, 1988; Guyatt, Walter & Norman, 1987; Silva, 1993). The manner in which measures are collected also contributes to their adequacy and usefulness. Barlow et al. (1984) have reviewed some guidelines for collecting quantitative measures of client's problems and progress and these are described in the following sections.

Issues In Psychological Measurement

In order to help researchers and practitioners implement adequate data collection and measurement procedures in their respective settings, Barlow et al. (1984) have provided some guidelines that may be helpful. A few guidelines that are particularly relevant are summarized in the suggestion that one should delineate *several* of the client's

problems in *specific* terms using *multiple measures* that are *sensitive, meaningful, accurate* and *psychometrically sound*.

Adhering to a set of guidelines such as those proposed by Barlow et al. (1984) may appear simple, however decisions may become more complex when one considers the many different measures available and many different measurement orientations from which to choose (Cone, 1988; Corcoran & Fischer, 1987; Engelsmann, 1982; Jones, 1971). For example, any given instrument might have an idiographic or a nomothetic basis, might be problem-specific or quite general in scope, might be state or trait focused, and may be examiner administered or self-administered (Cone, 1988). Some of the competing measurement orientations, such as global versus specific measurement, nomothetic versus idiographic measurement, and group-design versus single-case methodology will be discussed in the following sections.

General and Specific Measurement

Most of the widely accepted measurement tools have been designed to assess either specific variables or global changes in functioning, both having advantages and disadvantages (Guyatt, Feeny & Patrick, 1991). Non-specific, generic measures of functioning or adjustment such as the General Health Questionnaire (GHQ) or the Global Assessment of Functioning Scale (GAF) are useful tools for measuring broad changes over many different constructs. Generic measures, however, may be too general or vague to detect important fluctuations in particular or specific areas of concern (Guyatt et al., 1991). Instruments that are vague are said to have low levels of responsiveness, often failing to detect small but important fluctuations and changes in variables that are relevant

to the client (Guyatt et al., 1991). Instruments that have low responsiveness are sometimes said to “drown out” clinically important information. Pocock (1991) has elaborated indicating that “any specific *signal* could be swamped by the *noise* of all other influences [on the construct being measured] so that failure to demonstrate an effect on a global score should not be taken to mean that there is no important treatment difference” (p.261S). Generic measures that contain patients’ target complaints may sometimes be so general or even comprehensive that the complaints endorsed on the scale may become inadequately expressed in the final score (Battle, 1966). This issue of non-responsiveness can be especially problematic when assessing treatment outcome because the responsiveness of an outcome measure is crucial to detecting differences between different treatments and whether or not significant changes have occurred (Deyo & Centor, 1986).

Specific measures are those that aim to assess a single construct or set of specific constructs such as depression, anxiety and personality. For example, the Beck Depression Inventory (BDI) and the sub-scales of the Minnesota Multiphasic Personality Scale (MMPI) were constructed to assess very specific domains of adjustment or functioning. Measures that have been designed to assess specific variables or specific types of situations are widely used partly because of the obvious advantage provided by assessing problem-specific constructs, diseases or populations (Wiklund & Karlberg, 1991). If selected carefully, specific measures are more likely to be responsive to clinically relevant changes than are generic measures (Guyatt et al., 1991; Wiklund & Karlberg, 1991).

Specific measures can be advantageous when one is certain that the construct to be measured is defined by the items on the specific scale. Such instruments are not always

useful in assessing non-specific problems or general changes in functioning (Guyatt et al., 1991). Specificity also becomes problematic when an instrument is so specific that it fails to detect related and important information or issues that contribute to a client's major problems or the treatment outcome. This type of problem may be called "missing the mark" and constitutes a Type I error. This type of problem also occurs when the measure is specific to a particular construct that is relevant to the client, (for example, depression) but the instrument is not sensitive enough to gradual therapeutic improvements or changes (Barlow et al., 1984). Another problem with instruments that are population specific is that they provide "measures [that] may not be applicable across cultures, i.e., [some] measures may be more acceptable to patients in North America than in some European countries. Difficulties in language translation, and social/intellectual differences within countries may also interfere with the general validity of any particular line of questioning" (Pocock, 1991, p.261S).

It has been a struggle to avoid the difficulties and complications involved in outcome measurement. In order to make a compromise between the too-specific and the overly vague, there is a need for scales that are general enough to accommodate a wide variety of problem and therapy issues and yet specific enough to assess variables of significance to clients. Theorists have speculated that one way to avoid some of these pitfalls is to direct more attention "toward the specific changes which are sought with each individual client" (Garfield, Prager & Bergin, 1971, p.321). Measuring target problems is one way to approach this issue.

Measurement of Target Problems

Assessing outcome using a target-problem approach has been considered useful by many researchers and practitioners (Hesbacher, Rickels & Weise, 1968; Frank, Nash, Stone & Imber, 1963; Frank, 1966; Mintz, 1981; Nezu, Nezu & Perri, 1990). Frank (1966) reviewed the use of *focal symptoms* in psychotherapy and indicated that focal symptoms have again become the center of therapeutic interest. Frank (1966) defined focal symptoms as “any complaint for which the patient seeks treatment, including states of subjective distress...” (p.565). Clients seeking treatment often present a number of focal symptoms or target problems representing their chief complaints which therapists sometimes refer to as presenting problems (Hesbacher et al., 1968). Changes that occur in target problems have been recommended and shown to be useful as indicators of treatment outcome (Freyhan, 1959; Hesbacher et al., 1968). Furthermore, it has been suggested that measures of target problems should be tailored to the individual (Bond, Bloch & Yalom, 1979; Malan, 1973; Rickard, 1965) because “client behavior patterns [that] therapists attempt to change are not the same for all clients or even necessarily the same for any individual client at different stages of therapy” (Ford, 1959, cited in Rickard, 1965).

Hesbacher et al. (1968) have reviewed some of the advantages of using target problem approaches in outcome measurement. One advantage of using a target problem measure is that it is often brief and simple, consisting of very few items as opposed to using long and cumbersome lists of symptoms to evoke responses. Another advantage is that the items to be measured are generally uttered directly by the patient using his or her own words or natural language, which is subsequently recorded by the examiner with

minimal interpretation. This methodology can provide a measure of understandable, uncomplicated and personally relevant problem areas for the client (Hesbacher et al., 1968).

Treatment outcome studies that examine the differences between using target problem approaches versus global improvement measures have shown that the problem-specific measures are often more sensitive to change (Battle et al., 1966; Guyatt et al., 1991; Hesbacher et al., 1968; Nezu et al. 1990). Research using global measures of change as outcome indicated that these measures are limited in scope and value as they are often ambiguous and open to question (Battle et al., 1966; Garfield et al., 1971). More specific and clinically relevant measures, such as problem-specific instruments, have been shown to satisfactorily assess treatment outcome (Battle et al., 1966).

Outcome research using target problem measures has provided a rationale for using problem-specific criteria (Garfield et al., 1971; Hesbacher et al., 1968). The increased specificity and responsiveness that these measures can provide may be a practical solution to some of the measurement problems faced by researchers and clinicians. It has been suggested that by measuring problem-specific changes within the individual client, there is an increased likelihood of improving the quality of the assessment (Garfield, Prager & Bergin, 1971). One way to approach this task is through the use of idiographic methodology.

Idiographic and Nomothetic Measurement

Psychological assessment approaches often have been divided into the categories nomothetic and idiographic. The division began before 1858, when Samuel Bailey

proposed that the discipline of psychology be divided into two separate areas of study: one chiefly concerned with the subject of individual character and the other concerned with general laws that are common to all people (Allport, 1937). In 1904, the German philosopher, Windelband introduced the terms as a means of distinguishing between methods that are scientific (nomothetic) versus humanistic (idiographic) (Eysenck, 1954) and he suggested a separation of these nomothetic and idiographic disciplines (Allport, 1937).

The terms nomothetic and idiographic were first introduced into Anglo-American psychology by Allport in 1937. He described nomothetic methods as those “seeking only general laws,” or looking for commonalities among the subjects who undergo assessment, whereas idiographic assessment “endeavours to understand some particular event in nature or in society,” or looks for distinguishing characteristics concerning a single individual who has undergone assessment (Allport, 1937, p.22). The distinction between the terms nomothetic and idiographic might be clarified using chemistry and literature as examples. Chemistry is an exact science that deals with concepts such as the composition and structure of elements and it applies a set of general rules to all new problems that the chemist aims to solve. In this way, chemistry is a “nomothetic science”. Literature, by contrast, can be regarded as an “idiographic science” (Allport, 1962), which aims to explain the specific importance of a particular event or story from which others can generalize and learn.

Idiographic methodology stems from the notion that individuals are both unique and important. This viewpoint is clearly reflected in Allport’s (1937) book, in which he

began with the statement, "The outstanding characteristic of man is his individuality" (p.3). Allport (1937) discussed idiographic psychology as a means of examining the individual as a whole, comparing aspects of a person to that person him or herself. Beck (1953) described idiographic psychology as the method through which one can come to understand the "universe of traits [and] variables" that affect one another, and when these are combined they form an individual (p.357). Marceil (1977) indicated that according to Allport, idiographic methods were those that served to highlight uniqueness, identity, will, and other humanistic concepts. These definitions imply that the idiographic method of study in psychology is one that is concerned with the variables that are unique to an individual, and contribute to his/her differences and idiosyncrasies. According to this viewpoint, idiographic psychology examines the particulars of a person and how those particulars work within that person's own system. Idiographic methods are person-specific.

The idiographic method does not always attempt to generalize the information learned about one person to other individuals, although idiographic psychology often attempts to understand concepts by using a specific case and then applies this understanding to other cases. It is from this perspective that the *single case experimental design* was born. Traditionally, however, psychology has sought to discover general laws based upon norms that can be applied to the single case. Despite attempts to demonstrate the role of idiographic methods in psychology, it has been striving to make itself a completely nomothetic discipline (Allport, 1937, 1962; Beck, 1953).

Despite clinical and personalistic psychologists' interest in how individuals differ, early investigators in psychology such as Wundt, Muller, Ebbinghaus, Kulpe, and Titchner were devoted to establishing psychology as a nomothetic science (Skaggs, 1945). With the advent of formal measurement techniques in psychiatry and psychology, such as the Rorschach test, came an interest in supplementing subjective interpretation of clients with objective, nomothetic measures (Baldwin, 1942). This was an important advance in the science of psychology because the validity of the interpretative value of subjective records and accounts of individual lives was found to be unquestionably dependent upon therapist variables (Baldwin, 1942). Scientists in psychology have been preoccupied with "generalized truths" and nomothetic measurement methods since that time (Allport, 1937). This interest served as the foundation of nomothetic methodology, that is, the study of laws and principles that can be applied to groups of people or individuals.

Bromley (1968) explained that nomothetic psychology attempts to apply general laws, or norms, to the individual. Nomothetic assessment enables psychologists to learn what is true of persons and groups in general. It is concerned with the consistencies and regularities among people. Broverman (1962) explained that normative measurement assumes that all members of the population possess varying amounts of particular entities or traits which account for certain individual differences in behaviour. As a result, nomothetic measures assign the behaviour of a given individual to a point or mark on a normative scale. This procedure distributes the scores about the norm of the population. In this way, behaviours and other measured constructs are "ordered on dimensions which transcend the individual" (Broverman, 1962, p.295).

Another way to understand nomothetic methodology is to view it as a continuum between what is considered normal and abnormal. For example, a population's average score on a scale can be said to be the norm and can be used to determine which individuals deviate from that norm (Broverman, 1962; Cone, 1988). In this way, nomothetic assessment can help to detect those individuals who differ from the normative group, and who may therefore be of particular interest. Objective nomothetic measurement procedures can be used in this way to supplement therapists' more subjective clinical interpretations.

Despite the obvious benefits incurred by nomothetic measurement techniques, there are several cautions to using this method. Bromley (1968) cautions that when using nomothetic methods one is always at risk of overgeneralizing about people, and advocated idiographic methods to remedy this. Without the use of idiographic methods, there could be severe limitations in the ability to understand and predict individual behaviour (Runyan, 1983). This is so because in the context of assisting comparisons among individuals, nomothetic methods of assessment sacrifice some sensitivity to the individual. By contrast, idiographic assessment measures the idiosyncrasies in the activities and lives of individual people (Bromley, 1968). Using idiographic measurements, a clinician can assess specific variables that are relevant to the individual's situation without overgeneralizing. The use of idiographic assessment also allows the individual to be tested against what is "normal" by his or her standards as opposed to what is "normal" in general (Bromley, 1968). This methodology is sometimes called ipsative measurement (Broverman, 1962; Cattell, 1944; Jackson & Alwin, 1980).

Another predominant argument against using nomothetic measures for essentially idiographic purposes comes from the following line of thinking. Cone (1988) pointed out that when nomothetic methods are used, there is enough information lost in creating the normative standards that the end-result is a measurement that can not be generalized to individuals in different circumstances. As a result of this, the norm-based measure will offer minimal generalizability to the individual case (Barlow et al., 1984; Cone, 1988). This point of view has been asserted repeatedly and is summed up nicely by Barlow et al., (1984), who stated that generalization to the individual cannot be made from nomothetic measures since “the complexity of the human condition will preclude any attempt at experimentally establishing generalization” (p.58). They also explained that because group comparison designs are using groups to obtain their information, those designs “have inherent limitations in the ability of practitioners to apply their results to individuals” (Barlow et al., p.66). Followers of this philosophy have asserted that generalizability to the individual can be made only once an accumulation of single-case studies has created sufficient data concerning any given area of concern (Barlow et al., 1984; Bromley, 1986; Cone, 1988). Bromley (1986) refers to this process as the *development of case law*. The single-case methodology that began in the 1950’s is the trend that follows this logic, and is further described in a section below.

The Nomothetic versus Idiographic Debate There has been a debate in the literature concerning the use of idiographic and nomothetic assessment in psychology, which argues that psychology has become overly concerned with nomothetic methods and is not concerned enough about idiographic methods, individuality and the single case

(Holt, 1962; Runyan, 1983). Although traditional psychological science had followed mainly the nomothetic formula of measurement, some authors began to argue that there was an increasing need for the implementation of idiographic methods as well. For example, Allport, (1937) encouraged the use of idiographic assessment and felt that it was a necessary and logical next step for the study of personality in psychology. Later, Beck (1953) followed Allport's tradition, advocating the use of idiographic methods.

In attempt to reconcile the ensuing debate, Allport (1937) was among the first who sought to encourage the use of both nomothetic and idiographic methodology. Despite the tendency to ignore idiographic issues and the suggestion to separate the idiographic and nomothetic disciplines, Allport suggested an “artful blend of generalization with individual portraiture” (1937, p.22). He clarified that a skillful combination of both idiographic and nomothetic approaches which “overlap and contribute to one another” could broaden and strengthen the scope of psychology (Allport, p.22).

Research since Allport's early writings has shown that both idiographic and nomothetic methods are useful and “their combination results in maximal power” (Kenrick & Braver, 1982). More often, however, psychologists were persuaded that they must select a single method of evaluation (Allport, 1937; Marceil, 1977) and Stones (1978) pointed out that the majority of published work uses nomothetic methods. These and other writers in the field began what is known today as the idiographic-nomothetic debate and very few have settled upon a compromise between the two measurement methodologies (Runyan, 1983). For a comprehensive review of this debate, refer to Holt (1962).

Followers of the idiographic tradition sought appropriate idiographic methodology that could stand up to the rigour of nomothetic methods led to the development of the case study (Barlow & Hersen, 1984; Dukes, 1965). In this way the single case design was an attempt at the solution to problems associated with deciding between nomothetic and idiographic methodologies (Barlow et al., 1984; Barlow & Hersen, 1984; Cone, 1988). These single-case designs employ scientific and statistical methods in order to produce information that is generalizable to other individuals who present similar circumstances (Barlow & Hersen, 1984). Single case studies were useful for shedding light on rare phenomenon, casting doubt on nomothetically established theoretical assumptions (Dukes, 1965) and for answering specific questions regarding therapy process and outcome (Barlow & Hersen, 1984; Shapiro, 1961). The single case design is described more fully in a section below.

Another attempt to reconcile the nomothetic-idiographic debate lead to the scientist-practitioner split, described in the next section.

The Scientist-Practitioner Split. Homogeneous group designs, precise statistical procedures and nomothetic assessments constitute a large percentage of the research methods that have been used to determine the existence of effects of therapeutic interventions, therapist variables and other issues of importance to practitioners (Barlow et al., 1984; Barlow & Hersen, 1984; Hayes & Leonhard, 1991). In this way the science of psychology and the practice of psychology are closely interconnected. Due to the centrality of the individual client to clinical science and practice, however, the more scientific and nomothetic methods were frequently judged unacceptable or irrelevant to

practitioners' work with individual clients. Practitioners sought to bridge the gap between science and practice by bringing the research limitations to light and by developing the single-case experimental design (Barlow et al., 1984, Barlow & Hersen, 1984).

Unfortunately, there were other practitioners who dealt with the gap between science and practice by failing to consume and apply the research findings altogether (Barlow et al., 1984; Bergin & Strupp, 1972). As a result, a tension grew between researchers and clinicians, sometimes referred to as the *scientist-practitioner split* (Barlow & Hersen, 1984; Hayes & Leonhard, 1991). This scientist-practitioner split was partly responsible for the continued disillusionment with nomothetic assessment.

Single Case Methodology

The need for adequate assessment and research methods in psychological practice helped to advance the development of methods that were acceptable to both the clinician and the researcher. One of these methods is known as the single-case design (Barlow et al., 1984). Other names for the single-case design include *single-subject research*, *N of 1 studies*, *N=1 design*, *time-series designs* and sometimes they are referred to as *quasi-experimental designs* (Campbell & Stanley, 1981; Dukes, 1965; Davidson & Costello, 1969). Single-case research is conducted in an effort to find results that are useful to the individual client as well as generalizable to other individuals who share similar circumstances or problems (Barlow et al., 1984; Barlow & Hersen, 1984; Wolery & Harris, 1982).

There are many methods that may be employed within the single-case design. Most single-case designs are characterized by “accurate, repeated assessment, careful

analysis of trends in client progress, specification of the treatment plan and adherence to it, and a readiness to change directions when a client's program indicates that that is what is needed" (Hayes & Leonhard, 1991, p.225). Experimental designs and analyses used for single-case methodology vary from study to study because of client and situational variables, the questions asked and the research needs. There are, however, some elements that are common to most single-case designs such as repeated measurements, replication and visual analysis of data (Barlow et al., 1984). Some of these elements are described in more detail below.

Repeated measurements are an essential and important common factor in any single-case research design (Barlow et al., 1984; Barlow & Hersen, 1984; Hayes & Leonhard, 1991; Jones & Nesselroade, 1990). In fact, the use of repeated measurements over the course of time is the genesis of the term, *time-series methodology* (Barlow, Hayes & Nelson, 1984). Repeated assessment, or measures collected at temporal intervals are clinically and experimentally useful for a number of reasons. They can provide feedback to the therapist regarding the client's changes and can provide greater meaning to outcome results than simple pre-post measurements (Barlow et al., 1984). Repeated measurements are used to help demonstrate the effectiveness of the treatment or other independent variables. Treatments or interventions can be modified on the basis of such measurements when necessary (Barlow et al., 1984). Thus, accurate, repeated measurement nicely parallels the process of daily clinical practice in a non-intrusive manner (Hayes & Leonhard, 1991). Repeated assessment is also useful for providing a

pattern of change over the course of time. This overall pattern is useful for drawing conclusions about the independent variables.

As opposed to approaching research problems by examining differences between matched groups, single-case methodology often utilizes replication (Wolery & Harris, 1982). Replication is essential for establishing evidence or believability of treatment effectiveness and other results. Single-case experiments may be replicated through the use of repeated measurements on the same subject across different time periods, settings, treatments and even various therapists (Barlow & Hersen, 1984; Wolery & Harris, 1982).

Replication across individuals also enables the reliable generalization of the results to individuals sharing similar circumstances (Barlow & Hersen, 1984). This is especially true when replication of effects demonstrates generalizability across individuals who are *not* closely matched in terms of age, gender, and other demographic, social, cultural (etc.) variables (Barlow & Hersen, 1984). An emphasis on replication is likely to increase the power of the single-case designs and analyses because the demonstration of similar patterns of effects in more than one experiment increases reliability, validity and believability. This approach to generalizing across new individuals on the basis of information gleaned from replications of the single-case design has been said to be both idiographic and nomothetic in nature and has been thus termed an *idiothetic* approach (Jones & Nesselroade, 1990; Lamiell, 1981). Barlow et al., (1984) summarize the importance of replication in the single-case design with the statement; “No single case is a *critical experiment*. It is the overall picture that is important” (p.162).

Analysis of Data Generated by Single Case Designs

A controversial issue associated with single-case designs concerns data analysis and the interpretation of results (Ottenbacher, 1992). Data generated by single-case designs can be treated in a number of ways. Statistical procedures have been designed to examine the effects of certain types of single-subject data. These are especially useful when the variables under study do not demonstrate clearly visible effects and significance must be determined using statistical tests (Campbell & Stanley, 1981). Examples of useful single-case statistical tests of significance include trend estimation and the *Rn* statistic (Wolery & Harris, 1982), factor analysis and the P-technique factor analysis (Jones & Nesselroade, 1990) and other approaches designed for specific types of single-case data (e.g. Campbell & Stanley, 1981; Johannessen & Fosstvedt, 1991; Ottenbacher, 1992; Yarnold, 1988). Most commonly, however, data are subjected to what is known as visual analysis (Barlow et al., 1984; Barlow & Hersen, 1984; Gast & Tawney, 1984; Kazdin, 1992; Ottenbacher, 1992; Parsonson & Baer, 1978, 1986; Wolery & Harris, 1982).

Experimental effects in single-case studies are most often determined by visually examining or analyzing a graph of the individual's data (Kazdin, 1992; Ottenbacher, 1992; Wolery & Harris, 1982). Patterns in the graphically presented data that correspond to experimental manipulations are sought and interpreted. Researchers look for variability, patterns or trends and levels in the data (Wolery & Harris, 1982). Patterns that occur between and within experimental conditions generally can be used to determine whether there is too much variability, whether treatments are working, or whether the instruments are measuring the construct of interest (Wolery & Harris, 1982). This process is a

particularly relevant and important when searching for effects of various treatment phases or experimental conditions (Kazdin, 1992; Wolery & Harris, 1982).

Visual analysis of single-subject research data was traditionally used by researchers who were interested in obtaining large and obvious treatment effects (Kazdin, 1982; and Ottenbacher, 1992). Because of the dissimilarities between this approach and statistical methods used in nomothetic group-design research, the use of visual data analysis has produced controversy among clinicians and researchers. This controversy has commonly been referred to as *clinical versus statistical significance* (Barlow et al., 1984; Meehl, 1954; Ottenbacher, 1992). Although the analysis of data through visual inspection is controversial, it has been argued that, “if the treatment effects are so weak that they cannot be readily detected by visual inspection, they are probably equally weak clinically and, therefore, of questionable practical value” (Ottenbacher, 1992, p.203; see also Parsonson & Baer, 1986). Others argue that graphic presentation of data is sufficient in providing concise and detailed information concerning single-subject performance within and between design phases, the amount of time included in each phase, and the relationship between the independent and dependent variables (Tawney & Gast, 1984). When the certainty of the effects is unclear, statistical methods become useful and in some cases, essential (Kazdin, 1982; Ottenbacher, 1992). As a result of the controversies surrounding this issue, it has been suggested that visual analysis be paired with some form of statistical analysis (Kazdin, 1982; Ottenbacher, 1992).

Guidelines for graphic presentation of data have been suggested by Barlow et al. (1984) which appear to be followed by many single-case researchers. Most of the

published single-case research depicts graphs of data for each client individually, with the time or number of assessment sessions on the abscissa and the unit of measurement on the ordinate. This is a convenient way to record and store the data over the course of time. Interpretation of the patterns is facilitated by this approach as well (Barlow et al., 1984; Parsonson & Baer, 1978, 1986).

Single-case research has been one of the most promising solutions to the search for a methodology that “highlights the individual and, at the same time, maintains the integrity of an empirical and scientific approach to the study of human behaviour” (Barlow et al., 1984, p. 53). Single case designs are tools that “are not only scientifically defensible, they are much more applicable to the clinical environment than are group comparison designs” (Hayes & Leonhard, 1991, p.225). From this perspective, it naturally follows that single-case designs are facilitated by the use of idiographic measures (Barlow et al., 1984).

Psychometric Evaluation of Measures

Regardless of selected measurement orientations, adequate psychometric properties must be ensured (Barlow et al., 1984; Engelsmann, 1982; Green, 1981). The aspects or characteristics of instruments that make them both useful and adequately dependable are referred to as psychometrics. Reliability and validity are among the most commonly studied psychometric attributes of assessment scales (Cone, 1988; Green, 1981; Silva, 1993). Bellack and Hersen (1988) have stated that “reliability and validity are fundamental to any sound assessment approach” (p.614) and that studies of these psychometric constructs are paramount if an instrument is to have any clinical usefulness. Silva (1993) has conducted an extensive review of the literature concerning the need for

the testing of reliability, validity and the clinical usefulness of assessment measures.

Although some authors reject the notion that psychometric standards are useful in single-case research, Silva (1993) has concluded that psychometric assessment, especially the concerns of validity, are essential to sound assessment practices in the behavioral sciences.

Movement toward the integration of psychometric standards has been slow and the psychometric properties of measures are often unknown or inadequately established (Johnson & Bolstad, 1973; Silva, 1993). This is especially true for the concept of test validity which has received much less attention than the time devoted to its counterpart, test reliability (Silva, 1993). The issue of scale validity, which is relevant to this thesis, is discussed in greater detail in the next section.

Determining the Validity of Assessment Measures. It is clear from the preceding that the measurement properties of any new instrument must be tested and documented before it is widely accepted and applied (Bellack & Hersen, 1988; Green, 1981; Meenan, Gertman, Mason & Dunaif, 1982; Silva, 1993). Of particular interest to those concerned with psychometric standards is the assessment of validity. The American Psychological Association (APA) has published a manual entitled Standards for Educational and Psychological Testing, which explains that “validity is the most important consideration in test evaluation” (APA, 1985, p.9). In general, test validity refers to the extent to which an assessment technique measures what it is supposed to measure (Dunham, 1988; Guyatt et al., 1987). The APA (1985) has defined validity as “the appropriateness, meaningfulness and usefulness of the specific inferences made from test scores” (p.9). These inferences constitute the important information that is gathered from the scores on completed tests and assessment

measures. Therefore, when an assessment measure is tested for validity, “the inferences regarding specific uses of a test are validated, not the test itself” (APA, 1985, p.9).

Green (1981) explained that test validity is impossible without test reliability. More specifically, a test must be reliable in order to produce valid measurements although a test need not be valid to be reliable (Engelsmann, 1982). Reliability is a characteristic of a test itself which is either demonstrated or not. For example, a test may have high test-retest reliability, or split-half reliability and this is a feature of the test itself that does not change with the new uses of the test (Green, 1981). Validity is different from reliability in that it is a function of (or relationship between) the test content, the testing context and the test-takers. Validity is an evaluation of the inferences drawn about people from the scores and it is not a “fact” or an evaluation of the test itself (Engelsmann, 1982; Guion, 1977). Validity does not refer to characteristics of the instrument itself, but rather to the understanding of the relationship between the instrument and the information obtained through its use or its general purpose (Anastasi, 1986; Green, 1981; Guion, 1977). Therefore test validity is always specific to some well defined purpose (Engelsmann, 1982; Green, 1981; Guion, 1977).

There are several categories of validity that are often addressed individually (APA, 1985; Cronbach & Meehl, 1955). In general, the three main categories of validity are content, construct, and criterion validity (APA, 1985). Criterion-related validity can best be explained by dividing it into the two sub-categories; predictive and concurrent validity (APA, 1985). Other categories of validity have been commonly used to support the strength of different tests and assessment measures as well. For example, discriminant validity, face validity, ecological and internal/external validity have been frequently mentioned and assessed in order to

determine the usefulness of various rating scales (Beck, Epstein, Brown & Steer, 1988; Dunham, 1988; Gabrys & Peters, 1985; Green, 1981). It is important to recognize that while each category of validity has a specific definition or meaning of its own, each is related to the general definition of validity, and “the use of category labels does not imply that there are distinct types of validity or that a specific validation strategy is best for each specific inference or test use” (APA, 1985, p.9).

Attempts to explain and clarify the concept of test validity lead to the classification of different *types* of validity (Anastasi, 1986). Since the initial classification of validity terms, however, the use of *category* labels for validity concepts has become a controversial issue among researchers and psychometry. Despite explanations that there are not distinct types or categories of validity but merely *aspects* or *components* of validity, some felt that it was essential to test for each type of validity when designing a new test or measure (Anastasi, 1986). This was further complicated by the fact that there has been little agreement on the number and definitions of subtypes of validity or upon the hierarchical conceptualization of validity terms (Anastasi, 1986; Guion, 1977). There is also some disagreement concerning the methods of testing for different aspects of validity (Cone, 1988; Green, 1981; Guion, 1977).

Despite the controversies surrounding psychometric evaluation, there is a tendency to rely upon quantitative measures that have previously been shown to be reliable and valid, such as the Beck Depression Inventory (BDI), the Minnesota Multiphasic Personality Inventory (MMPI), or the Symptom Check List (SCL-90) (Fauman, 1990; Gabrys & Peters, 1985). Although the use of psychometrically sound instruments is desirable, research has indicated that there is often little validation of either process or

outcome measures (Corcoran & Fischer, 1987; Fauman, 1990, Johnson & Bolstad, 1973; Silva, 1993). This limits the number of choices available for psychometrically sound, adequate measures for research and practice. Psychometric evaluation of measures is therefore an essential activity that can increase the effectiveness and usefulness of quantitative measurement methodologies in psychology, psychiatry and the social sciences (Anastasi, 1986; Engelsmann, 1982; Silva, 1993).

Although there is a strong following of psychometric tradition, there is also an argument against the need for test validation in certain circumstances. Guion (1977) supports the validation processes used for test scores and hypotheses but explained that there is not always a need for test validation. Guion stated that validity “is requiring in varying amounts for different problems. For some tests one needs a big complex network of research evidence. For others, the value of the measure is apparent to any reasonable person, and the concepts of validity and validation are at most required only in a vague, metaphorical sort of way” (1977, p.410-411). Cone (1988) has argued that in single-subject psychometrics there is no need for test validation beyond examining face validity of the measure. Others have addressed the issue by asserting that the technical terms used in validation processes should be replaced with more straightforward terms, concepts and phrases such as devising studies to determine if a measure fulfills a certain purpose (Anastasi, 1986; Green, 1981; Guion, 1977; Williams & Naylor, 1992).

In summary, there is a growing consensus among both researchers and practitioners that adequate psychometric properties of quantitative measures must be ensured (Barlow et al., 1984, Bellack & Hersen, 1988; Silva, 1993). This means there is a

need for assessing reliability, validity and other psychometric properties of instruments that may be considered useful tools for clinical research and practice. Previously, it has been suggested that the use of valid and reliable problem-specific and idiographic measurement methodology can help to resolve measurement problems (Barlow et al., 1984; Bond et al., 1979; Malan, 1973; Rickard, 1965). As a result, many psychologists aim to develop rigorous and objective idiographic measures designed to assess and monitor interventions and treatment outcome (Schyve & Prevost, 1990; Mirin & Namerow, 1991).

Determining The Validity of Discretized Analog Scaling. The psychometric evaluation of Discan is central to this thesis. Discan is a measurement tool that has been shown to be precise, reliable and clinically useful for obtaining quantitative measures over the course of therapy (Singh & Bilsbury, 1989a). There is some preliminary evidence for the validity of Discan, however, its concurrent and discriminant validity has not been tested specifically in a rigorous way. The purpose of the present thesis is to examine the extent to which Discan can be used as a valid assessment tool for measuring the constructs of anxiety and impulsivity. The design and hypotheses for examining the validity of Discan measures in the present study are described following a detailed description of Discan.

Discretized Analog Scaling

Discretized analog scaling (abbreviated Discan) is an idiographic measurement tool that was designed specifically to monitor change in one or more clinical target problems or experiential states over the course of time (Singh & Bilsbury, 1989a). Discan methodology

is capable of measuring an individual's unique, subjectively experienced dysfunctions, which makes it particularly responsive to small but important details of one's problems and concerns (Singh & Bilsbury, 1989a). Discan measures variables that are directly relevant to the concerns of the individual which helps to make this assessment methodology particularly useful in single case methodologies (Liddell et al., 1987; Singh & Bilsbury, 1989a).

Discan has been described as a method for obtaining precise quantitative measures of variables whose possible values form a continuum (Singh & Bilsbury, 1989). This is especially true for problems or dysfunctions that "are not stable but are transient, in the sense that their intensities are expected to change over the course of time" (Singh & Bilsbury, 1989b, p.27). In this way, the scores obtained from Discan scales can be used to show changes or fluctuations during the therapy process and can also indicate therapeutic change or the outcome of treatments or therapies.

Discan theory and methodology originate in Shapiro's Personal Questionnaire technique (1961), a systematic interview-based means of assessing and quantifying self-reported dysfunctions that are expressed in the patient's natural language (Singh & Bilsbury, 1989a). Like Shapiro's Personal Questionnaire (PQ), Discan was developed as an assessment system to measure and monitor the ever-changing effects of therapies on defined subjectively experienced problems over the course of time. Discan, however, was formulated to measure problems in a more simple and reliable fashion (Singh & Bilsbury, 1982). Discan sought to improve upon techniques designed by Shapiro (1961) by increasing the sensitivity, precision and reliability coefficients of the measurement scale

while decreasing the level of difficulty and length of time required to complete the scale (Singh & Bilsbury, 1982, 1989a). The results of these improvements can be recognized by the degree of simplicity, precision and reliability with which Discan has been administered (Liddell et al., 1987; Ning & Liddell, 1991; Singh & Bilsbury, 1989a, 1989b). Bilsbury & Richman (in press) reviewed the ways in which Discan has improved upon Shapiro's PQ techniques.

Discan is unlike most scales, questionnaires and other measures used today in that it was not designed to measure any specific constructs in particular. Discan is not a preconstructed set of questions. Rather, Discan is a framework within which clinical problems and other constructs of interest are defined, delineated, quantified and evaluated (Bilsbury & Richman, in press). In this way, Discan can be compared with the numerical Likert and analog scales commonly used today (Singh & Bilsbury, 1989a). Like the analog scale, Discan employs a graphical feature to quantify variables of interest.

Likert scales, which are ordinal scales, assume that a variable to be measured has different intensities which are represented by equidistant "anchors" that fall along the continuum line. Analog scales, which are interval scales, also assume that the variable to be measured has different intensities which can be represented by a point somewhere along a continuum line, except that there are only minimum and maximum anchors which act as end-points along the line. The line in between the two end-points of the analog scale represents a finite number of points at which the variable in question may fall. The format of the Discan scale differs from the Likert and analog scales, however, in that Discan assumes that the continuum upon which variables are to be measured is neither partitioned

by several predetermined anchor points nor is it best represented by a finite number of points at which the client's level of dysfunction may fall. Instead, the Discan scale is best described as a linear continuum which is partitioned into a finite number of ordered categories also called class intervals (Singh & Bilsbury, 1989a). The difference between the Likert and the Discan scale is that the Discan intervals are not equally spaced along the continuum line which makes the scale "Discretized Analog". The uneven spacing of the intervals on the Discan scale occurs because the real or true spacing between different intensities of a given client's problem is generally unknown (Singh & Bilsbury, 1989b). When an individual's problem is broken into levels of severity for a Discan scale, only the ordering or sequence of the levels of severity is known. The true numerical or quantitative distance between each level is not necessarily equal, nor is it quantifiable. In this way, Discan scale is a "*self-anchored*" ordinal type scale (Singh & Bilsbury, 1989a).

Discan Scale Components

Discan scales consist of three separate components. Two of these are used to define or operationalize the subjective variable that is to be measured. These are called *reference levels* and *lead-in statements*. The third Discan component is a mathematical scaling device (an algorithm) which is used to quantify the client's responses. This quantitative information is summarized upon a graphical device called the *Discan scoring form* (Singh & Bilsbury, 1989a).

Reference levels. Reference levels, sometimes called *qualitative stage levels*, are descriptive cues used to describe the different levels of a variable (such as a target problem or experiential state) that is to be measured (Singh & Bilsbury, 1989a). These reference

levels may be thought of as “anchor points” which describe the levels of severity of a variable that are placed along the underlying continuum in conventional rating scales. The difference between Discan reference levels and conventional “anchor points” is that reference levels are not assigned numerical values or magnitudes. Reference levels are simply rank ordered in increasing intensity or severity and each reference level is distinct from the next.

Reference levels break a variable of interest down into several levels or *intensities* of severity. For example, an individual’s concern may involve the inability to cope with anxiety. For practical or clinical reasons, this target variable, the inability to cope with anxiety, can be the construct that is chosen to be measured quantitatively. In order to design reference levels for this construct, different levels or intensities of the problem must be described in the client’s own words or natural language. A series of three, four or five levels of this problem may be constructed and each one is recorded separately upon a blank index card. Each of these levels should be a concise “summary statement” of the different levels of severity of the problem or construct that is to be measured. These summary statements should range in order of severity from minimum intensity (eg. goal state or problem remission) to maximum intensity or severity. The validity and quality of measurement with Discan depends heavily upon the choice of reference levels (Singh & Bilsbury, 1989a). Guidelines have been set for designing these reference levels in a way that will optimize their validity, reliability and usefulness (Bilsbury & Richman, in press).

There are different types of Discan measures based upon the number of reference levels that are constructed for a problem. The most common Discan measures are the

3/10 form and the 4/14 form, with three and four reference levels respectively. In order to increase the optimality of a Discan scale, it should have three or four of these reference levels. Discan 4/14 has the highest level of optimality because it creates the greatest number of scale points (14) per number of reference levels (4). Using Discan 4/14 increases the reliability coefficients of the measure as well (Singh & Bilsbury, 1989a). Discan reliability has been elaborated upon in sections below.

Several Discan scales may be constructed for one individual using separate sets of reference levels. These multiple Discan scales should each deal with problems or aspects of a problem that are separate and distinct from one another so as not to complicate the measurement process.

Lead-in statements. Lead-in statements are simple phrases which are used to introduce the subjective variable or construct that is to be measured. A lead-in statement is used to place the reference levels in a specific context. A possible lead-in statement might be "Over the last week I have been feeling:". The lead-in statement can refer to specific time frames (eg. past, present and future), and/or situational contexts (eg. at home, on a bus, with my friends). Several different lead-in statements can be used in conjunction with a single set of reference levels to orient a client to the several specific contexts in which a problem variable occurs (Bilsbury & Richman, in press; Singh & Bilsbury, 1989a).

Discan scoring forms. The device upon which a quantitative score is obtainable is called the Discan scoring form. Unlike many self-rating scales, the scoring form must be used by the Discan administrator, not the individual being assessed. The scoring form has

three different functions: firstly, it is used to help in the administration of the Discan scale.

It does this by delineating the steps to determine which reference levels should be compared with other reference levels. Secondly, as its name implies, the scoring form is useful for obtaining a quantitative score for the variable that is being measured. A single score is obtained for each individual problem for a single administration. Thirdly, the scoring form is designed so that a consistency (reliability) check is possible within a single evaluation. This increases the reliability and validity of the scale (Singh & Bilsbury, 1989a).

There are two different Discan scoring forms most commonly used, one designed for use with four reference levels and another designed for use with three reference levels. The form which accomodates four reference levels is called the Discan 4/14 form (Appendix B), so called because it yields fourteen numerical values (or scale points) from the use of four reference levels. The scoring form which accomodates three reference levels is called the Discan 3/10 form. This is because from the three reference levels used, it is possible to obtain ten scale points. The scale points on the scoring form are denoted alphabetically as opposed to numerically because each "scale point" truly represents a class interval whose actual numerical value is not fixed. This is because, as explained earlier, the relative spacing of the reference levels is unknown (Singh & Bilsbury, 1989a, 1989b). The use of these scoring forms and the comparison method by which scores are obtained is described in greater detail in Appendix A.

The Discan Scaling Process

Discan methodology consists of a few simple steps which have been described in detail in Singh & Bilsbury (1898a; and 1989b) and are summarized briefly here. The first step involves the selection of topics or constructs for assessment such as target problems or foci of therapeutic attention (Bilsbury & Richman, in press; Singh & Bilsbury, 1989a). Individual problems that are relevant to therapy are selected within the flow of the clinical process and a Discan scale is constructed for each. The second step involves the idiographic scale construction which is also a process that is conducted in partnership with the client so that ultimately all of the scale components (ie. the topics, the reference levels and the lead-in statements) have been negotiated and agreed upon by both the therapist and the client (Singh & Bilsbury, 1989a). The next steps involve scale administration and the recording of client responses upon the Discan scoring form. These final steps are aided by the use of the Discan scoring form, which is used to assign a single numerical score for each of the problems measured. The steps in administering a Discan scale are described in greater detail in Appendix A.

Discan Scores (Data)

Discan is an idiographic scale and as such, Discan scores are not compared to normative data. Because of this, data generated by a single administration of a Discan scale is relatively meaningless on its own. When scores are repeatedly collected they can become clinically meaningful by examining changes or fluctuations over the course of time or therapy. For this reason, Discan should be administered repeatedly over the course of time, preferrably at every therapy session. This repeated administration will produce a

series of scores that can be plotted and represent a profile of change for an individual's problem or set of problems (Singh & Bilsbury, 1989a).

There are no "cut-off" scores for problems measured by Discan. Scores on Discan scales range from a value of 1 (which is the lowest possible score on any Discan scale and indicates problem remission) to a high score of 10 (which indicates maximum problem severity on the Discan 3/10 scale) or a high score of 14 (which indicates maximum problem severity on the Discan 4/14 scale). An individual's scores on any one of his/her Discan scales may fluctuate between the high score and the low score over the course of time. The plot of these scores over time will indicate the pattern of change or stability of the construct or variable that was measured. Change may be interpreted from a subjective, clinical stance. The significance attributed to any change between two or more consecutive Discan scores is subjective. It cannot be said, for example, that a difference of any particular amount of scores between assessment sessions is statistically significant or not. The differences between scores can only be interpreted in the context of the clinical implications that provide the basis for Discan assessment. There are no norms with which to make judgements about data generated by Discan assessment. Statistical time-series analysis techniques may also be employed (Singh & Bilsbury, 1989a).

Several Discan scales may be constructed for one individual using separate sets of reference levels and so scores that are generated from separate Discan scales should be stored or recorded separately so as to provide clear and distinct profiles of change over time. The number of separate score profiles is only limited by time constraints and practicality (Singh & Bilsbury, 1989a).

Psychometric Properties of Discan

Discan has various psychometrically relevant features which are summarized briefly below and have been outlined in greater detail in Bilsbury & Richman, (in press) and in Singh & Bilsbury (1982, 1989a).

Discan Reliability. The notion of *optimal measurement* is introduced in Singh & Bilsbury (1989a) via the concepts of Type I and Type II measurement error. It is possible to minimize the Type I error (α) by increasing the number of reference levels used and/or increasing the number of response opportunities. This would result in making finer partitions along the underlying continuum. The danger in doing this is increasing the complexity of the task which raises the Type II error (β). The methods for minimizing Type II error for a fixed Type I error are described in Singh & Bilsbury (1989a). Thus Discan scales have a reasonable degree of “fineness” and accuracy, yet do not contain an overwhelming number of response intervals. This contributes to the responsiveness of Discan scales.

Discan has been shown to have good internal consistency. The internal consistency of Discan can be evaluated at the time of administration using the Discan scoring form. Discan administrations require that respondents provide choices between two different reference levels at time, a process referred to as “dichotomous comparisons” (Singh & Bilsbury, 1989a). Some of these comparisons allow for overlapping information. When overlapping information is responded to in an inconsistent, haphazard, careless or random fashion, it becomes visibly apparent as the responses are recorded on the Discan scoring form. In this way, an internal consistency check may be made in a

single evaluation. The likelihood of detecting this type of error increases as the number of comparisons, which serve as consistency checks, are increased (Singh & Bilsbury, 1989a, b).

Discan Validity. Bilsbury and Richman (in press) suggest that the validity of idiographic measures, especially Discan scales, can be sought in different ways than is typically employed for nomothetic measures. Cone (1988) suggests that when idiographic methodologies are used, “content and face validity are essentially synonymous” (p.58), that “content validity and criterion validity are quite closely related” (p.61) and that “discriminant validity ... is not relevant...” (p.61). Bilsbury and Richman (in press) suggest that the term *consensual validity* be used to describe the type of validity that ought to be considered when using Discan assessment. By definition, consensual validity has been met if “both practitioner and patient agree that these qualitative stage levels [or reference levels] are indeed the foci of therapeutic attention, and both patient and practitioner agree on these levels of severity” (Bilsbury & Richman, in press, p.109). For this reason, the validity of measurement with Discan scales is at least partly dependent upon the selection of the reference levels. Certain criteria must be met in order to create a valid Discan scale. The underlying continuum must refer to a single construct under consideration; the reference levels must be distinct from one another and well ordered in terms of severity; the scale must be administered correctly and in a clear fashion and to ensure validity there must be a reasonable level of reliability in the administration of the scale (Bilsbury & Richman, in press; Singh & Bilsbury, 1989a). These concepts are addressed in greater detail in the Discussion section of this thesis.

Preliminary evidence for Discan validity has been demonstrated repeatedly by authors who have used Discan satisfactorially (Liddell et al., 1987; Ning & Liddell, 1991; Singh & Bilsbury, 1989a). This evidence is discussed in the next section.

Preliminary Evidence for Discan Validity

Extensive clinical practice and several research studies have provided some evidence for face validity of Discan measures. Discan has been beneficially employed in single-case designs as well as in group design studies to assess clinical change and treatment outcome (Bilsbury & Richman, in press; Liddell et al., 1987; Ning & Liddell, 1991; Singh & Bilsbury, 1989a). Singh & Bilsbury (1989a, 1989b) have reported over six years of employing Discan scales in the psychological assessment and monitoring of a diverse group of patients. Discan has also been demonstrated to be a useful tool for measuring clients' progress in a relaxation technique (Bilsbury, 1988; Singh & Bilsbury, 1989b). Previous usages of the Discan method suggest that it may be used validly, however, there are limitations in this research; further examination of Discan validity is required..

Liddell et al. (1987) used Discan measures for measuring and monitoring changing subjective states during the course of therapy. Using a single-case design, they measured behavioral, cognitive and somatic experience of anxiety in an agoraphobic client. Discan measures were sensitive to clinical changes and to desynchrony between different types of anxiety. Discan methodology was also reported to be a "good strategy for evaluating" behavioral, cognitive and somatic anxiety responses over the course of treatment and at follow up as well (Liddell et al., 1987, p.427). The results of this study are limited,

however, because Discan was the sole method of evaluation and there were no comparison measures used in the assessment of anxiety. This is compounded by the fact that there was only one single-case design conducted without replication studies to provide additional support. Furthermore, the three Discan scales used in this study measured three modes of anxiety concurrently which may possibly suggest that the three scales were measuring the same construct. On the basis of these limitations in this study, Liddell et al. do not provide conclusive evidence for the convergent or discriminant validity of Discan measures. Despite these drawbacks, face validity for the Discan anxiety scales is strongly suggested in Liddell et al.

Ning and Liddell (1991) conducted a study designed to replicate some of the findings of Liddell et al. (1987) and to address some of the limitations in Liddell et al. Ning and Liddell used a group design as opposed to a single-case design, and a combination of objective and subjective measures to monitor and measure the effects of treatment on individuals with dental anxiety. Three self-rating instruments were used to assess subjective anxiety, a dental anxiety scale, a general anxiety scale and a set of 15 Discan scales as well. A single set of Discan scales were pre-designed for the entire group of 12 clients (they all used the same set of a priori determined reference levels) to measure three aspects of perceived dental anxiety including behavioral, cognitive and physiological anxiety. These three types of anxiety were assessed in five different imagined dental situations, using five separate situation-specific lead-in statements. This created 15 separate Discan scales that were administered to each of the clients in a random order on seven different occasions; before treatment, after each of four treatment sessions, one

week after attending a dentist appointment and at a six-month follow up (Ning & Liddell, 1991). The dental anxiety scale was administered before therapy, at the end of the last therapy session, immediately following dental treatment, one week following dental treatment and at a six-month follow-up. The general anxiety scale was administered at the start of the therapy program, after the program, and at a six-month follow-up. Treatment outcome was measured by means of two objective measures as well. Making a dental appointment half way through the therapy was the first measure and actual attendance of that appointment was the second objective measure (Ning & Liddell, 1991).

Discan was found to be a useful tool for assessing the variables of interest in this study in that it showed how each of the aspects of dental anxiety changed over the course of time. Individual scores were not reported and their relationship to the dental anxiety measure and the general anxiety measure was not clearly described. Although some aspects of anxiety (ie. cognitive and physiological) as measured by Discan did not decrease over the course of time, the behavioural aspect of anxiety did decrease and the subjects all followed through with making a dental appointment and attending it for treatment. Therefore, the Discan scale measuring behavioural anxiety may have been useful in assessing anxiety. Furthermore, the way in which Discan scales break down “complex” problems, such as anxiety, into smaller problems was suggested to be therapeutically useful (Ning & Liddell, 1991). For example, separating “dental anxiety” into behavioral, cognitive and physiological anxiety components was reported to have helped clients to increase their awareness of the different components of their anxiety, which may have helped them to re-establish control over their feelings that were previously overwhelming.

This may have made the residual perception of anxiety more tolerable (Ning & Liddell, 1991).

Similarly to Liddell et al., (1987) research conducted by Ning and Liddell (1991) provides some evidence for the face validity of Discan anxiety scales. However, there were some limitations of this research study. One of the major limitations of this study concerns the validity of the Discan anxiety scales used in the study. Several Discan scales were used to assess anxiety over the course of time without comparing the scores to another measure of anxiety to provide some index of validity. There were no correlations drawn between the Discan anxiety measures and the other subjective measures in the study. No individual accounts of the relationships between the scales was reported. Because of this, the Discan scales in Ning and Liddell cannot be said with certainty to measure what they claimed to measure and there is therefore a lack of convergent and discriminant validity of these Discan scales. Another drawback in the study is that the Discan scales were all pre-constructed and this removes an important idiographic component of the scales from the process. This may have had a negative impact on the results because a Discan scale that is not idiographically constructed cannot, by definition, be as responsive to the experience of the individual who is undergoing assessment. Despite these research limitations, Ning and Liddell have provided some compelling preliminary evidence to suggest that Discan is sensitive to changes in different aspects of anxiety. Their results also provide further support for the notion that Discan is a user-friendly instrument that can be applied with relative ease in clinical and research settings.

The studies described above using Discan clearly demonstrate that Discan can be used effectively to assess various subjective variables such as anxiety. These studies strongly support the face validity for Discan anxiety scales, however, they provide minimal evidence of convergent and discriminant validity for Discan anxiety scales. Discan validity was not explicitly examined or reported by the authors of the preceding studies, but the fact that face validity for Discan was demonstrated suggests the need for further validation of Discan.

The Present Study

In order to examine the validity of Discan, the present study compared Discan measures with several scales of known reliability and validity. In order to assess both convergent and discriminant validity of Discan, it was necessary to use two separate types of Discan measures in the present study. These included idiographically designed Discan anxiety measures and pre-constructed (or a priori designed) Discan impulsivity measures. These two types of Discan measures were compared with two corresponding nomothetic scales that have established reliability and validity. More specifically, Discan-anxiety measures and Discan-impulsivity measures were used for comparison with both the State-Trait Anxiety Inventory, State subscale (STAI-S) and the Basic Personality Inventory - Impulse Expression subscale (BPI-ImE). In order to explain the bases for the hypotheses of the present study, each of these four measures are described briefly in the next section. Following the description of the measures, the hypotheses and expected correlations among these measures are described.

Comparison Measures

In order to examine the convergent and discriminant validity of Discan measures it was necessary to use comparison measures. These measures were carefully chosen based upon study design requirements. For example, in order to assess the anxiety and impulsivity constructs measured by Discan, nomothetic anxiety and impulsivity comparison scales were chosen. Because the design of the present study was such that repeated assessments were necessary, the brevity and user-friendliness of the comparison measures was essential. Finally, in order to make assertions about the validity of Discan measures, the psychometric properties of the comparison measures were carefully considered.

In order to examine the validity of Discan methodology, the psychological construct anxiety was selected for measurement. Anxiety was selected as the primary construct for assessment due to the availability of both clinical and student populations who were experiencing problems associated with anxiety. The availability of psychometrically sound anxiety assessment instruments, such as the STAI-S, was another reason for the selection of anxiety as the main assessment construct. The efficacy of anxiety therapies was not a concern in the present study.

In order to examine the concurrent validity of Discan anxiety measures and the discriminant validity of Discan impulsivity measures, the State-Trait Anxiety Inventory (STAI) was selected as a comparison measure. The STAI has two subscales, the state form (S) and the trait form (T). The STAI-S form measures signs and symptoms of anxiety that are transient and fluctuate over time and was thus well suited as a comparison

measure with Discan anxiety, which also measures transient and ever changing states (Singh & Bilsbury, 1989a; Spielberger, 1983). The Discan measures and the STAI were used with permission by the publisher, refer to Appendix R.

Under experimental conditions, subjects provided higher ratings on STAI-State anxiety when exposed to stressful conditions and rated lower under normal, low-stress conditions. Under the same experimental conditions, subjects scores on STAI-Trait anxiety were relatively stable (Spielberger, 1983). Further research has demonstrated that the STAI-S has relatively low test-retest correlations, which range from .16 to .63, with a median of .33. These low stability coefficients are expected with the STAI-S scale because a valid measure of state anxiety should fluctuate over time and reflect the influence of unique situational factors that occur at the time of testing. Alpha reliability coefficients for the STAI-S scale were high, ranging from .90 to .94, which indicates good internal consistency (Spielberger, 1983).

The STAI has shown evidence for construct, concurrent, convergent and discriminant validity. STAI scores correlate strongly with scales that measure similar constructs and have low correlations with scales that measure unrelated constructs. Another suitable feature of the STAI-S is that it is a brief user friendly measure with 20-items that can be endorsed with one of four response options per item (Spielberger, 1983). This aspect of the STAI-S lends itself well to repeated measures designs, such as the design used in the present study.

Although the instructions for completing the STAI-S suggest that the respondents consider how they feel “right now, at this moment”, Spielberger (1983) has indicated that

the directions may be modified to change the time interval of interest to the experimenter.

As a result of this, the instructions for completing the STAI-S in the present study were modified. Participants in the present study were asked to consider either how they were feeling “over the last day (or so)” or “over the last week”, depending upon which context was easiest for the participant. In this way, it was possible to assess changes in anxiety over the same time frame on both the STAI-S and Discan anxiety measures for each individual participant.

There has been extensive research conducted using the STAI to assess a wide range of clinical and research populations. The STAI has been reported useful for assessing state and trait anxiety associated with a number of clinical disorders and illnesses (Spielberger, 1983). The broad applicability of the STAI makes it a useful comparison measure for studies wishing to examine the validity of new measures, such as Discan. It is for this purpose that the STAI-S was selected as a comparison measure for the present study.

In order to examine the concurrent validity of Discan impulsivity measures and the discriminant validity of Discan anxiety measures, the Basic Personality Inventory - Impulse Expression scale (BPI-ImE) was selected as a second comparison measure. The BPI-ImE was used with permission from the publisher (Appendix R). The BPI is a 240-item true and false type questionnaire designed to measure personality and psychopathology (Jackson, 1989). The BPI has a 20-item Impulse Expression (ImE) scale which, as mentioned previously, is designed to assess impulsivity concepts such as temper and level-headedness; the tendency and/or ability to think beyond the present to consider future

consequences before acting; the degree of responsibility taken for one's actions; risk-taking and degree of recklessness; and the ability to cope with routine, lengthy and tedious tasks (Jackson, 1989). When separated from the 240 item BPI, the Impulse Expression subscale is a brief user friendly measure with 20 true and false items that lends itself well to repeated measures designs, such as the design used in the present study.

The BPI-ImE scale has low correlations with anxiety related concepts. The correlations between the BPI-ImE and STAI State and Trait anxiety were .32 and .43 respectively. The BPI-ImE scale also correlates poorly with the Anxiety scale on the Millon Clinical Multiaxial Inventory (MCMI) scale at .19 (Jackson, 1989). These low correlations indicate that the BPI-ImE scale is not likely to measure aspects of affect or behaviour that are related to the constructs measured by anxiety scales. This makes the BPI-ImE scale an ideal tool for measuring discriminant validity of Discan anxiety scales.

Test-retest reliability of the BPI-ImE was examined in two separate studies with correlations between the initial testing and a one-month follow-up test of .78. This indicated high stability for the BPI-ImE scale over the course of time which provides support for the measure as assessing a personality construct. It was therefore not expected that the scores on the BPI-ImE would fluctuate notably over the course of time. Despite this, there is reason to suspect that some personality measures may be subject, in certain circumstances, to fluctuation over the course of time. Costa and McCrae (1983) explained that under certain circumstances, aspects of one's personality are subject to change, and that this is especially detectable on an individual basis. Further research in

this area should be conducted before it can be assumed that specific personality constructs do not vary over the course of time (Costa & McCrae, 1983).

The BPI-ImE was designed to assess a construct that is most always regarded as a personality characteristic and which is usually stable over the course of time. Despite this, it was attempted to increase the degree of fluctuation in BPI-ImE scores. This was done by manipulating the context within which the respondents perceived the impulsivity construct. More specifically, the instructions for completing the BPI suggest that respondents should carefully consider whether each statement is self-descriptive or not (Jackson, 1989). These instructions do not specify that the respondent should consider the items within a certain time frame or context. There is no reference made in Jackson (1989) to indicate that the instructions of the scale may be modified to examine the constructs in a different context or time frame. Despite this, the instructions for completion of the BPI-ImE were modified for the purposes of the present study. The respondents in the present study were asked to consider only how they were feeling “over the last week” or “over the last day (or so)” when completing the BPI-ImE. This modification in the instructions required the respondents to think about their behaviours in a short-term time frame such as “over the last week”. This may have altered the stability of the content of the BPI-ImE, making the instrument more sensitive to changes or fluctuations in a concept that might be otherwise perceived as relatively stable. This was done to encourage participants to think about subtle changes in the impulsivity or spontaneity of their behaviours, which in turn may encourage more fluctuation of scores on the BPI-ImE. The reasoning behind this manipulation was to create a measure of

impulsivity that would produce some degree of fluctuation or change over time. Because correlational analyses were fundamental to conclusions drawn about the data in the present study, this fluctuation in the scores was considered an important aspect of examining the validity of Discan measures.

Other aspects of the psychometrics of the BPI-ImE suggest that it is a psychometrically sound instrument. Several studies have shown that alpha reliability coefficients for the BPI-ImE scale were high, ranging from .77 to .86, which indicates good internal consistency, especially for clinical samples because of increased variance (Jackson, 1989). Numerous research studies have suggested that the BPI-ImE has shown evidence for construct, convergent and discriminant validity. BPI scores showed significant association with scales that measured related constructs and relative independence with scales that were less conceptually related (Jackson, 1989). These features of the BPI-ImE make it a useful comparison measure with which to assess the validity of other measures, such as Discan. It is for this purpose that the BPI-ImE was selected as a comparison measure for the present study.

Discan Measures

A single Discan anxiety measure was constructed for each individual participant in the present study (Appendix C). Two important features of these Discan anxiety measures were that they were designed to assess state-related anxiety and that they were idiographically designed. It was important that these Discan anxiety measures would assess state anxiety because it was essential to assess a construct that would show fluctuations or change in the scores over the course of measurement. In order to conduct

correlations between measures, increased variability among measures was sought. Discan anxiety measures were also being compared to the STAI-S which is also a measure of state anxiety and in order to examine the convergent validity of Discan anxiety scales, it was necessary to make an attempt to have Discan anxiety scales measure a similar construct as its comparison measure.

It was considered to be important that the Discan anxiety measures were idiographically designed. One of the distinguishing features of Discan methodology is that it is able to assess variables that are relevant to the uniquely experienced states of the individual (Singh & Bilsbury, 1989a). Discan scales that are idiographically constructed are more sensitive to the issues, concerns and idiosyncracies of the individual for whom the measure was constructed. Therefore, as a result of this increased sensitivity, idiographically constructed Discan scales are more likely to be responsive to changes over the course of time (Bilsbury & Richman, in press; Singh & Bilsbury, 1989a). The Discan anxiety measures in the present study were designed idiographically for each individual participant in order to preserve this important aspect of the instrument.

In order to examine the discriminant validity of Discan scales, impulsivity was selected as a construct for assessment. Impulsivity was selected primarily because it has been demonstrated to be unrelated to anxiety-type issues. Impulsivity measures, (such as the BPI-ImE as described below), show low, non-significant correlations with anxiety measures (Jackson, 1989). The availability of a user friendly and psychometrically sound instrument designed to measure impulsivity, the BPI-ImE, was another reason for the

selection of impulsivity for assessment in the present study. As a result of this a Discan impulsivity measure (Appendix D) was constructed.

There were two reasons for the construction of a Discan impulsivity measure. First, scores on Discan impulsivity were compared with scores upon the nomothetic impulsivity measure, BPI-ImE. This was done so as to provide an additional means for assessing the concurrent validity of Discan scales. Secondly, by examining whether or not Discan impulsivity scales correlated with either of the anxiety measures used in this study, it was possible to examine the discriminant validity of Discan measures.

The Discan impulsivity measure used in the present study was not idiographically designed. Rather, it was pre-designed so that each of the participants received the same set of Discan impulsivity reference levels. The Discan impulsivity measure was pre-designed for two reasons. First, it was not necessarily expected that the participants in this study would feel that impulsivity was a relevant aspect of their lives or experiences. Therefore, it might have been difficult to design an idiographic Discan impulsivity measure for some or many of the participants. Secondly, the Discan impulsivity measure was pre-designed so that it would contain ideas or constructs similar to those found in the BPI-ImE scale. The issues addressed within the impulsivity construct as assessed by the BPI might be vastly different from those concepts that could be addressed as a part of the construction of an idiographic Discan impulsivity scale. It was attempted to avoid this possibility because in the present study Discan impulsivity measures were compared with the BPI-ImE as a means of assessing concurrent validity. As a result, it was attempted to

construct a Discan impulsivity measure with content that was as similar as possible to the content of the BPI-ImE.

Concepts addressed in the pre-designed Discan impulsivity measure were similar to those addressed in the comparison impulsivity measure, the BPI-ImE. Using each of the items described in Jackson (1989) a set of four Discan reference levels were designed to assess the varying degrees of impulsive and spontaneous behaviour that were inherent in the BPI-ImE scale. For example, Discan impulsivity levels were designed to address increasing amounts of behaviour that included temper and level-headedness; the tendency and/or ability to think beyond the present in order to consider the consequences of action; the proneness to undertake risky or reckless behaviour; the inclination to behave irresponsibly; and the degree to which one is able to cope with lengthy and tedious tasks without becoming bored (Jackson, 1989). High scorers on the Discan impulsivity as well as the BPI-ImE scale will be characterized by a more impulsive hot-tempered and reckless type of personality. Low scorers will be more level-headed, patient and able to concentrate on tedious tasks (Jackson, 1989).

The Discan impulsivity measure was designed to assess a construct that is generally regarded as a personality characteristic and which should be relatively stable over the course of time. Despite this, it was attempted to make the Discan impulsivity measure more similar to state-type measures, such as Discan anxiety measures. Discan impulsivity reference levels were introduced in the context of a lead-in statement that required the participants to think about their behaviours “over the last week”. This may have altered the stability of the content of the Discan impulsivity measure, making the

instrument more sensitive to changes or fluctuations in a concept that might otherwise be perceived as relatively stable. This was done to encourage participants to think about subtle changes in the impulsivity or spontaneity of their behaviours, which in turn, may have encouraged more fluctuation of scores on the Discan impulsivity measures. The reasoning behind this manipulation was to create a measure of impulsivity that would produce some degree of fluctuation or change over time. Because correlational analyses were fundamental to conclusions about the data, this fluctuation in the scores was considered an important aspect of examining the validity of the Discan scales used in the present study.

It is clear from the preceding that there were two fundamental differences between Discan impulsivity measures and Discan anxiety measures in the present study. The Discan anxiety measures were idiographically designed to assess a state-type construct. The Discan impulsivity measures were not idiographically designed and measured a trait-related construct. Because of these two differences between the Discan measures, it was expected that the correlations between measures including Discan anxiety would be dissimilar to those correlations between measures including Discan impulsivity. The expected correlational differences between the two Discan measures and the comparison measures are outlined in the hypotheses below. Both Discan measures used in this study are described further in the Method section of this thesis.

Design and Hypotheses

Test validity, as reviewed earlier, may be thought of in terms of understanding what it is that a particular test measures or “the extent to which the variance in a set of

scores is relevant to the purposes of testing” (Guion, 1977, p.408). Any source of empirical information obtained in the same context and at the same time as the test is used for measurement can serve as a source of validity information (Anastasi, 1986). There is no one standard method for testing for the validity of a measure for a given purpose. Validity assessments vary based upon the type of measure and the purpose for which the measure is being used (Anastasi, 1986; Green, 1981; Guion, 1977). In general, however, to demonstrate whether a scale is validly measuring what it has alleged to measure, and not something else, there must be a significant correlational relationship between two (or more) measures that purport to measure the same (or similar) construct (Green, 1981; Silva, 1993).

In the present study, there were two aspects of validity that were addressed to examine the validity for Discan measures of anxiety and impulsivity in the current context. By examining correlational relationships between participants’ scores on Discan anxiety measures, Discan impulsivity measures, the STAI-S and the BPI-ImE it was possible to examine these aspects of test validity for both Discan scales. The first of these two aspects of the validity that were examined was concurrent validity, a subcategory of criterion-related validity. This was examined by comparing measures that purport to measure the same construct. The second aspect of validity that was examined was discriminant validity which was determined by examining the correlational relationships between measures that purport to measure distinct and separate constructs.

Concurrent validity was examined by correlating scores on anxiety measures with scores on impulsivity measures. Specifically, scores on Discan anxiety measures were

correlated with scores on the STAI-S scale and scores on the Discan impulsivity measure were correlated with scores on the BPI-ImE scale. Discriminant validity was examined by correlating scores on anxiety measures with scores on impulsivity measures. Specifically, scores on Discan anxiety measures were correlated with scores on the BPI-ImE and scores on the Discan impulsivity measure were correlated with scores on the STAI-S scale. Additionally, scores on Discan anxiety measures were compared with scores on the Discan impulsivity measure. The correlations between all possible pairs of these four scales produced five sets of correlations from which to examine the discriminant and concurrent validity of Discan anxiety and Discan impulsivity scales. Table 1 demonstrates the design for the correlations as well as the expected relationships between these four measures.

Table 1

Expected Correlational Relationships Among Scales

Scale:	Measures of Anxiety:		Measures of Impulsivity:	
	(1) Discan Anxiety	(2) State-Trait Anxiety Inventory	(3) Discan Impulsivity	(4) BPI Impulse Expression
2.	Strong correlation	---	---	---
3.	Low or no correlation	Low or no correlation	---	---
4.	Low or no correlation	Low or no correlation	Strong correlation	---

The present study employed two different designs. A *repeated measures single-case design* (Barlow & Hersen, 1984; Yarnold, 1988) was used to assess the validity of Discan measures on an individual participant basis. A group design was also used, in which there were two subject groups, a clinical sample and a student sample.

Single-case methodology was employed in this study in order to preserve the idiographic nature of Discan which is an important aspect of its methodology. When idiographic Discan measures are used, scores from one individual can not be compared to those of another. The exception to this is when the Discan measure has been pre-designed for group use (Singh & Bilsbury, 1989a). As a result, data generated from each individual who participated in this study was treated separately or individually so that each participant served as a replicate of the design.

Repeated measures were taken over the course of time for two reasons. As described previously, Discan scales produce a quantitative score which is relatively meaningless as a single data point. When several Discan scores have been collected over the course of time, the data become meaningful. Scores on all four measures can be plotted so as to provide a profile of change within scales and between scales for each individual. Secondly, repeated measures are an essential source of variance within measures for the single-subject design. Drawing information about the validity of a measure requires a certain degree of variance to produce a correlation large enough to test for statistical significance (Guion, 1977). In order to draw conclusions about the measures used in a single-case design, the use of repeated measures is essential. "Validity is both derived from and refers to *variance* in a *set* of scores" (Guion, 1977, p.408). It

was therefore necessary that the data generated by the four scales described above must be collected repeatedly over the course of time.

A group design was employed in the present study. This was necessary for the purpose of providing adequate data to examine the concurrent and discriminant validity of Discan anxiety and impulsivity scales. Two subject samples were used with analyses conducted for each group separately and combined. Gender differences were examined for both samples, however sample sizes were not equal and there were no significant differences between the male and female groups and so these analyses are not reported in the results of this study.

The data in the present study were graphically presented, visually and statistically analysed. For the single-subject design that was used in the present study, individual scatterplots were used for examining patterns of change over time on each of the four measures used. Relationships among the measures were examined using within-subjects correlations and visual analysis. For the group design in the present study, relationships among the measures were examined using between and within group correlations.

The goal of much psychotherapy research is to determine treatment effectiveness (Barlow et al., 1984). Although repeated measures were taken over the course of treatment for one group of individuals in the present study, treatment effectiveness was not a concern. Assessing the validity of Discan measures was not dependent upon the effectiveness of the treatments for clients who participated in this study. This is because the scales need not have shown improvement over time, they merely had to have demonstrated correlations in the predicted manner.

The design of the study as delineated above and summarized in Table 1 was such that there were five main sets of correlations to calculate between the four instruments described. These correlations were carried out on an individual basis, on the total number of subjects as a whole, and by dividing the subjects into groups based upon sample (student and clinical) as well as gender groupings. The hypotheses surrounding these analyses are outlined below.

Hypotheses

1. It was hypothesized that scales measuring anxiety would correlate highly with one another. Specifically, scores on the Discan anxiety scales were hypothesized to correlate highly with STAI-S scores. Previous evidence suggests that Discan anxiety measures may be used with some degree of validity. Idiographic Discan anxiety measures were designed for every participant in the present study to address many of the issues and concerns that the individual felt was related to their experience of anxiety. In each Discan anxiety scale, it was attempted to address several aspects of the anxiety experience so as to cover a broad spectrum of affect and behaviour associated with the individual's anxiety as is done using the STAI-S. As a result, Discan anxiety measures were expected to measure the relevant aspects of each individual's anxiety experiences. Therefore, it was hypothesized that the scores on Discan anxiety measures would correlate with the scores on the STAI-S scales in the present study. Furthermore, this hypothesis was expected to hold true for individual as well as group analyses.

2. It was hypothesized that scores on the two anxiety measures would correlate strongly with each other (ie. $r \geq .6$) over the course of repeated assessments, with possibly

the exception of the initial assessment occasion. Specifically, for the within groups design, it was expected that pairs of scores on the two anxiety measures would correlate strongly on each of the eight repeated assessment sessions that occurred in the present study with possibly, the exception of the initial assessment occasion. It was expected that there was a slight chance that the correlations on the initial occasion might be weaker because of the higher demands placed on the participants at that time. The novel tasks, time and cognitive demand of designing a Discan anxiety scale in the initial session were expected to require more concentration and energy than the subsequent assessment sessions. It was possible, therefore, that the initial session might be more confusing or taxing to individuals and that the assessment results might not be as accurate as they would otherwise.

3. It was hypothesized that the off-diagonal correlations would be weaker than the diagonal correlations among anxiety scales. The strength of correlations among anxiety measures in the present study can be supported by the lower strength of the off-diagonal correlation coefficients among anxiety measures. These off-diagonal correlation coefficients are the r values that were calculated between measures that were drawn at different times of assessment, as opposed to the diagonal correlations, which are calculated from scores that were drawn at the same time of assessment. For the two anxiety measures which were expected to be highly correlated on each of the eight repeated assessments, it was expected that the off-diagonal correlation coefficients would be non-significant or weak (ie. $r \geq .35$) in strength. This is because scores on a measure of state type anxiety should be sufficiently scattered or variable over the course of time so as

to produce convergent results between two anxiety measures at one time of testing but discriminant results when the scales are compared at different times of testing.

4. It was hypothesized that scores on the two impulsivity measures would correlate over the course of repeated assessments, with possibly the exception of the initial assessment occasion. Specifically, it was hypothesized that scores on the Discan impulsivity measures would correlate with scores on the BPI-ImE scales in the present study for the within groups design and for the individual analyses as well. This was expected because the Discan impulsivity measure was constructed using direct wording from some items in the BPI-ImE and constructs described in Jackson (1989) so that there would be similar content between these two measures. Scores on the Discan impulsivity measures and on the BPI-ImE were not expected to correlate as strongly as those between anxiety measures. As described previously in the Discan Measures section of this paper, the Discan impulsivity measure was not idiographically designed and is therefore not likely to be as sensitive (as the Discan anxiety measure) to changes in the constructs that it is attempting to measure. This is compounded by the fact that impulsivity is a personality characteristic which also tends to produce less variability in the scores over the course of repeated assessments. A measure that produces lower levels of variability will have artificially deflated correlation coefficients (Guion, 1977). For these reasons, it was hypothesized that correlations between the scores on the Discan impulsivity measure and on the BPI-ImE will be strong but not as strongly significant as those between the anxiety measures that are described above.

5. It was hypothesized that the off-diagonal correlations describing the relationship between the two measures of impulsivity would be related to one another. Specifically, the off-diagonal correlation coefficients among the impulsivity measures were expected to be stronger than those off-diagonal correlations among anxiety measures. The differences were expected for two reasons; first, the Discan impulsivity measure was not idiographically designed which may make the measure less sensitive to change over the course of time. Secondly, because impulsivity is a trait type construct, it was not expected that there would be as much variability among scores over the course of repeated assessments. As a result, the variability of scores on impulsivity measures that were taken at different times might not have been as discrepant as the scores between state-anxiety measures were likely to be. Therefore, it was expected that many of the off-diagonal correlations between measures of impulsivity would be significantly or strongly related.

In order to assess the discriminant validity of Discan measures, it was necessary to examine correlations between measures that were not expected to be related to one another. Jackson (1989) reported results from research studies that showed low correlations between the BPI-ImE and anxiety measures. As a result, anxiety and impulsivity were not expected to be related constructs. Therefore, scores on anxiety measures were not expected to correlate with scores on impulsivity measures.

6. Based upon evidence described in the literature, it was hypothesized that scores on Discan anxiety measures would not correlate with scores on the BPI-ImE scales in the present study. These findings were expected for the within groups design and for the

individual analyses as well. This pattern of findings was expected across all eight repeated assessment sessions that occurred in the within groups design.

7. It was hypothesized that scores on the Discan impulsivity measure and the STAI-S would not be not strongly related. Evidence in Jackson (1989) suggests that impulsivity and anxiety are unrelated constructs. The Discan impulsivity measure was designed to measure content similar to those in the BPI-ImE which are constructs that were reported to correlate poorly with anxiety-related constructs. As a result of this, it was hypothesized that scores on the Discan impulsivity measures would not correlate with scores on the STAI-S in the present study. This was expected to occur across all eight repeated assessment sessions that occurred in the present study.

8. It was hypothesized that scores on the Discan anxiety measures and scores on the Discan impulsivity measure would assess different constructs and would therefore not correlate strongly over any of the eight repeated assessments. Low or no correlations were expected among scores on these two Discan measures.

9. The relationships among scores on the pairs of measures described above were expected to be demonstrated through the use of the group design as well as the single case design. The single case designs were limited by smaller sample sizes (whereby the eight replications serve as the sample size) and so the results of these correlations were expected to yield high correlation coefficients yet not necessarily statistically significant correlations.

10. Analyses conducted for the within groups design were statistically conducted, using correlations. For the individual analyses, single case design, however, visual analysis

methodology was also used. It was hypothesized that through the use of visual analysis, it would be possible to examine the relationships between all possible pairs of scales as described above. More specifically, visual analyses were expected to help examine the concurrent and discriminant validity of Discan anxiety and impulsivity measures. In this way, the use of visual analysis was expected to provide additional support for some of the hypotheses stated above. (The criteria for visual analyses is described in the presentation of these results.)

Summary

The ways in which accurate measurement contributes to psychological research and practice has been outlined above. The controversies associated with instrument selection and psychometric evaluation were summarized. Discan methodology has been offered as a possible solution to some of the problems that were presented. Adequate psychometric consideration of Discan scales needs to be considered prior to making assertions about its utility in psychological research and practice. Past research demonstrated some evidence for the face validity of Discan measurements. Concurrent and discriminant validation of Discan measures have not been previously examined. This is the purpose of the present thesis. The methods by which this evaluation occurred are now explained.

Method

Criteria for Participant Selection

Two different groups of individuals were utilized in this study, a student sample with high levels of trait anxiety and a clinical sample undergoing treatment in a weekly

anxiety management group. There were no age or gender restrictions and participants were not required to have reading or writing skills to participate.

Student Group

Students were recruited for this study from an introductory psychology class at Acadia University. To qualify for participation, students had to complete a screening questionnaire, the STAI-T, to determine their level of trait anxiety. All of the students in the class were given a copy of the STAI-T with a cover-sheet (Appendix F) stapled to it. This cover-sheet explained that the screening was voluntary, but had to be done in order to be eligible to participate in the present study. The purpose of the screening questionnaire and the instructions for completing it were also explained. Incentives for participation in the research project were described as well.

164 students (48 males and 116 females) completed the STAI-T screening. The average STAI-T raw score for the 164 students overall was 41.19, for the female sample was 41.89 and for the males was 39.5. The average STAI-T standard score for both the female and male groups was between 51 and 52. The average percentile ranking for the females was between 59 and 62; the males had an average percentile ranking between 57 and 60. These scores did not differ significantly from the average scores of the general population from whom the STAI norms were devised (Spielberger, 1983). There were no statistically significant differences between the STAI-T scores for these two groups of students.

There were no cut-off STAI-T scores associated with participation in the present study. Instead, it was decided that an initial sample size of 40 students would be obtained

by approaching the most anxious individuals in the group until 40 students agreed to participate. A large initial sample size was sought because it was expected that time commitments would increase the drop-out rate in the present study. All students' STAI-T standard scores were ranked from highest to lowest. The students with the most elevated levels of trait-anxiety as measured by the STAI-T were telephoned by the experimenter and invited to participate in the present study. The participation compliance rate was very high with 40 students agreeing to participate out of the top 44 from the list of students with elevated anxiety. All of these students had a STAI-T standard score above 57 with a percentile ranking of 81 or higher. Although there was no cut-off score associated with participation, even the lowest scorer on the STAI-T of the 40 students had a high level of trait anxiety. The average STAI-T standard score for the group of 40 student participants was 63.58. There were 13 male participants in this sample whose average STAI-T standard score was 63, which falls in the 88th percentile ranking. There were 27 female participants in this sample whose average STAI-T standard score was 64, which corresponds to a percentile ranking of 91. Norms for scoring all administrations of the STAI for the student sample were obtained from Spielberger's (1983) manual containing norms for students and military recruits. Students who participated in the present study ($n=40$) ranged in age from 17 to 35 ($M = 20.45$, $SD = 4.06$, mode = 18), and most were single (93%) and unemployed (83%).

Although there were uneven numbers of male and female participants in the present study, the proportions of male and female participants to males and females screened overall were equal. Specifically, there were 29% males ($n=48$) and 71% females

(n=116) screened in the class of 164 students and there were 33% males (n=13) and 67% females (n=27) who agreed to participate in the study. Five students dropped out part way through the study resulting in a final student sample of 31% males (n=11) and 69% females (n=24). Equal numbers of male and female participants were not sought because it was the aim of sampling to achieve participation by the most anxious students as opposed to setting other fixed sampling criteria. There were no restrictions for student participation in this study except for the presence of an elevated STAI-T score prior to participation.

Clinical Group

Recruitment for participants in the clinical subject group took place through the weekly anxiety management groups that were held by the Valley Mental Health clinic, Berwick, NS. There were two consecutively run anxiety management groups that were approached for volunteer participation. After the initial session for both of the anxiety management groups, the researcher was introduced and information concerning the opportunity to participate in the current study was provided.

In order to alleviate any concerns that the clients may have had about participating in a research project, the researcher explained the purpose of the study, the requirements on behalf of participants and also showed examples of the scales that would be used to measure anxiety. Handouts (Appendix E) were administered to all of the clients during this initial contact as well to provide an opportunity to examine the study requirements and other relevant information. The researcher's name and telephone number were provided on this handout so as to enable clients some time to consider whether or not they

would like to participate. Names and telephone numbers of all of the clients who were interested in volunteering were taken after this initial contact.

The researcher telephoned each of the interested clients to determine whether or not the individuals were still interested in participating. There were six clients in attendance at the first anxiety management group, five of whom initially indicated an interest in the study and three of whom finally agreed to participate. All three of these participants were females. One of these three participants dropped from the study after only two assessment sessions reportedly due to time management problems. There were nine clients present in the second of the anxiety management groups, six of whom indicated an interest in the study and four of whom finally agreed to participate. Two of these participants were male and two were female. None of these four participants dropped from the study. Based upon the number of clients who attended the anxiety management groups ($n=15$), the participation rate ($n=6$) in the present study was reasonable.

A total clinical sample of seven participants (5 female, 2 male) was recruited from the two consecutively run anxiety-management groups. These participants ranged in age from 23 to 55 years, with one half of this sample in their mid-thirties. One female participant, aged 55, dropped out of the study after the completion of only two of eight sessions, rendering her data unusable. Of the remaining six participants, 50% were single, 33% married and 17% divorced and two thirds of the sample were employed. It was not attempted to have equal numbers of males and females in the clinical group because any

participant experiencing elevated anxiety was accepted into the study. The proportions of males and females in the student and clinical samples were equal.

This group of participants had the STAI-T administered as a part of their initial anxiety management session and, with the exception of one outlier, their STAI-T standard scores ranged from 66 to 90, with a mean of 77. The percentile ranks for these standard scores ranged from 93 to 100, with a mean of the 97.6th percentile rank. The one outlier in this group of six subjects was a male whose STAI-T standard score was 44, which corresponds to the 33rd percentile rank. This individual explained that his general level of anxiety (trait anxiety) was low, but he experienced high levels of anxiety in very specific situational circumstances (state anxiety). Despite this difference from the other subjects in this study, the outlier data are included in all analyses. Norms for scoring all administrations of the STAI for the clinical sample were obtained from Spielberger's (1983) norms for normal adults in three age groups (using the appropriate age group for each individual participant).

There were no attempts to make diagnoses or to obtain diagnostic information concerning any of the subjects in the clinical sample. This is because, as explained earlier, the outcome of the treatment had no effect on making inferences about the validity of the Discan scales. Despite having high levels of anxiety, all of the individuals in the clinical sample appeared to be normally functioning adults whose cognitive abilities were adequate in terms of participating as fully as the student participants in the present study.

Measures

Quantitative Measures

The present study utilized a repeated measures design using a test battery consisting of four separate quantitative measures or instruments. These included Discan anxiety measures, the Discan impulsivity measure, the State-Trait Anxiety Inventory, State scale (STAI-S) and the Basic Personality Inventory, Impulse Expression scale (BPI-ImE). Each of these measures have been described previously in the introduction to this thesis, however, in order to describe the methods by which these measures were both designed and used, they are reviewed below.

Discan-anxiety. A Discan scale that measures anxiety was constructed for each individual participant (Appendix C). These measures followed the Discan 4/14 format which means they had four reference levels describing four different or distinct levels of anxiety that each participant was experiencing. This Discan measure used a 14 point scale to quantify anxiety. This 14-point scale has a low score of 1 which indicates problem remission or the goal state and a high point of 14 which indicates maximal problem severity (Singh & Bilsbury, 1989a).

The process by which these Discan anxiety measures were constructed for each participant followed the recommendations of Bilsbury and Richman (in press) and also Singh & Bilsbury (1989a). This process will be described briefly here. The researcher began by establishing a preliminary level of rapport between the researcher and the participants. This was followed by the construction of the Discan idiographic scale components. This is a process that is conducted in partnership with the participant so that

ultimately the scale components have been negotiated and agreed upon by both the researcher and the participant (Singh & Bilsbury, 1989a). The Discan scale was first introduced to the participant as four blank index cards upon which his or her experience of anxiety was to be recorded. It was explained that each of these cards was meant to describe different levels of severity of anxiety. These cards, together as a set, are referred to as reference levels (Singh & Bilsbury, 1989a). The way that the four reference levels are designed to break down the problem of anxiety was explained.

The designing of the reference levels began with the construction of reference level 4, the highest level of anxiety on the Discan scale. The participant was asked to describe his or her anxiety when it was at its worst imaginable level, or its worst experienced level. As the participant described this experience of anxiety, the key words and phrases were hand written onto a blank index card by the experimenter. The experimenter encouraged the participant to discuss the feelings that were associated with his or her anxiety, the physiological components, and the effects of the anxiety upon affect, social, academic and leisure activity. Any other aspects of the anxiety experience that were addressed were recorded by the experimenter. This index card was labeled Level 4.

Following the construction of Level 4, reference level 1 was constructed. The experimenter went through the same process to determine some phrases or key words describing the participant's problem remission, goal state or the best possible state imaginable with regard to his or her specific experience of anxiety. Prompting was used to address the same aspects of anxiety that were addressed in the most severe level, Level 4. This lowest level of anxiety was then labeled Level 1.

Following the construction of Level 4 and Level 1, it was explained that there should be some degrees of anxiety that fall between these two extremes and that these would be written onto the two blank index cards that were placed in the middle of the worst and best levels. Individual participants were first prompted to discuss their experience of anxiety that would be bad or extreme but not quite as severe as their highest level, Level 4. Again, all of the issues that were raised in the construction of level 4 were repeated. This high-intermediate reference level of anxiety was labeled Level 3. Finally, in order to construct the low-intermediate reference level of anxiety, the participant was asked to describe his or her experience that was a bit better than Level 3 but still not quite as good as the experience described in Level 1. Participants were encouraged to reread the items listed in the reference levels that had already been constructed in order to remember the types of issues that had been addressed and recorded on the index cards. Prompting was used to cover all of the aspects of anxiety that were addressed in previously designed reference levels, so as to keep the flow of ideas similar from one level to the next. This cascading of severity of the same constructs is essential to creating a reliable set of Discan reference levels (Bilsbury & Richman, in press; Singh & Bilsbury; 1989a). Responses were recorded onto the last blank index card and this low-intermediate level of anxiety was labeled Level 2.

When all four reference levels had been designed, a *title* was placed upon each one to describe the succession of severity of the problem. This procedure was conducted with prompting from the experimenter. For example, the experimenter may have begun by addressing a title for the most severe reference level, Level 4, in the following way. The

participant was asked “Shall we call this your worst, or most severe level of anxiety?” and the participant’s response may have either affirmed the suggestion or they may have suggested a more appropriate title for the card. This title was then written onto the top of the index card. This procedure was repeated for all other reference levels as well.

In order to verify that the reference levels were accurately describing the experiences of the individual, the experimenter requested a reading through all four levels. Once the participant had read through all of the cards, he or she was asked whether or not the cards accurately reflected what they were trying to describe. Participants were able to make changes to the levels, in the form of additions, deletions, rewording, reordering, relabeling and any other suggestions that they had. These changes were made to the reference levels until the participant and the experimenter were satisfied that they addressed the problem accurately and that they followed the necessary cascading succession of severity that was described in Bilsbury and Richman (in press) and Singh and Bilsbury (1989a).

The final stage in Discan measure construction involves the lead-in statement. A lead-in statement was individually designed for each participant’s set of anxiety reference levels. Participants were asked whether or not it would be easier to remember how they were feeling “over the last week” or “over the last day or so” when looking at the different levels of their anxiety. The participant’s choice was recorded onto a blank index card as well. Appendix C includes a copy of the lead-in statements for each participant as well.

Although a group-design Discan anxiety scale could have been pre-constructed for all participants in the present study, a unique, specific Discan anxiety scale was

constructed for each individual participant so that the Discan measures would be more sensitive to issues and experiences of anxiety in the lives of these participants. In this way it was possible to retain the idiographic nature of the Discan anxiety measures.

Discan-impulsivity. A pre-designed Discan measure, described earlier in this thesis, was used to measure impulsivity (Appendix D). As mentioned previously, pre-designed reference levels were used for this scale because it was not necessarily expected that many of the participants in the present study would experience problems with impulsivity. The Discan impulsivity scale was designed like the Discan anxiety scales, in the 4/14 format so that it had 4 reference levels and created a scale with 14 possible scores. Reference levels on the Discan impulsivity measure were designed so as to correspond closely with the wording of constructs addressed on the BPI-ImE measure and described in Jackson (1989). The method by which the Discan impulsivity measure was designed will now be described.

Concepts addressed on the BPI-ImE can be summarized into three main types of behaviours. These include carelessness, recklessness and risk taking; consideration of consequences and the future outcome of behaviour; and boredom and restlessness with working through a task. Each of these three aspects of behaviour can be described in such a way as to represent a continuum of most severe levels of these behaviours to the absence of these behaviours. As a result, it was attempted to create four distinct levels of severity of impulsive behaviour that would cascade from most severe impulsive type behaviours down to low or no impulsive behaviour.

The first of the three aspects of the BPI-ImE types of impulsive behaviour, carelessness, recklessness and risk taking, was broken down into four levels of severity. The highest level was written, "I am careless and reckless and take risks quite often". The next level in the cascade was not quite as severe, "I usually enjoy being spontaneous and acting on the spur of the moment". Following this, the low-intermediate level was designed, "I do enjoy acting spontaneously but I try to be careful too." Finally, the lowest level of this aspect of impulsive behaviour was designed as follows, "I sometimes act silly or do exciting things but never in a careless way."

The second of the three aspects of the BPI-ImE types of impulsive behaviour, consideration of consequences and the future outcome of behaviour, was broken down into four levels of severity. The highest, most severe level was written, "I hardly ever think of the future before I act." The next level in the cascade was not quite as severe, "Only sometimes do I think of the consequences of my actions.". Following this, a less severe, low-intermediate level was designed, "I am usually level headed and think before I act about half of the time." Finally, the lowest level of this aspect of impulsive behaviour was stated as follows, "I am always level headed and like to consider the future before I act."

The final of the three aspects of the BPI-ImE types of impulsive behaviour, boredom or restlessness with working through a task, was broken down into four levels of severity. The highest, most severe level was written, "I am usually bored with things so I will act spontaneously for excitement." The next level in the cascade was not quite as severe, "I find it hard and boring to focus on one thing for too long." Following this, the

low-intermediate level was designed, “Sometimes I can sit and work on a single task but I get bored with it half of the time.” Finally, the lowest level of this aspect of impulsive behaviour was designed as follows, “Also, I can usually work at something for a while without getting bored or restless.”

These statements regarding the three main aspects of impulsive behaviours were placed together on the index cards to form a full set of four reference levels (Appendix D), and combined with a lead-in statement, “Over the last week (or few days) I have been feeling:”. This completed the designing of the Discan impulsivity measure. In order to examine whether or not this measure was useful for assessing Discan impulsivity, a pilot study was conducted (Appendix G). This pilot study was found useful for making some revisions on the items in the Discan impulsivity measure.

State-Trait Anxiety Inventory (STAI). The STAI subscale measuring State anxiety, described previously in this thesis, was used in this study. The STAI-S (Form Y) was copied and administered in its original form and in the manner suggested by Spielberger, (1983) (with permission from the publisher, Mind Garden, Inc.). No alterations were made to the scale itself. As explained earlier in this thesis, the instructions for respondents taking the STAI-S were changed so as to assess state anxiety “over the last week” or “the last few days” as opposed to using the immediate time frame as a context for endorsing the items on the scale. This was done so as to assess the same time frame as the Discan anxiety measures.

Basic Personality Inventory (BPI). The BPI Impulse Expression (ImE) subscale was used in this study. The full scale BPI is a 240-item questionnaire which has 12 clinical

scales, each with 20 items that require a true or false response (Jackson, 1989). The 20-item BPI Impulse Expression (ImE) scale items are scattered throughout the 240 item BPI test. The 20-item ImE scale was extracted from the 240-item BPI and these 20 items were randomly ordered and printed onto a separate sheet with the general directions for the test printed at the top of the page (adapted and printed with permission from the publisher, Research Psychologists Press, Inc.).

The 20 items on the BPI-ImE scale were randomly ordered in order to prevent the “True, False, True, False” response pattern that exists in the original scale order. This was necessary because the BPI-ImE scale was administered without the advantage of embedding the questions among a host of other clinical scales, which is the case in the full-scale 240-item BPI. No other alterations were made to the BPI-ImE.

Qualitative Measures

Repeated measures within a specific assessment tool should be compared only if the data are collected under similar conditions (Barlow, Hayes & Nelson, 1984) because measures can be influenced by relevant independent variables outside of treatment, such as life events. In order to take life events and other independent variables outside of treatment into account, a second set of qualitative measures were designed and administered. These measures both consisted of a single-item question. The first of these measures was designed to tap into recent events or changes that had occur in the lives of participants (Appendix H). The second of these measures was designed for use after the final repeated-measures assessment occasion has taken place in order to examine the way

that the participants had felt about the measures that they had been using (Appendix I). These two measures are described in greater detail below.

Repeated qualitative questionnaire. A single item questionnaire was designed for repeated use to tap into major events or changes that occur in the lives of participants (Appendix H). This questionnaire simply asked *“Is there any reason, event or circumstance that may have happened over the last week (or recently) that explains the way you are feeling this week? Or that changed things for you on these assessments?”* This single-item questionnaire was administered at the end of every assessment session including the last. It was administered verbally by the researcher so that the participant could quickly respond without having to read the questionnaire or to write down his/her thoughts. When major events or circumstances had not occurred in the lives of the participants, they simply responded to this question with the reply, “No”. When major events had happened, this questionnaire was useful for recording the details of that particular event if the participant was willing to share that information. This was helpful for determining the accuracy of the anxiety measures that were used for each assessment.

Final qualitative questionnaire. A second single-item qualitative questionnaire (Appendix I) was verbally administered after the end of all eight assessment occasions. This questionnaire was designed to assess the way that participants felt about the measures used for the assessments. This questionnaire simply asked *“Which of the two instruments, the Discan anxiety cards or the paper-and-pencil STAI did you prefer for measuring your stress and anxiety and which one was easiest?”*. Participants were able to respond both

parts of this question with one of three choices, the Discan scale, the STAI or both/neither.

This questionnaire was designed to address any of the comments or concerns that participants had about the scales, including difficulties, preferences, and more specific issues. Responses to this questionnaire were expected to provide qualitative information that contribute to the reasoning and explaining of certain changes reflected in the quantitative data.

Procedure

Individuals who were interested in participating were telephoned and scheduled with a meeting time and place for the initial assessment sessions. Individuals were reminded during this telephone call that they were still under no obligation to participate in the study and that they could withdraw at any point in time and without explanation. Individuals who were undergoing therapy were reminded that failure to participate would have no effect whatsoever upon their treatment at Valley Mental Health. Individuals who agreed to participate were asked to meet the researcher either at the site of the anxiety management groups at Valley Mental Health or at the researcher's office at Acadia University. All students and four of the clinical participants met the researcher on the campus of Acadia University. The others were met at an office at Valley Mental Health.

The Initial Assessment Session

During the initial meeting with individual participants, a series of steps were taken to ensure the safety, comfort and awareness of the participants. Participants were again informed that they were under no obligation to participate and that they could withdraw at

any point in time during the study. The purpose of the study was redescribed to the participants in such a way as to avoid revealing that there would be correlations drawn between the measures used. Possible risks and benefits, confidentiality issues and other rights of the participants were made available in the Informed Consent Form and were reviewed verbally as well. A copy of the Informed Consent Form (for students, Appendix J, and for the clinical group, Appendix K) was administered and items were explained verbally by the experimenter. If the participant wished to continue with participation, these forms were signed and dated by both the participant and the experimenter. All of those who volunteered to participate agreed to the terms of the study.

Participants were informed that all questions throughout the study would be answered as honestly and accurately as possible. They were informed that the researcher would help them with any of the assessments. The researcher also informed participants that there would be no attempts to deceive anyone during this study.

When participants felt comfortable with the situation, the tasks involved with the assessments were explained. Administration of the four tests, the STAI-S, the BPI-ImE, the personalized Discan anxiety measure and the Discan impulsivity measure began after this. First, the STAI-S was administered. Participants were asked to think about how they had been feeling over the last few days when answering the questions on the STAI-S. Many of the participants asked about the definition of some of the terms used on the STAI-S and they were explained by the experimenter. Following the administration of the STAI-S, the BPI-ImE was administered. Participants were informed that this questionnaire was not related to their experience of anxiety and that they should think

about how they had behaved over the last week when responding to the items on this measure. The STAI-S was scored by the researcher during this administration of the BPI-ImE.

Following the administration of the two nomothetic scales, the Discan anxiety measure was introduced. The construction and administration of the Discan anxiety measure took place at this time. This was the most time consuming task for participants. There were no difficulties encountered with completing this task. Following this, the Discan impulsivity measure was introduced and administered. The full scoring algorithm (10 questions) was used in Discan administration so as to maximize the internal reliability of the Discan anxiety (and impulsivity) scales.

All four measures were scored during this initial session and the outcome of each scale was reviewed with the participant. Following the administration of the four measures, the repeated qualitative questionnaire was administered and the responses were recorded.

Participants were informed that they would receive verbal feedback concerning their changes over the course of time on the variables measured. No written feedback was provided in order to avoid misinterpretation. Any questions that the participants had regarding the measures or procedures were answered candidly. Any comments that the participants had about the measures they were using were recorded as well. Subjects were thanked for attending the assessment session, reminded that their assessment information would be held completely confidential, and a meeting time for the next assessment session was scheduled.

Subsequent Assessment Occasions

Subsequent sessions proceeded in the same way except that the scales were familiar to the participants, the Discan anxiety scale had been previously designed and the Informed Consent Form had been read and signed previously. This reduced the time that was needed for these subsequent sessions. Again, at this and all sessions throughout the course of the study, all questions and concerns of the participants were addressed by the experimenter.

Most of the subsequent assessment sessions took place in person with the researcher present, however, a few participants opted to participate over the telephone. This option was restricted to three of the last four sessions in order to make sure that the participants were familiar enough with the processes of Discan scale administration. Subjects who opted for the telephone sessions were given a package of assessment materials to take home with them. Participants were asked not to write on these materials and were required to return the package at the last assessment session, which was to take place in-person, as the first four sessions had been conducted.

A scheduled calling time was arranged between the researcher and the participant. When called, the participant was asked to place the assessment materials out before him/her. The participant was asked to take out the STAI (Self-Evaluation Questionnaire) and to reply orally to each of the 20 items as the experimenter read them aloud. As this was done, the experimenter recorded the responses onto a copy of the STAI-S in the participant's file. This procedure was repeated for the 20 items on the BPI-ImE as well.

After this, the experimenter asked the participant to put away the STAI and the BPI-ImE and to obtain the set of Discan anxiety cards from the package of materials. The participant was asked to place certain cards out in front of them, as would normally be done in the assessment sessions. When the appropriate cards had been placed in front of the participant, the researcher asked the participant to select which one had more closely represented the way that they were feeling during the context specified by the lead-in statement. The participant's choice was recorded by the experimenter on a blank Discan scoring form in the participant's file. This process was repeated until all Discan questions had been asked and the measure was complete. A score was obtained and the experimenter informed the participant of this score. The participant was also informed where this score lay in terms of scores obtained on previous assessment sessions. The experimenter asked the participant to put the Discan anxiety cards away in the specially labeled envelope. Finally, the experimenter asked the participant to obtain the set of Discan impulsivity cards and the procedure was repeated for this measure as well. When all four quantitative assessments had been administered, the repeated qualitative measure was administered and the responses were recorded by the experimenter. The scores on all of the measures were reviewed with the participant and the subsequent telephone session or the final in-person session was scheduled.

The Final Assessment Occasion

Upon the final assessment session, the assessment four quantitative measures were readministered as well as the repeated qualitative questionnaire and with the addition of the final qualitative questionnaire. Responses were recorded and scores were reviewed as

usual. The scores over the eight assessment sessions were reviewed again with the participants.

Participants were debriefed as to the purposes of the present study again, this time including the idea that there might be a relationship between the measures. This possible relationships between the scales was explained and any questions regarding the study, the measures or the results were answered openly, as usual. Some participants left an address with the experimenter so as to receive the results when they became available. All participants were informed that the results were also available from the researcher by writing to the psychology department at Acadia University. Participants were thanked for participating in the present study. Incentives for participating in the study were awarded to students. Participants were reminded again that the raw data and their personal confidentiality were protected as well.

Data Analyses

Data collected from all participants were placed into an SPSS (Statistical Package for the Social Sciences) data file. Using this program, several analyses were conducted, including descriptive statistics and frequencies for each of the variables plotted. Pearson's Product Moment Correlations were also conducted to examine the relationships among the quantitative measures used in the study. The data were also plotted onto scatterplots so as to enable visual analyses of the results. These procedures are described fully in the results of this thesis.

Results

Subject Time Commitments

All subjects in the present study were asked to complete eight separate assessment sessions. Of the 40 students who initially volunteered to participate in the study, 35 completed all 8 sessions. Of the 7 clinical participants who initially volunteered, 6 completed all 8 sessions. The following results reported will include data only for those 41 subjects (35 students and 6 clinical participants) who completed all 8 assessment sessions of the study. The time that it took for students (n=35) to complete the initial assessment session ranged from 20 to 60 minutes with an average of 32 minutes. The subsequent sessions for the student group averaged between 8 and 11 minutes each with an average total time commitment of 99 minutes (or 1 hour and 40 minutes) over the course of eight separate assessment occasions. The time that it took for the clinical group (n=6) to complete the initial assessment session ranged from 30 to 75 minutes with an average of 50 minutes. The subsequent sessions for the clinical group averaged between 12 and 20 minutes each with an average total time commitment of 155 minutes (or 2 hours and 35 minutes) over the course of eight separate assessment occasions. It was attempted to meet with all individual participants once every seven days for eight consecutive weeks. Scheduling problems and holidays presented obstacles to achieving this goal, and the assessments took place less regularly than was planned.

Statistical Analyses - Student and Clinical Subject Groupings

SPSS was used to analyze the data in the present study. Pearson's correlations were conducted using 2-tailed tests of significance for groups of subjects. For the group

design, correlations were calculated between scores on all possible combinations of pairs of the four measuring scales over the course of eight separate assessment occasions. More specifically, correlations between the scores that were drawn on each of the eight assessment occasions were calculated for each pair of scales. This means, for example, that scores for time one, two, etc. through to time eight on the STAI-S were correlated with scores for time one through time eight on the Discan anxiety measure. This calculation of correlations was carried out for all possible combinations of the four quantitative scales. This resulted in six possible sets of correlations, each set containing correlation coefficients calculated between scores on all eight assessment occasions. This design was summarized in Table 1. These analyses were repeated for the total group of subjects (n=41) (results summarized in Appendix L), and separately for the student group (n=35) (Appendix M) and the clinical group (n=6) (Appendix N).

Examining Concurrent Validity of Discan Measures, Group Design

It was expected that the Discan anxiety scores would correlate strongly with the STAI-S scores over the course of the eight assessment occasions. More specifically, it was expected that scores on the first session would correlate with each other, and scores on the second session would correlate, and this pattern would be repeated through to the eighth session. The expected exception to this pattern was that anxiety measures on the initial assessment session might not correlate as strongly due to increased difficulty of the tasks on that session. For the student and clinical groups combined (n=41), the correlations between the eight sets of scores on these two anxiety measures were all strongly significant at $p < .01$ (except for the first of eight sessions which was significant at

$p < .05$) and the direction of the correlations was in the manner predicted (Appendix L1). That means that Discan anxiety scores and STAI-S scores did not differ significantly in the direction and degree of fluctuation, even on the initial assessment occasion. These results are particularly meaningful when the strength of the correlations is considered. The r values for correlations between these anxiety measures ranged from .3403 to .7034 with an average r across all eight sessions of .5947. These coefficients were stronger or higher than what would be expected to have happened by chance alone and are suggestive that the anxiety measures were measuring similar constructs over the course of the eight assessment sessions.

Correlations between Discan anxiety scores and STAI-S scores for the student group ($n=35$) were all significant at $p < .01$ except for the correlation between the anxiety measures at session 1, which was non-significant (Appendix M1). The statistically significant correlation coefficients ranged from .5672 to .7425, which suggests that the scores on anxiety measures for the student group were strongly related. Results for the clinical group ($n=6$) were not as straightforward as for the student group. Four of the eight correlations (50%) of the correlations between Discan anxiety scores and STAI-S scores for the clinical group were statistically significant (1 at $p < .01$ and 3 at $p < .05$) and ranged from .8136 to .9378. The other four correlations (50%) were non-significant. The r values for the non-significant correlations ranged from .5989 to .7976 which were high and, as a result, it appears that the relationship between anxiety holds among the clinical sample. The clinical sample was too small ($n=6$), however, to permit statistical significance without very substantial correlations (Appendix N1). Nevertheless, even these

high levels of association were met in four of the eight instances, with r values exceeding those among the student sample in almost all instances.

Further support for the concurrent validity of Discan anxiety measures was provided by examining the off-diagonal correlations between Discan anxiety and the STAI-S scores. Scores on state type anxiety measures should be sufficiently scattered or variable over the course of time so as to produce convergent results between pairs of anxiety scores at one test time but discriminant results (non-significant) when the scales are compared at different times of testing. For the total group of participants ($n=41$) all of the 56 possible off-diagonal r values between scores on Discan anxiety measures and the STAI-S were non-significant (r values ranged from .0217 to .2761) with the exception of 5 significant correlations which had corresponding r values of .3264 to .4165 (Table L1). The strength of these correlations was very low when compared to the high r values that were found between measures assessing anxiety at the same assessment occasions. The criterion that is to be used for determining statistical significance for the off-diagonal correlations is an alpha level of .1 which is more stringent than the level that was used in the present study (ie. alpha of .05). Despite this, the difference between the size of the diagonal and off-diagonal correlation coefficients was substantial.

In order to examine the concurrent validity of the Discan impulsivity scales, scores on Discan impulsivity were compared with scores on the BPI-ImE scales. It was expected that the Discan impulsivity scores would correlate strongly with the BPI-ImE scores at each time of measurement, over the course of the eight assessment sessions. These correlations were not expected to be as strongly significant as those between scores on the

anxiety measures because the Discan impulsivity scale and the BPI-ImE were thought to measure a trait type personality variable. Measuring a personality variable could reduce the strength of the correlations because there is likely less variance among scores on trait type variables and thus a decreased chance of finding very substantial correlation coefficients.

For the student and clinical groups combined ($n=41$) the correlations between scores at each assessment occasion on impulsivity measures were all strongly significant at $p<.01$ for all 8 assessment sessions and the direction of the correlations was in the manner predicted (Appendix L2). That is, scores on the Discan impulsivity measure and the BPI-ImE fluctuated in the same direction and to the same degree. The r values for these correlations ranged from .5188 to .6561, with a mean r value of .5920 which demonstrates a strong relationship between the two measures of impulsivity at each time of assessment. This pattern of concordant findings was repeated exactly for the student group ($n=35$) with all of the correlations between impulsivity measures statistically significant at $p<.01$ (Appendix M2). The pattern was not replicated for the clinical group ($n=6$), however, which had only one significant correlation ($r=.8122$, $p<.05$) out of the total of 8 possible correlations (Appendix N2). The r values for the non-significant correlations for the clinical group ranged from .1389 to .6051. Some of these r values were comparable to those significant r values for the total group of participants combined which suggests that a relationship appears to hold among the clinical sample. These r values were possibly non-significant because of the small sample size ($n=6$).

The results of the correlations between scores on the Discan impulsivity measure and the BPI-ImE that were drawn at the same time of assessment must be interpreted in the context of the off-diagonal correlations between these measures. The off-diagonal correlations reflect the relationship between scores that were drawn at different testing times. In order to demonstrate strength of the correlations calculated from same-time assessments, the correlations for the different-time of assessment should be non-significant at an alpha level of .1. For the total group of participants ($n=41$), the off-diagonal r values for the correlations between the scores on Discan impulsivity measures and the BPI-ImE were all statistically significant, however, with the exception of one single correlation (Appendix L2). This means that the scores on the Discan impulsivity measure and scores on the BPI-ImE were correlated not only when they were drawn during the same assessment occasion but also at all other sessions as well. The strength of the off-diagonal correlations ranged from .2430 to .6806 with an average of .4599, which is lower than the average of the diagonal correlations (.5920). This suggests some evidence that the diagonal correlations are stronger than the off diagonal correlations but the statistical tests indicated that there was no difference. The correlations presented above were tested at alpha levels of .01 and .05. As mentioned previously, a more stringent test of whether the off-diagonal correlations were significant or not would involve using an alpha level of .1.

Examining Discriminant Validity of Discan Measures, Group Design

In order to examine the discriminant validity of Discan scales, Pearson's correlations between measures of anxiety and measures of impulsivity were examined. As a measure of discriminant validity for Discan anxiety measures, scores on Discan anxiety

were compared with scores on the BPI-ImE scale over the course of the eight assessment sessions. It was expected that, for each of the assessment sessions, scores on Discan anxiety scales would not correlate with scores on the BPI-ImE scale. The correlation coefficients between Discan anxiety and the BPI-ImE were all non-significant at or above the .05 significance level for the student and clinical groups combined ($n=41$) (Appendix L3). The r values for this analysis ranged from .0095 to .2859, which are very weak correlations coefficients and further suggest that there was no correlation between Discan anxiety and the BPI-ImE. The relationship between Discan anxiety and the BPI-ImE scale is summarized in Table 2 below.

The off-diagonal correlation coefficients between scores on Discan anxiety measures and the BPI-ImE were not expected to be related. This is because the variability in the scores on the Discan anxiety scale should have been sufficiently different from the more stable impulsivity scores on the BPI-ImE. The off-diagonal r values between scores on Discan anxiety measures and the BPI-ImE were all non-significant with the exception of 3 out of the 56 possible values (Appendix L3) for the total group of participants ($n=41$). The r values ranged from .0009 to .4031, which are very weak and suggest that there was no relationship between scores on the Discan anxiety scales and the BPI-ImE at different times of assessment.

As a measure of discriminant validity for Discan impulsivity scales, it was expected that Discan impulsivity scores would not correlate with scores on the STAI-S scale. The results of this analysis were not as clear as expected. For both subject groups combined ($n=41$), there were 5 non-significant correlations out of a possible 8 between these scales

(two were significant at $p < .05$ and one at $p < .01$) (Appendix L4). The r values for the non-significant correlations ranged from .0390 to .2399 and the r values for the significant correlations ranged from .3256 to .4254. The r values for the three significant correlations in this analysis were very low and suggest that the relationship between the two measures was not as strong as the relationships that were found between measures that were hypothesized to correlate. The strength of the non-significant correlations between these measures was also very low as was hypothesized. Table 2 below summarizes the relationship between the Discan impulsivity and the STAI-S scales.

The off-diagonal correlation coefficients between scores on Discan impulsivity measures and the STAI-S were not expected to be related. This is because the variability in the scores on the STAI-S should have been sufficiently different from the more stable impulsivity scores as measured by the Discan impulsivity scale. The off-diagonal r values between scores on Discan impulsivity measures and the STAI-S were all non-significant with the exception of 10 out of the 56 possible values (Appendix L4) for the total group of participants ($n=41$). The r values for the non-significant off-diagonal correlations ranged from .0085 to .2999 and the r values for the statistically significant correlations ranged from .3098 to .4596. These values are quite low and do not suggest that the two scales are related. The weak correlation coefficients suggest that there is little correlation between scores on Discan impulsivity scales and the STAI-S. Although results indicate that there were some significant relationships among scores taken at different assessment times, they were most likely due to chance.

As an additional measure of discriminant validity for both of the Discan scales, it was expected that Discan anxiety scores would not correlate with Discan impulsivity scores. As was expected, all correlations between these measures were non-significant above the .05 significance level with the exception of a single correlation ($r=.38$, $p<.05$) for the two groups combined ($n=41$) (Appendix L5). The r values for the non-significant correlations ranged from .0555 to .2366. These are low correlation coefficients and suggest that there is no statistical relationship between the scores on Discan anxiety measures and Discan impulsivity measures. Table 2 summarizes the relationship between these two scales.

The off-diagonal correlation coefficients between scores on Discan anxiety measures and the Discan impulsivity measure were not expected to be related. This is because the variability in the scores on Discan anxiety measures should have been sufficiently different from the more stable impulsivity scores as measured by the Discan impulsivity scale. The off-diagonal r values between scores on Discan anxiety measures and the Discan impulsivity measure were all non-significant with the exception of 5 out of the 56 possible values (Appendix L5) for the total group of participants ($n=41$). Corresponding r values ranged from .0026 to .2803 for the non-significant correlations and from .3371 to .5499 for the significant ones. These off-diagonal correlations were all very low and suggest that there is no relationship between Discan anxiety and Discan impulsivity measures at different times of assessment.

It was hypothesized that scores on the BPI-ImE and the STAI-S would not be strongly correlated. The strength of correlations between the BPI-ImE and STAI-S

scores were higher than expected. For the two groups of subjects combined ($n=41$) 5 of 8 correlations were significant at $p<.01$ (Appendix L6). The statistically significant r values ranged from .4044 to .5121 and the r values for the non-significant correlations ranged from .1654 to .2846, which were very low. The strength of the statistically significant correlations in this analysis suggests that there was some relationship between scores on the BPI-ImE and the STAI-S but these correlations were not as strong as correlations between measures of the same construct. Results of this analysis were useful in explaining the relationship between the anxiety and impulsivity constructs in general.

Most of the relationships among scores on the four assessment measures followed the expected patterns (refer back to Table 1) to a statistically significant degree and provide support for the concurrent and discriminant validation of Discan as a measure of anxiety and of impulsivity. Concurrent validity of Discan anxiety scales was supported by the degree of significant correlations between scores on Discan anxiety measures and the STAI-S. The non-significant off-diagonal correlation coefficients between these measures were lower in strength and provided further support for the concurrent validity of Discan anxiety scales. This is because the non-significant off-diagonal r values indicate that the Discan anxiety scale is a state measure and not a trait measure and they indicate that the correlations between scores on the measures took place at the same times of assessment but not randomly over the course of the assessments.. The discriminant validity of Discan anxiety measures was supported by the non-significant low correlation coefficients that were found between scores on the Discan anxiety measures and the BPI-ImE both on same time assessments and in the off-diagonal coefficients as well. Non-significant low

correlations between scores on Discan anxiety measures and the Discan impulsivity measures further supported the discriminant validity of both Discan anxiety and impulsivity measures. This is true both for the same time assessments and all of the off-diagonal correlations as well.

The concurrent validity of Discan impulsivity measures was supported to some degree by the significant relationships between scores on Discan impulsivity and the BPI-ImE at the same time of measurement. The strength of the correlations between these two measures of impulsivity suggests that the scales were measuring similar constructs at each assessment occasion. The significant off-diagonal correlations between these two measures, however, makes it difficult to judge whether the measures were fluctuating concurrently over the course of assessments or if both measures were assessing a trait type variable. The r values between the two impulsivity measures at the same time of assessment were slightly higher than the remainder of off-diagonal significant r values. This suggests that the scores on the impulsivity measures were more related at the same time of assessment than they were at different times of assessment. This provides some evidence for the concurrent validity of the Discan impulsivity measure. The significant relationship between scores on the STAI and scores on the BPI-ImE suggest that personality characteristics, such as impulse expression, may change over the course of time and may be related to some degree to anxiety type constructs. This may help to explain the lower strength of correlations between impulsivity measures than were found for the anxiety measures.

There were few significant correlations between Discan impulsivity measure and the STAI-S on either the same time of measurement or the different times of assessment. This provides evidence for the discriminant validity of the Discan impulsivity measure. Finally, as mentioned above, the non-significant correlations between scores on Discan anxiety measures and the Discan impulsivity measures further supported the discriminant validity of Discan impulsivity measures. This is true both for the same time assessments and all of the off-diagonal correlations as well. Table 2 summarizes the patterns of relationships found among the four scales in the context of the “expected patterns” depicted in Table 1 above.

Table 2

Correlational Relationships Among Scales for the Total Group of Subjects (n=41)

scale:	Measures of Anxiety:		Measures of Impulsivity:	
	(1) Discan Anxiety	(2) State-Trait Anxiety Inventory	(3) Discan Impulsivity	(4) BPI Impulse Expression
2.	All significant from .34 to .70 (mean = .59)	---	---	---
3.	88 % non-significant from .06 to .24 12% sig., $r = .38$	63% non-significant from .04 to .24 37% significant from .33 to .43	---	---
4.	No significance from .01 to .29	63% significant from .40 to .51 37% non-significant from .17 to .28	All significant from .52 to .66 (mean = .60)	---

Statistical Analyses - Single-Subject Design

An important component of Discan assessment is the ability of the scale to measure subjective experience in an idiographic manner. As a result of this, every Discan scale is designed specifically for the individual with whom it is to be used for measurement. There were 47 individually designed Discan anxiety scales in the present study. Of these 47 Discan anxiety scales, 41 belonged to individuals who completed

enough assessment sessions to enable a correlational analysis upon their individual data sets. Using SPSS, Pearson's correlations were calculated between each pairing of the four scales (Discan anxiety, Discan impulsivity, STAI-S and BPI-ImE) for every individual participant. These correlations were carried out using 1-tailed tests of significance. Correlations were calculated between pairs of measures across the 8 scores on each measure. Although there were just 8 assessment sessions with which to correlate the measures for each subject, the results of these analyses were strongly supportive of the hypotheses (refer to Appendix P). Results from these analyses are summarized below.

Examining Concurrent Validity of Discan Measures, Single-Subject Design

It was expected that scores on scales measuring anxiety would correlate strongly over the course of time for each individual subject. Therefore, Pearson's correlations between Discan anxiety and STAI-S scores (collapsing across all 8 assessment sessions) were examined for every individual subject. For the entire group of participants ($n=41$) there were 34 individuals (83% of the sample, 29 students and 5 clinical participants) who showed a statistically significant relationship between their Discan anxiety scores and their STAI-S scores, (23 individuals (68%) at $p<.01$ and 11 individuals (32%) at $p<.05$, 1-tailed tests). The r values for the significant correlations between anxiety measures ranged from .6658 to .9559 (Appendix P) with a mean r of .8435. These high correlation coefficients are strongly supportive of the relationship between scores on individuals' Discan anxiety scales and the STAI-S. Of the remaining 7 individuals (17%) who did not demonstrate a statistically significant relationship between their scores on measures of anxiety, 6 of these had r values between .5105 and .6020, with corresponding p -values ranging from .057 to

.098 (Appendix P). These correlation coefficients are large enough to suggest that a relationship may exist, however, there may have been too few assessments to determine statistical significance. The strength of the significant and non-significant correlations strongly supports the hypothesized relationship between anxiety measures. These findings are summarized in Table 3 below.

It was expected that scores on scales that measure impulsivity would correlate (but not to the same degree as anxiety measures) over the course of time for each individual subject. Therefore, Pearson's correlations between scores on the Discan impulsivity measure and on the BPI-ImE were examined for every individual subject. Again, this was done by collapsing across all eight assessment sessions. For the total group of subjects ($n=41$) there were only 10 individuals (24% of the sample, including 9 students and 1 clinical participant) who showed a statistically significant relationship between their Discan impulsivity scores and their BPI-ImE scores, (3 individuals (30%) at $p<.01$ and 7 individuals (70%) at $p<.05$, 1-tailed tests). The r values for these correlations were high and ranged from .6281 to .9367 (Appendix P). Of the remaining 31 individuals (76%) who did not demonstrate a statistically significant relationship between their scores on measures of impulsivity, 5 of these had r values between .5257 and .5980 with corresponding p -values ranging from .059 to .090. These correlation coefficients are large enough to suggest that a relationship may exist, however, there may have been too few assessments to determine statistical significance. The remaining 26 subjects had correlation coefficients lower than .5 between their Discan impulsivity scores and BPI-ImE scores. The r values for this group of individuals ranged from .0000 to .4915

(Appendix P) and the mean r for individuals' non-significant correlations between impulsivity measures was .2960. These correlations were very low and do not provide much support for the hypothesis that anxiety measures will be strongly correlated. Possible explanations for the weak r values are discussed in the discussion below. The findings of these individual analyses are summarized in Table 3 below.

Examining Discriminant Validity of Discan Measures, Single-Subject Design

In order to measure discriminant validity of Discan anxiety scales, Pearson's correlations between measures of anxiety and measures of impulsivity were calculated for each individual subject. It was expected that scores on individuals' Discan anxiety scales would not correlate with scores on the BPI-ImE scale. As was expected, very few of these correlations were statistically significant above the .05 significance level. For the two subject groups combined ($n=41$), the correlation coefficients between Discan anxiety and the BPI-ImE were non-significant at or above the .05 significance level for 37 individuals (90% of the sample, 31 students and all 6 clinical participants) of the student and clinical groups combined ($n=41$). The r values for these correlations ranged from .0000 to .5916 with a mean r value of .2922 (Appendix P). Only 4 individuals' coefficients were significant (3 at $p<.05$ and 1 at $p<.01$) with r values ranging from .6869 to .8242 (Appendix P). The strength of the majority of correlations between Discan anxiety and the BPI-ImE suggests that there is little or no relationship between the two measures, as was hypothesized. These findings are also summarized in Table 3 below.

As a measure of discriminant validity for Discan impulsivity scales, it was expected that individuals' Discan impulsivity scores would not correlate with scores on the STAI-S

scale. For the two groups of subjects combined ($n=41$), there were 34 individuals (83% of the sample, 29 from the student sample and 5 clinical) with non-significant correlations between scores on these measures. The r values for these correlations ranged from .0185 to .6138 with a mean r of .2715 (Appendix P). These correlations are all very small, which was consistent with the hypotheses. Seven individuals (17%) had significant correlations (5 individuals (71%) were significant at $p<.05$ and 2 (29%) at $p<.01$). The r values for these correlations ranged from .6557 to .8413 (Appendix P) which were unexpectedly high but only for this small proportion of the sample. Table 3 summarizes the results of this analysis.

As an additional measure of discriminant validity for both Discan scales, it was expected that Discan anxiety scores would not correlate with Discan impulsivity scores. For the two groups combined ($n=41$) there were 10 individuals (24% of the sample, 9 from the student sample, 1 clinical), with significant correlations between scores on these measures all at $p<.05$. The correlation coefficients for these correlations ranged from .6230 to .7759 (Appendix P) which were quite high but only for this small number of subjects from the total sample. The remaining 31 (76% of the sample) correlation coefficients were non-significant, as was expected. The r values ranged from .0000 to .6162 with a mean r value of .2456 (Appendix P). These correlations were very weak as was hypothesized. These findings are summarized in Table 3 below. The correlation matrices for all individuals may be found in Appendix P.

Most of the individual relationships between scores on the four assessment measures followed the expected patterns (refer to Table 1) to a statistically significant

degree and, again, they provide support for the validation of Discan as a measure of anxiety and of impulsivity. The strength of the correlations was higher for the correlations between measures that purport to measure the same constructs and correlations were weaker among those measures that were designed to assess different constructs from one another. The following Table 3 summarizes the patterns of relationships found among the four scales in the context of the “expected patterns” depicted in Table 1 above.

Table 3

Summary of Correlational Relationships Among Scales for Individuals (n=41)

scale	Measures of Anxiety:		Measures of Impulsivity:	
	1. Discan Anxiety	2. State-Trait Anxiety Inventory	3. Discan Impulsivity	4. BPI Impulse Expression
2.	83% significant from .67 to .96 (mean = .84)	---	---	---
3.	76% non-significant from .00 to .62 (mean = .25)	83% non-significant from .02 to .61 (mean = .27)	---	---
4.	90% non-significant from .00 to .59 (mean = .29)	83% non-significant from .05 to .59 (mean = .28)	24% significant from .63 to .94 (mean = .77) 76% non-significant from .00 to .59 (mean = .30)	---

Visual analysis of the individual data

Compelling arguments for the use of visual analysis of data have been made and are reviewed in the introduction of this paper. For the present study, an important aspect of data analysis included the visual analysis of the data scatterplots for every individual subject. Some examples of these scatterplots are provided in Appendix Q. By visually examining these scatterplots, it was possible to draw conclusions about the manner in

which the assessment measures were behaving over the course of the eight assessment sessions. Using visual analysis, it was possible to examine the relationships between the measures of anxiety, between the measures of impulsivity and between all scales combined.

In order to visually inspect the data in the scatterplots, pairs of scores were examined for each possible combination of two measures at a time. For examining concurrent validity of Discan measures, the scores on Discan anxiety measures and the STAI-S were compared at each single time of assessment for each individual's scatterplot.

The same method was used to examine the relationship between scores on Discan impulsivity measures with the scores on the BPI-ImE. To examine the discriminant validity of Discan measures, the scores on Discan anxiety measures and the BPI-ImE were compared at each single time of assessment for each individual's scatterplot. This procedure was used to examine the relationship between the scores on the Discan impulsivity measure with scores on the STAI-S, and again for the scores on Discan anxiety and Discan impulsivity measures.

There were two criteria set for examining a relationship between any two sets of scores from the four measures used in the present study. The first criterion was the examination of the proximity of each set of scores to one another. Specifically, if two scores at a single assessment occasion were very close together on the scatterplot, then visually, they appeared to be measuring the construct at a similar level or intensity at that particular session. Scores that were roughly one standard deviation away from the mean were thought to be proximal and those that appeared to be greater than one standard

deviation away from the mean were not. Scores that fall within close range of one another in this manner are called concordant scores and are likely to be highly correlated (Rachman & Hodgson, 1974). This concordance between two scores alone is not sufficient for making judgments about the validity of the Discan measures. When this pattern between pairs of scores was repeated over the course of several consecutive assessment sessions, in other words, when the scores on the two measures co-vary, then the strength of the relationship between measures becomes evident. This pattern of co-varying scores, or similar changes over the course of repeated assessment, is called synchrony (Rachman & Hodgson, 1974). The greater the number of assessment sessions with scores that are synchronous, the greater the concurrent validity of the scales.

Similarly, if two scores at a single assessment occasion were not close together on the scatterplot, then visually, they appeared to be measuring either separate constructs or the same construct at two different levels of intensity at that particular session. Scores that do not fall within close range of one another in this manner are called discordant scores and are not likely to be highly correlated (Rachman & Hodgson, 1974). This discordance between two scores alone is not sufficient for making judgments about the validity of the Discan measures. A pattern of scores that vary independently is called desynchrony (Rachman & Hodgson, 1974). When this discordant pattern between pairs of scores was repeated over the course of several consecutive assessment sessions, then desynchrony between measures becomes evident (Rachman & Hodgson). Consecutive assessment sessions with scores that are desynchronous can be interpreted as evidence for

the discriminant validity of instruments that were not expected to measure the same construct.

The second criterion set for the examination of the validity by way of visual analysis was the positive and negative variability or fluctuations in the pairs of scores. When scores on measures covary in the same direction, this provides evidence for the concurrent validity of these measures. When scores do not vary in the same direction from session to session, the measures are likely measuring distinct constructs. It may also be possible, but not likely that those instruments were measuring the same construct at different intensities over the course of time. This desynchrony between scores on instruments that are designed to measure different constructs is a means of examining discriminant validity. Results from the visual analysis of the four measures in the present study are summarized below.

Examining Concurrent Validity of Discan Measures Using Visual Analysis

Using visual analysis as the basis for drawing information about the concurrent validity of Discan anxiety scales, there is strong evidence to support the notion that Discan anxiety scales are validly measuring the construct that they purport to measure. In 100% of the individual cases there appears to be a significant relationship between scores on Discan anxiety measures and STAI-S scales. More specifically, in 32 (78% of the sample) of the 41 individual cases there appears to be synchrony between Discan anxiety scales and STAI-S scales over the course of all eight assessment sessions. Only 9 of the 41 scatterplots (22% of the sample) show one assessment occasion with discordant results between the measures of anxiety. As a result, pairs of scores between these two measures

were almost always concordant which provides further evidence for the synchrony between measures. None of the scatterplots show more than one assessment occasion with discordant results between the measures of anxiety. This is strong evidence in support of the hypothesis and may be greater than the evidence provided by statistical analyses between Discan anxiety and STAI-S scales which indicated a statistically significant relationship in only 83% of the individual cases.

Using visual analysis as the basis for drawing information about the concurrent validity of Discan impulsivity scales, there is strong evidence to support the hypothesis that Discan impulsivity measures are measuring the same construct and in the same way as the BPI-ImE. To summarize, in 36 (88% of the sample) of the 41 individual cases there appears to be concordance between pairs of scores on Discan impulsivity measures and BPI-ImE scales. Only 5 of the 41 scatterplots (12% of the sample) show more than three assessment occasions with discordant results between the measures of impulsivity. There were 17 individuals (42% of the total sample) who showed concordance between pairs of scores on both scales over the course of all 8 assessment sessions (100% of the sessions). There were 9 individuals (22% of the sample) who appeared to have just one of their assessment sessions showing discordant results. There were 6 individuals (15% of the sample) who appeared to have discordant results upon 2 of their 8 assessment occasions. Finally, there were 4 individuals (10% of the sample) who appeared to have discordant results on 3 of the 8 assessment occasions. This means that 88% of the subjects had at least 62.5% concurrent results between pairs of scores on the impulsivity measures. There were 78% of the subjects who had concurrent results on at least 75% of the pairs of

scores on their impulsivity assessment occasions. There were 64% of the subjects who had concurrent results upon at least 88% of their assessment occasions. These results provide evidence of the synchrony between the impulsivity measures, which provides support for the concurrent validity of the Discan impulsivity measure. This provides strong evidence in support of the hypothesis that may indeed be greater than the evidence provided by statistical analyses between Discan impulsivity and BPI-ImE scales. The statistical evidence demonstrated a significant relationship in only 24% of the individual cases, whereas using visual analysis, it appears that there is evidence for the concurrent validity in at least 88% of Discan measures..

Examining Discriminant Validity of Discan Measures Using Visual Analysis

Visual analysis was important when looking at the discriminant validity of Discan measures, although, because of the complexity of the data, it was much more difficult to decipher information about discriminant validity of the scales from the scatterplots (Appendix Q). Although statistical analyses provided strong support for the discriminant validity of Discan scales, the use of visual analyses helped to confirm the evidence for the discriminant validity of Discan scales. The scores on measures of anxiety and measures of impulsivity are discordant at most of the individual assessment sessions and are desynchronous over the course of time. As a result of the complexity of these plots, a summary of the number of individuals showing discriminant validity of Discan scales will not be given. As an example, however, the data in the scatterplots Q37a and b for Subject #37 (Appendix Q) demonstrates the discordant scores between anxiety and impulsivity measures and the desynchrony over the course of all 8 assessments. This example

provides support for the discriminant validity of Discan anxiety and Discan impulsivity measures.

Qualitative Analyses as a Supplemental Means for Interpreting Data

In order to help to explain any possible discrepancies between scores on the two anxiety measures, two qualitative oral questionnaires were administered. There was a repeated qualitative oral questionnaire administered after each assessment occasion. This questionnaire asked subjects to indicate what events had been occurring in their lives in the recent past that may help to explain their levels of stress and anxiety. Using this qualitative component of the assessment session, subjects who responded dissimilarly to the two anxiety questionnaires were usually able to provide an explanation for their responses. Examples of this type of explanation are given below.

The second oral qualitative questionnaire that was administered asked participants to explain how they felt about the assessment measures that they had been using. When subjects had completed all eight assessment occasions, they were asked to indicate which of the two scale formats was (1) preferred for measuring their stress and anxiety and (2) easiest to use and understand. Subjects were given three response options which included (1) Discan cards, (2) paper and pencil questionnaires and (3) both or neither. The students who completed the study (n=35) preferred the Discan cards (n=27) over the paper and pencil method (n=7) while only one subject chose the both/neither category. Most of the students (n=21) reported that they found the Discan scales easier to use than the paper and pencil methods (n= 12) and 2 of the students selected the both/neither category.

Results for the clinical sample (n=6) were comparable to those of the students, with two thirds (n=4) indicating a preference for the Discan cards, 1 individual preferred the paper and pencil method and 1 individual chose the both/neither category. Similarly, two thirds (n=4) of the clinical group indicated that they found the Discan cards easiest to use and understand for measuring their stress and anxiety. One third (n=2) of the clinical group indicated that the paper and pencil method was easier to use.

The pooled information from statistical analyses, visual analyses and the corresponding qualitative responses allowed for a deeper understanding of the nature of measurement of the anxiety scales and the relationships among them. Although there were rarely statistically significant discrepancies between measures of anxiety for most of the participants in the study, there were occasionally a few. The combination of visual analysis of the data and examination of the responses to both of the qualitative analyses were helpful in explaining some of the discrepancies between measures. For the 7 subjects for whom there was no statistical correlation between measures of anxiety, some explanations were offered in explanation of anxiety score discrepancies. For example, Subject # 1 had a correlation coefficient between anxiety measures was non-significant ($r=.5366$, $p=.085$). Despite this, visual analysis of the data shows a very close relationship between the two anxiety measures over the course of time, with the exception of assessment occasion #6 (refer to the scatterplot Q1a in Appendix Q).

Upon her 6th assessment session which showed discrepant results, this subject explained that the STAI-S was high because “it seemed to measure my feelings that I experience all of the time” but that her Discan anxiety was low because “it is measuring

my response to stress which I am not experiencing this week". She proceeded to explain that this had "not been a very stressful week for me, just a little." Therefore, her low Discan anxiety score was a more accurate reflection of the level of anxiety she was experiencing and the elevated STAI-S score was a reflection of the way that she views herself, or, in other words, the STAI-S seemed to be measuring trait anxiety for her on this particular assessment occasion. Upon the final assessment session, in response to the second qualitative questionnaire this subject also explained that "the STAI-S is more relevant to the overall stress and anxiety that I experience. The Discan anxiety measure is closer to the way I *respond* to stress and often I can hold that back [control it]." This subject also found the STAI-S easier to use and understand than the Discan methodology, which may have explained why she felt the STAI-S was measuring her stress and anxiety more accurately on assessment occasion #6 even though her verbal explanation was inconsistent with her elevated STAI-S score.

In order to further illustrate the strength of information gleaned from the combination of statistical, visual and qualitative analyses, the following example is provided. Subject # 4 demonstrated a relationship between anxiety measure scores that approached significance but were not statistically significant ($r=.5105$, $p=.098$). Visual analysis of her data indicates that a strong relationship between her measures of anxiety exists, with possibly, the exception of assessment occasion #3 when her Discan anxiety is higher and her STAI-S score is lower (refer to scatterplot Q4a in Appendix Q). On her third assessment occasion, she responded to the qualitative questionnaire by revealing that her "school work was stressing me out" and therefore the elevated Discan measure was

more accurately reflecting her true experience of anxiety than her low STAI-S score. Her responses to qualitative questionnaires follow the same pattern as described for subject #1 above. She explained that “the STAI-S is a better measure of the way I feel generally or all of the time whereas Discan anxiety measures my stress and anxiety specifically and how it changes from week to week.” These types of qualitative explanations of discrepant results were useful in determining whether or not a scale was perceived as measuring a particular construct.

In order to simplify the experimental tasks for the participants in this study, qualitative questionnaires were not used to assess perceptions or opinions about the impulsivity scales. Future research might include some qualitative questionnaires regarding the usefulness of impulsivity scales.

Discussion

Summary of Support for the Validation of Discan Measures

The present study was designed to examine the validity of Discan measurement scales. The results of the present study provide strong support for the concurrent and discriminant validity of Discan anxiety and Discan impulsivity scales. Findings from the combinations of statistical, visual and qualitative analyses confirm the expected relationships among scales (refer back to Table 1).

Referring back to the hypotheses stated earlier, it was expected that scores on the Discan anxiety measures would correlate strongly with scores on the STAI-S scale. This was because each of the Discan anxiety measures were idiographically designed to assess the participants’ unique experience of state anxiety. As a result of this, it was expected

that Discan anxiety measures would be sensitive to the fluctuating levels of state anxiety related emotions, behaviours and thoughts that were experienced by the participants. Pearson's correlations for the total group of subjects, for the student group and for the clinical group of subjects all provided strong support for this hypothesis. Statistical analyses provided strong support in favour of the concurrent validity of Discan anxiety measures. Almost all correlations between scores on the anxiety measures for each of the assessment occasions for the two subject groups combined were highly significant (Appendix L1). The off-diagonal correlations were all non-significant which means that the correlations between anxiety measures were correlated only at the same times of assessment and not at other times (Appendix L1). This provided further support for the concurrent validity of Discan anxiety measures as a state-type measure. Correlations between anxiety measures for the student group (Appendix M1) and the clinical group (Appendix N1) were also supportive of the concurrent validity of Discan anxiety measures. The single-case correlations were another source of support in that 83% of participants had statistically significant r values for correlations between anxiety measures (Appendix P). Using visual analyses, all of the individuals' scatterplots showed evidence of synchrony between the anxiety measures (Appendix Q). The qualitative analyses provided further support for the face validity of Discan anxiety scales because of the perceived ease in using Discan measures and the perceived accuracy of Discan anxiety scales for measuring the participants' subjective anxiety experiences.

As a second means for assessing the concurrent validity of Discan scales, analyses between the Discan impulsivity measures and the BPI-ImE were conducted. Because the

Discan impulsivity measure was designed using content from the BPI-ImE, it was hypothesized that scores on the Discan impulsivity scale would correlate strongly with scores on the BPI-ImE scale. These correlations were not expected to be as strong as those between measures of anxiety, however, for two reasons. The first is that the Discan impulsivity measure was not idiographically designed and therefore not as likely to target the subjective experiences that were relevant to each individual participant. Secondly, the Discan impulsivity measure was designed based upon the BPI-ImE which is a trait-type measure, designed to assess a personality construct, impulsivity. The problem with this is that these scales are not as likely to show as much variability or fluctuation over the course of the assessment sessions because impulsivity is described in the literature as a stable, trait type variable. As a result, the impulsivity measures were expected to be synchronous, to vary in the same way over the course of time, but they were not expected to show as much strength of association as the two anxiety measures in correlational analyses.

Despite the expected patterns of scores for these measures, Pearson's correlations for the total group of subjects (Appendix L2), for the student group (Appendix M2) and for the clinical group of subjects (Appendix N2) all provided strong support for the concurrent validity of Discan impulsivity scales. For example, all of the Pearson's correlations between scores on impulsivity scales were statistically significant for the total group of subjects, within groups design. However, these findings must be interpreted in the context of the off-diagonal correlation coefficients between impulsivity measures. These off-diagonal correlations represent relationships between pairs of scores at different

times of assessment. Most of these off-diagonal correlations between scores on impulsivity measures were statistically significant. This finding does not support the concurrent validity of Discan impulsivity measures because it suggests that scores on impulsivity measures correlate at the same time of assessment and at different assessment times as well. These findings were expected, however, because Discan impulsivity and the BPI-ImE measure a personality construct that should be stable over the course of repeated assessments. Results from the single-case design do not support the concurrent validity of Discan impulsivity measures to the same degree as the group analyses. This is likely due to the fact that there was decreased variability in the impulsivity scores and too few data points to reliably correlate the scales. Another plausible explanation may be the fact that the impulsivity measures were not as personally relevant as the anxiety measures.

Despite evidence that suggests that impulsivity is a stable trait type variable, the scatterplots in Appendix Q revealed that there is a large amount of variability among the impulsivity measures. Using the criteria set about for visual analyses of the individual plots of the data, about 88% of the individuals' plots showed evidence of a strong relationship between the two impulsivity scales. Impulsivity measures were noted to be synchronous over the course of time but with less frequent positive and negative fluctuations. The impulsivity measures were less synchronous, however, than the anxiety measures. This can account for the difference in the number of statistically significant correlations between impulsivity measures as compared to anxiety measures. As a result of these findings, there is clear evidence for concurrent validity of the Discan impulsivity.

In summary, as a result of the findings between measures of anxiety and between measures of impulsivity, there is strong support for the concurrent validity of Discan anxiety and Discan impulsivity scales. These results imply that idiographic Discan measures that are carefully fashioned to assess a specific construct such as anxiety can be used in a valid and reliable way. The results reviewed above also imply that pre-designed Discan measures, such as the impulsivity measure used in this study, can be used in a valid and reliable way. From these results of analyses designed to examine the concurrent validity of Discan scales it is clear that the Discan scales are measuring the constructs that they were designed to measure.

Although there was strong evidence in support of the validity for Discan impulsivity scales, it was not as strong as for the anxiety scales. There may be several explanations for this finding. Unlike the Discan anxiety scales, the Discan impulsivity scale used in this study was not idiographic. The Discan impulsivity scale was pre-designed in order to accomplish two things. Firstly, it must be restated that impulsivity was chosen as a construct for measurement because it had been reported to have low correlations with anxiety, which was the main construct of measurement in the present study. Because it was assumed that anxiety and impulsivity would be unrelated to one another, it was not expected that the participants of the study would necessarily be able to relate to the concept of impulsivity or spontaneity. It was not expected that participants would feel that the issue of impulsivity was relevant enough for them to be able to negotiate the necessary four levels of severity of impulsivity for a Discan scale. Therefore, to avoid such problems, a preconstructed Discan impulsivity scale was thought to be a

better choice than using idiographically designed ones. Secondly, the concept of impulsivity or spontaneity is likely to be interpreted in a broader fashion than the commonly discussed concepts of stress and anxiety, and the types of issues that might become a part of a Discan representation of impulsivity would likely be vastly different from individual to individual. This differentiation between individuals on idiographically designed impulsivity measures would not normally be problematic. It was not acceptable for the present study, however, because the present study was relying upon correlations between Discan impulsivity and impulsivity as measured by the BPI-ImE. Therefore, it was necessary to follow the BPI-ImE as a formula for designing the preconstructed Discan impulsivity scale. Possibly as a result of using a pre-constructed Discan impulsivity scale, the results of the analyses between measures of impulsivity were less straightforward than the results using measures of anxiety.

The discriminant validity of Discan anxiety and impulsivity measures was examined. Discan is a specific measurement instrument that is designed to assess one construct at a time. It was important, then, to determine that the Discan measures were able to assess specifically defined constructs. This was done by examining the discriminant validity of Discan measures. It was hypothesized that there would be no or low correlations between scores on (1) the Discan anxiety scale and the BPI-ImE scale, (2) the Discan impulsivity scale and the STAI-S, and (3) Discan anxiety scales and Discan impulsivity scales. Pearson's correlations for the total group of subjects, for the student group and for the clinical group of subjects all provided strong support for this hypothesis. For example, all of the Pearson's correlations between scores on Discan anxiety and BPI-

ImE were statistically non-significant for the total group of subjects. There were about 63% non-significant correlations between scores on Discan impulsivity scales and the STAI-S for the total group of subjects. Finally, there were 100% statistically non-significant correlations between scores on Discan anxiety and Discan impulsivity scales for the total group of subjects. These results are strengthened by the non-significant off-diagonal (different times of assessment) scores as well. Although the use of visual analysis was slightly more difficult in this circumstance the scatterplots clearly demonstrated that the majority of anxiety scales and impulsivity scales did not vary simultaneously or concurrently. This provides additional support for the discriminant validity for Discan anxiety and impulsivity measures as well.

Further support for the validation of Discan scales comes from the increased reliability with which the Discan scales were administered. Discan scales are able to be administered with a high level of internal reliability by increasing the number of paired responses that are administered in order to obtain a single Discan score. By administering all, or almost all of the possible comparisons during the present study, it was attempted to achieve the highest possible level of internal reliability. In fact, there were merely 5 separate assessment occasions that requires readjustment of the responses during the entire course of the research project. This increased reliability provides additional support for the validity of the Discan scales. This is because the validity of a measure is dependent upon having strong reliability as well. Without the high reliability that was achieved in the present research, the results of the validity assessments would be questionable.

In summary, the results of the various statistical and visual analyses that were used in the present study were helpful in examining the concurrent and discriminant validity of Discan anxiety and impulsivity measures. There was evidence to suggest that Discan anxiety and impulsivity scales can assess the constructs that they were designed to measure in a valid and reliable way.

Visual Analysis as an Aid in Interpreting Results

The graphical representation of the data provided confirmation for the concurrent validity of Discan anxiety and impulsivity scales. Based upon graphical evidence for the synchrony between Discan anxiety and STAI-S scales, Discan anxiety scales can be said to be validly measuring what they purport to measure. The scatterplot Q11a for Subject #11 (Appendix Q) provides a graphical example of the type of relationship that was commonly found between Discan anxiety scales and STAI-S scales. The r value for the relationship between the two scales in this plot was .8799 which was significant at $p < .01$. The information provided in the scatterplot provides confirmation of the significant relationship between these two measures.

The visual analysis of the relationship between anxiety measures does more than confirm the findings of the statistical analyses. Visual analysis also provides strong evidence that some of the correlations that are found to be statistically non-significant may actually be a misrepresentation of the relationships that clearly exist between the measures. This is to say that the statistical means with which the scale validity is tested may be inadequate to show the true strength of the relationships that occurred between the scales. There are a number of reasons for the possible statistical shortcomings, such as the fact

that there were only eight assessment sessions on which to collect scores on all of the measures as well as small sample size in some instances. Increasing the number of assessment sessions might have increased the statistical strength of the analyses. In any case, there is visual evidence to show that a strong relationship exists between the measures of anxiety even when there is no statistical evidence to back this up. For example, the scatterplot Q46a for Subject #46 (Appendix Q) shows a strong relationship between the two anxiety measures, yet the r value for the correlation was .5883 which was accompanied by a non-significant p -value of .062.

The use of visual analysis was particularly important in evaluating the concurrent validity of Discan impulsivity measures. This is because the statistical analyses that were designed to evaluate the concurrent validity of Discan impulsivity measures were not adequate in representing the true patterns that were evident through the use of visual inspection. The statistical relationship between scores on impulsivity measures (at the same time of assessment) were significant, however, the off-diagonal correlations were as well. This was problematic because it was difficult to tell if the same-time of assessment correlations were significant as a result of the relationship between the measures or because the measures were producing scores that were stable over the course of time. By visually inspecting the scatterplots of the data, however, it was possible to determine that there was a relationship synchronous between the impulsivity measures that provides evidence in support of the concurrent and discriminant validity of Discan impulsivity measures.

The results of the group statistical analyses between measures of impulsivity showed strong statistical evidence that the scales were related and statistically supported the validity of Discan impulsivity scales. However, for each individual subject, the statistical support for this hypothesis was not as strong. There may be several reasons for the lack of strength of the relationship between impulsivity scales when looked at statistically on an individual basis. It is likely that the low number of assessment sessions (eight) with which to make correlations was in part responsible for the low numbers of statistically significant correlations. Using such a small number of data points makes it more difficult to detect statistical significance, even when a strong relationship between the variables exists. Another reason that the statistical analyses between measures of impulsivity may not have been as strongly significant as for the anxiety scales may have to do with the fact that there was generally less *movement* or scatter in the scores among the impulsivity scales. The degree of impulsivity that a person experiences may vary somewhat over the course of time but it tends to be a personality characteristic, which is generally more stable than transient. This means that there should be less fluctuation within an individual's impulsivity scales than within their anxiety scales. The scatterplots of the data confirmed that more of the movement (or scatter) of the data occurred within the anxiety construct and less occurred within the impulsivity construct. Because the strength of statistical correlational analyses is partially dependent upon obtaining variation in the data, the low variability of the impulsivity scales may have accounted for some of the lack in statistical significance. Despite this, there was some positive and negative fluctuation in scores on the impulsivity measures. As a result of the drawbacks of

statistical analysis in this circumstance, visual analyses of the relationship between the impulsivity scales for individuals was more revealing in some ways than the correlational statistics. For example, the scatterplot Q33b for Subject 33# (Appendix Q) clearly demonstrated a strong relationship between the two impulsivity measures, yet the r value for the correlation was .5257 which was accompanied by a p -value of .090 which just approached statistical significance yet was non-significant.

Further usefulness of the visual analysis technique becomes evident when there is a very low r value for the correlation between the scales and the p -value is quite high. As an example, scatterplot Q17b for Subject #17 (Appendix Q) had an r value of .3536 and $p=.195$ that did not even approach statistical significance and yet there is a visible relationship between the impulsivity scores as measured by the Discan impulsivity scale and the BPI-ImE. Subject #1 provides another example of this pattern. In this scatterplot Q1b (Appendix Q), there is no statistical significance between the scores on the Discan impulsivity scale and the BPI-ImE scale ($r=.3675$, $p=.185$) and yet there is a great deal of evidence in the scatterplot to suggest that the scales are measuring the same construct, and in the same manner. In the scatterplot Q1b for Subject #1, the scores follow a synchronous pattern over the course of time with the exception of the fifth assessment session. Clearly, visual inspection of the data is necessary in these circumstances to draw important information about the scales being used. When visual inspection of the data is taken into account in this example, the validity of the Discan impulsivity scale is confirmed for this particular subject. This pattern becomes even more apparent in scatterplot Q29b for Subject #29 (Appendix Q). In this example the r value for the correlation between

Discan impulsivity and BPI-ImE was .0000 and the p-value was .500 which indicates no statistical relationship whatsoever. Clearly, visual analysis of this scatterplot can contribute some additional information concerning the relationship between the scores on the two scales.

In summary, visual analysis is useful for inspecting the graphical information and for making judgments about the measures used. By visually inspecting the scatterplots, it was possible to confirm findings from statistical analyses and to provide additional information as well. The use of visual analysis provides commonsense information about the measures used in the study. Visual analysis can have particular importance with regard to the inspection of Discan measures. This is because Discan measures are not compared to normative data and the interpretation of the changes in scores over the course of assessments is subjective. It has been explained that results from measures that are not interpretable through visual analysis often have little clinical value (Ottenbacher, 1992). As a result, it is important that scores on Discan measures are readily interpretable through visual inspection of the data.

Research Limitations and Suggestions

The present study was designed to assess the concurrent and discriminant validity of Discan measures. To accomplish this task, two unrelated constructs were selected for measurement. The selection of two appropriate constructs for measurement was limited by the accessibility of a large group of participants who were all experiencing two distinctly non-correlated problems. Individuals experiencing elevated anxiety were not difficult to recruit and, as a result of this, anxiety was chosen as the main construct for

assessment in the present study. It was necessary to measure a construct that was not correlated with anxiety. Impulsivity was chosen as a the second measure because of its low correlation with state and trait anxiety (Jackson, 1989). Impulsivity, however, is a trait-type construct which is supposed to be stable over the course of repeated assessment. As a result of this, impulsivity is not particularly suitable for measurement with Discan scales because Discan is an instrument designed to measure and monitor ever changing states over the course of time (Singh & Bilsbury, 1989a). Discan was not designed for use as a measure of trait type variables whose values tend to remain stable over the course of repeated assessments. Recommendations for future research using Discan would include assessing state type variables, as opposed to trait type variables.

The statistical criterion used in the present study to determine the non-significance of the off-diagonal correlations was an alpha level of .05. In order to accept the null hypothesis, which was the goal for this particular analysis, a more stringent criterion should be applied. An acceptable alpha level for accepting the null hypothesis is .1. The use of this more stringent level should be considered for future research.

One of the unexpected findings in the present study was the significant relationship between scores at the same time of assessment on the STAI-S and the BPI-ImE measures. Jackson (1989) reported low and non-significant r values for these correlations. Results of the group correlations in the present study, however, show that these two measures are correlated and related to one another. As a result of this, impulsivity, as measured by the BPI-ImE in the present study, cannot be said to be unrelated to state type anxiety. One possible explanation for this may be that the instructions for the BPI-ImE were altered to

inquire about the participants' levels of impulsivity during a specific time frame as opposed to "in general". This change was made to the instructions so as to create a measure of impulsivity that was sensitive to change in a similar way as Discan impulsivity measures were. The time-context specified in the lead in statement for the Discan impulsivity measure was also designed so that the measure would be sensitive to change. This may have altered some of the relationships that were drawn between scores on the measures used in the present study. Future research in this area may be enhanced by using two measures of state related constructs. This would be more easily achieved in a clinical setting wherein the participants are likely to be experiencing several problems that are measurable by Discan methodology.

Another limitation in the present study was the unequal sample size. In order to examine the concurrent and discriminant validity of Discan measures, it was not necessary to match sample size and characteristics, such as age or gender. Despite this, the unequal samples in the present study were inconvenient for several reasons. For example, there were too few individuals in the clinical sample to draw conclusions from all of the analyses conducted. Although there were no differences expected between groups, it may have been interesting to examine the possibilities. It is possible, for example, that the student and clinical samples were different in some way with regard to their relationships between anxiety and impulsivity measures. To examine such possibilities, future research should include equal sample sizes, or at least larger samples.

The results of the present study could have been strengthened by incorporating interrater reliability. It may have been the case that the rater of all of the assessment scales

was biased in favour of detecting support for the hypotheses. In order to correct for this, a second rater of the visual data would be sufficient. In order to safeguard against rater-bias even further, the scoring of all of the assessments could take place after the four assessment scales have been administered. In this way, there could be no opportunity for an experimenter to lead a participant to respond in a particular way to the various questionnaires.

Generalizability of the results of this study should be limited to similar cultural environments. Measures with which assessments were made in the present study may have cultural biases built in to them. The administration of Discan is subject to subjective biases as well. This bias must be considered when using Discan in either a clinical or research setting.

Conclusions

The combination of statistical, visual and qualitative analyses in the present study was useful in examining the concurrent and discriminant validity of Discan anxiety and impulsivity measures. The single-case and group designs that were employed provided an opportunity to examine group correlations and individual statistical and graphical results. The relationships among scores on the two Discan scales and the comparison measures, the STAI-S and the BPI-ImE, have provided strong support for the usefulness, reliability and validity of Discan measures. These results have suggested that idiographic Discan measures can be constructed and administered in a reliable and valid way. More specifically, the idiographically designed Discan anxiety measures appeared to have a greater level of concurrent validity than the pre-designed Discan impulsivity measure. This

suggests that the idiographically designed measures are more responsive to the changes that are taking place over the course of repeated assessments than the pre-designed Discan measures. It was also noted that the validity of Discan measures is increased when the construct of measurement is a state-related variable. It is likely the case that the more stable the construct of measurement, the less likely it will be subject to repeated assessments. Therefore, the Discan measurement process is able to assess changes in a trait type variable but it is better suited to measuring state type variables. Finally, the limitations of the present study did not seriously impede the goals of this research. Recommendations for future research, however, could enhance the generalizability of the findings.

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Appendix A

Discan Methodology and Administration

Discan methodology has been described in detail in Singh & Bilsbury (1898a; and 1989b) but will be summarized briefly here. The first step is to select one or more problem dimensions (ie. individual problems that are relevant to therapy). Next, a Discan scale is constructed for each. This is a process that is conducted in partnership with the client so that ultimately the scale components have been negotiated and agreed upon by both the therapist and the client (Singh & Bilsbury, 1989a).

When constructing a Discan scale for a specific problem, that problem is broken down into levels of severity, called "reference levels". A client's problem-continuum is divided into a set (two, three, four or five) of levels which are ordered according to their intensity or severity. This is done by asking the client questions that lead them to describe the worst imaginable level of the problem, their goal state and some realistic steps in between the most severe and least severe levels. For example, the typical questions that might be phrased include; "What is the worst imaginable way that you can describe this problem?" and "If the problem were to be at its best, or even gone away altogether, how would you describe that?". In order to determine some intermediate levels, typical questions might include; "If you were a little bit better, but not much, how would you describe that?" and "If your problem was almost gone, but not entirely, how would you be feeling?" Most commonly, and optimally, four levels of severity are used.

In the best possible case, a client will be able to offer several thoughts or ideas in response to the questions about their problem. These thoughts or ideas are hand-written

by the clinician onto index cards. Each level is recorded onto a separate index card. Every attempt must be made not to alter the natural phrasing of the client's descriptions of the levels of their problem. Keeping the levels in the client's own natural language is an important part of the Discan methodology. This means that the "anchor points" along the continuum are actually phrased in the client's own words and they truly represent an accurate and understandable definition of the different intensities of the client's problem. Sometimes the client will require help in keeping the reference levels simple, concise and on track with regard to the problem that is being measured. If there are too many ideas or issues represented in a single reference level, this may become problematic when the Discan scale is later administered. The clinician should therefore attempt to keep the client on track and to deal with specific problems, one at a time. The therapist should also ensure that each of the reference levels are distinct from one another and are rank ordered in terms of their intensity. Note that this is different from traditional scale anchor-points because Discan reference levels do not involve magnitudes or numerical values. This is because the relative spacings between reference levels are unknown. When discrepancies occur between the ideas of the client and the clinician, it should be attempted to clarify these so that there is minimal chance of measurement error during scale administration. The most frequently used number of reference levels is four for reasons of simplicity, increased reliability and decreased chance of error. This process of delineating reference levels for a single problem can be repeated for additional, separate problems. Problems can be related to one another, as long as they are distinctly different from one another to ensure that they do not measure the same thing.

The second step in the Discan scaling process is the construction of a brief “lead-in statement”. This lead-in statement simply puts the reference levels into context, such as the time frame or specific situation in which the problem may occur. For example, a lead-in statement can put the problem into the context of the recent past (“Over the last two weeks I have been feeling:”); the present (“Today I feel:”); or into the context of the future (“I expect that over the next two weeks I will feel:”). The context will depend upon the client’s specific program, treatment, or other situational factors. Lead-in statements are used to help prepare the client to make decisions between the reference levels.

The third step in the Discan methodology is the administration of the scale. Although there are several different ways to administer the Discan reference levels, all of the methods involve a “repeated comparisons” method. Unlike the Likert and analog scales, Discan reference levels are not all presented at one time. Instead, the reference levels are randomly presented in pairs so that a client has to choose only between two reference levels at a time. The therapist begins this process by placing the lead-in statement and two randomly chosen reference levels before the client on a table or desk. These cards are then read aloud by the therapist who should proceed to ask the client to point to the reference level that they feel best represents their perception of the problem intensity (Singh & Bilsbury, 1989a). The therapist facilitates this process by reading the lead-in statement and the two reference levels aloud so that the problem is phrased as a question. For example, the therapist might ask, “ ‘Over the last two weeks:’ which of these two levels have you felt closer to, ‘Level one, ...’ or ‘Level two, ...’? Point to the

card.” The client is then required to make the decision between the pair of reference levels by responding verbally or by pointing to the chosen level. This process is repeated until several dichotomous comparisons have been made, as specified in the scoring algorithm. In some cases, the algorithm specifies a “Middle” option within a pair comparison. An index card is required upon which the word “Middle” is written. This card is slipped in between two reference levels depending upon the client’s responses to the dichotomous comparisons. By allowing the additional choice of being in the middle of two adjacent reference levels, the sensitivity and precision of the Discan scale is increased.

The final step in the Discan methodology is recording the client’s responses to the dichotomous comparisons which reveals a quantitative score for each problem measured. A special Discan scoring form (photostatically reproduced in Appendix B) is used to record the client’s responses. This scoring form makes it possible to obtain a numerical score and it also has a built-in reliability indicator which ensures that the client does not produce inconsistent responses. When using three reference levels, it is possible to obtain a score ranging from 1 to 10 where a score of 1 indicates problem remission and a score of 10 indicates maximum severity. Likewise, when using four reference levels it is possible to obtain a score ranging from 1 to 14 where 14 indicates maximum severity. The 14 point scale was used in the present study.

This scoring form is a simple graphical device which, when completed, reveals an instant numerical score (Singh & Bilsbury, 1989a). This is accomplished in the following way. When a client responds to the dichotomous comparisons, they essentially choose one of two choices which are also represented numerically on the scoring form. The

clinician must record their response by circling the appropriate number on the scoring form. This process is repeated for each of the comparison responses that the client provides, usually about three or four comparisons (Singh & Bilsbury, 1989a). The more of these comparisons that are used, the more reliable the administration of the scale becomes (Singh & Bilsbury, 1989a). For the purposes of the present study, all possible comparisons were used in each administration of Discan scales.

Once this process has been completed, the clinician must draw a line that connects up all of the circled numerical values. This process of connecting the circles will automatically produce a criss-cross pattern on the scoring form. The criss-cross line that cuts through the center of the scoring form will fall on the client's overall score for the particular problem being measured (Singh & Bilsbury, 1989a). This score can be recorded on a graph of the client's progress or changes over the course of time, as suggested by Barlow et al. (1984).

The scoring form also has a built-in reliability check. If a client responds inconsistently or randomly, the scoring form will produce a pattern that immediately signals the administrator of the inconsistency (Singh & Bilsbury, 1989a). This pattern will appear when the numerical values are connected by a line. It will cross the middle of the scoring-form twice, thereby indicating, falsely, two different scores. When this occurs, the clinician is immediately notified of inconsistent responding and can check for the source of the error. It may be wise to see if the error was in recording the responses, whether the client is confused or responding carelessly or randomly, or whether the reference levels are no longer representative of the client's problems. If the reference

levels are no longer suitable to the client's target problems, they can be modified, or abandoned altogether for a new set of clinically relevant levels (Singh & Bilsbury, 1989a).

The reliability (ie. internal consistency) of a Discan scale (and the chances of detecting such inconsistent responding), is achieved when the full algorithm is used, which maximizes the number of comparisons even though some of them are redundant. Singh & Bilsbury (1989a) use the term "replications" to refer to the comparisons that provide overlapping information. It is explained that using extra comparisons that provide the overlapping information will increase the reliability coefficients for the Discan scales. The reliability coefficients vary, depending upon the type of Discan scale used and whether full or partial replication is employed.

For the purposes of the present study, the full scoring algorithm was used and so all possible replications were employed. This increased the reliability of the Discan scales which can, in turn, affect the validity of the Discan scales as well.

Appendix B

Reproduction of the Discan 4/14 Scoring Form

DISCAN SCORING FORM 4/14

NAME _____

Y/M/D _____ TITLE _____

Step	MRP	Low	High	TRP	Line
					0
III	L1	∞	∞	L1	1
		1	1/2		2
II	L1.5	i	ii	L1.5	3
		1/2	2	L2	4
I	L2	∞	∞	L2	5
		2	2/3		6
II	L2.5	ii	iii	L2.5	7
		2/3	3	L3	8
I	L3	∞	∞	L3	9
		3	3/4		10
II	L3.5	iii	iv	L3.5	11
		3/4	4	L4	12
III	L4	∞	∞	L4	13
		4			14

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Note. The Discan 4/14 form is from "Measurement of subjective variables: the Discan method," by A. C. Singh and C. D. Bilsbury, 1989, Acta Psychiatrica Scandinavica, 79 (Supp 347), p. 22. Copyright 1981 by A. c. Singh and C. D. Bilsbury. Reprinted with permission.

Appendic C

Discan Anxiety Measures

Subject # 1 Student Group, Reference Levels and Lead-in Statement:

Lead-in: Over the last week I have been feeling:

Level 4: Worst Anxiety. Feel like I want to give up and don't care about things right then. Feel worried, scared, heart beating faster, get a headache really easily, tears not controlled. Feel like my mind is not there. Want to be by myself. Don't want to go out with people or do things.

Level 3: Fairly Anxious. Still mingle with people but can't pay much attention to them. respond simply. Feel worried, can't focus, just staring at nothing and thinking.

Level 2: Mild Anxiety. Try to forget anxiety temporarily so I can still do things and be with people. Physical symptoms are not felt yet.

Level 1: Free of Anxiety. Feel happy, satisfied, free. Can do anything I want. No feelings of headache, no loss of appetite, or other anxiety feelings.

Subject # 2 Student Group, Reference Levels and Lead-in Statement:

Lead-in: Over the last day I have been feeling:

Level 4: High Anxiety. Hot flashes, tired. Happens when worried about time pressures or money issues. Avoid certain things (friends).

Level 3: Anxious/ Worried. Still tired, run down. Try to get things done; might call a friend or two maybe. Still worried about things.

Level 2: Slightly Stressed. Partly sociable; might go out for a night but not as talkative. Still thinking about things. Still worried; not that tired.

Level 1: Mildly Worry-free. Happy, but not completely worry free. Can visit, talk, be sociable. Still may worry but very infrequently.

Subject # 3 Student Group, Reference Levels and Lead-in Statement:

Lead-in: Over the last week I have been feeling:

Level 4: Very Anxious. Can get almost nauseous, headaches, migraines, heart rate increases, loss of appetite, nervous feelings. Get grumpy, but still chat with friends.

Level 3: More Anxious. Stressed, things on my mind, a lot of worry. Getting grumpy. No headaches, no sickness, can eat.

Level 2: A Little Anxious. Worry for no real reason but it could still cause a bad mood. No real physical symptoms.

Level 1: Almost Anxiety Free. Easy to get along with, friendly, laugh a lot, content. Still thinking ahead to things but not stressed about them. Eat normally, no headaches, feeling fine.

Subject # 4 Student Group, Reference Levels and Lead-in Statement:

Lead-in: Over the last day or so, I have been feeling:

Level 4: Worst Possible Anxiety. Loss of control, don't know what to do with my life. Shaking, crying, butterflies really bad, sweat a lot, hot and cold. Avoid things, put things off or make reasons not to go. Won't go out sometimes. Feelings of despair.

Level 3: Anxious. Butterflies, sweating. No crying or shaking or hot and cold. Still worry and wonder about things but don't have the despair. Takes a lot for me to go out and do activities, will put them off but will eventually do it.

Level 2: A little Anxious. Still have butterflies, still sweating, clammy. Will usually do activities without too much concern or procrastination. Still worry a little.

Level 1: Low Anxiety. Don't worry as much or at all. Still think of things without being bothered by them. No physical symptoms. Will attend activities.

Subject # 5 Student Group, Reference Levels and Lead-in Statement:

Lead-in: Over the last day I have been feeling:

Level 4: Anxious. Worried, nervous, upset. Heart beats faster. Affects studying, find it hard to remember what you are reading.

Level 3: Moderate Anxiety. Not worried so much, not feeling too upset but still a little bit. Heart beat a little slower. Still a little hard to do studies.

Level 2: A Little Anxious. A little tiny bit worried and upset and nervous. Heart stops beating fast. A little bit hard to do studies, activities.

Level 1: Anxiety Free. Feel relaxed, not nervous. Feel calm inside. Activities not affected.

Subject # 6 Student Group, Reference Levels and Lead-in Statement:

Lead-in: Over the last week I have been feeling:

Level 4: Worried/ Anxious. Feelings of heartbreak, sad, disappointment when things go wrong. Sweating, nervous when in a high anxiety situation. Feelings of discouragement. Affects study ability, sleep.

Level 3: Slight Worry. Not really sad or disappointed. A little discouraged. Just a little nervous, not too bad. Managing to work, study but still worried about it.

Level 2: "What-if". Feel confident but know things can happen, so slightly worried about it. "What-if" type of nervousness. Not nervous. Sleep not affected. Studying is OK.

Level 1: Stress-free. No worries, no nervousness. Feeling happy, content. Activities like study and sleep are OK.

Subject # 7 Student Group, Reference Levels and Lead-in Statement:

Lead-in: Today I have been feeling:

Level 4: Worst Anxiety - High. Panic attacks, can't breathe, hyperventilate, walls closing in, can't get out of it, hard to understand these feelings. Can't do anything like school, social. Heart beat racing, sweaty palms, feel nausea, disoriented, shaky and jittery.

Level 3: Medium Anxiety. Disoriented, can't get things in order. Feel physical symptoms coming on sometimes but usually I'll just hyperventilate or get a really bad pain in stomach. A little nausea sometimes.

Level 2: Mild anxiety. Worried and on edge. Things could go either way really easily - so it is usually controllable at this stage. Get irritable, grumpy mood. Can do work and social activity sometimes with ease other times with difficulty.

Level 1: Really Low Anxiety. Not anxiety free but I feel really good, know what I am doing, feel self confident. Things are in order, can get things done. Feel really calm, relaxed, not nervous or worried.

Subject # 8 Student Group, Reference Levels and Lead-in Statement:

Lead-in: Over the last day I have been feeling:

Level 4: Worst, Highest Anxiety. Really jittery, can't sit still, heart beats fast. Thoughts race through my head, loss of control. Hot, sweaty, shakiness. Can't get the cause of

anxiety out of my head. Hard to concentrate on anything else. Hard to eat. Affects school, social activities. Think irrational, senseless thoughts.

Level 3: Fairly Anxious. No loss of control but still stressful. Feeling physical symptoms coming on, maybe a little warm and sweaty but not shaky. Can still focus on other things if I know I *have* to. Would act different in social situations.

Level 2: Mild Anxiety. Worry or stress but could probably forget about it and do something else. No physical symptoms. Can do activities.

Level 1: Really Low Anxiety. Calm and relaxed. No physical symptoms. Maybe a few worries on my mind. Can get things done more effectively.

Subject # 9 Student Group, Reference Levels and Lead-in Statement:

Lead-in: Over the last day I have been feeling:

Level 4: Really stressed. Self-esteem goes down, feel crappy. Set things aside, like stress etc. Don't feel like doing anything, for example, don't bother going to class. Upset at people, angry with people especially my parents, upset at self too.

Level 3: Medium Stress. Get upset easily but still try not to dwell on stressful things. Not very motivated to get things done. Feel frustrated at times with others and with self especially.

Level 2: Mild Stress. Will try to solve problems, try to do stuff that needs to be done. Feel pretty good about self and not pick yourself apart. Not getting too upset with people, try to let things slide.

Level 1: Stress Free. Feel good, happy, motivated, more energy. Easier to concentrate. Want to go out and do things. Easier to get work done.

Subject # 10 Student Group, Reference Levels and Lead-in Statement:

Lead-in: Over the last day I have been feeling:

Level 4: Worst Anxiety. Sick, throw up, tired, nausea. Feel like head is going to explode, everything happens all at once in my head then I need to sleep or "pass-out". Get fidgety. Get away by sleeping. Feel worried, tense. Can't do work or concentrate.

Level 3: Quite Anxious. Still fidgety, still sleep to relieve stress. No nausea, sickness or head exploding. Still worried and tense. Still can not work or concentrate or maybe just one half an hour of easier work.

Level 2: Mild Anxiety. Able to concentrate a little more on work, manage to get things done. Still have long-term worries. No sickness or physical symptoms.

Level 1: Really Low Anxiety. Able to concentrate and do work. Don't feel any physical symptoms (sickness) but still have sweaty palms etc. Relaxed and calm.

Subject # 11 Student Group, Reference Levels and Lead-in Statement:

Lead-in: Over the last day I have been feeling:

Level 4: Extreme Anxiety. Trapped in time, want to pull hair out. Have a lot of tension, frustrated, worried. Get angry, blow-up at everything especially others. Heart beats faster, feel like I can't breathe, get hot. Have to go off by myself, sit there or lay down.

Level 3: Medium Anxiety. Would have all of the same feelings as Extreme Anxiety but I wouldn't *show* it. I could back off and be by myself. Still want to get away from the situation.

Level 2: Mild Anxiety. Feel nervous, closed in but could focus more on the better things, so I could calm myself down. No physical symptoms. Could do activities OK.

Level 1: Anxiety Free. Happy, in an overall good mood, positive. Friendly to others, talkative. No physical symptoms, feel relaxed, calm, comfortable and content. Can go into social and work situations easily.

Subject # 12 Student Group, Reference Levels and Lead-in Statement:

Lead-in: Over the last day I have been feeling:

Level 4: High Anxiety. Feel headaches, nervous, frustrated, sometimes nausea. Hard to do work, hard to concentrate. Want to stay in bed and sleep. In a bad mood.

Level 3: Medium Anxiety. Still feel a bit of headache, not so much nervousness. Still not in a great mood, still a little hard to concentrate. Would rather lie down but do manage to get most things done.

Level 2: Low Anxiety. Easier to concentrate on things, can get things done. In a better mood. A dull headache may come on but not really bad.

Level 1: Anxiety Free. Feel happier, not really nervous. Easy to get work done, don't mind going out and doing things.

Subject # 13 Student Group, Reference Levels and Lead-in Statement:

Lead-in: Over the last week I have been feeling:

Level 4: Really tense. Really *short* with people. easy to set off. Tense, really tense, jumpy. Moody, stressed out. Have no control over the situation and that bothers me.

Level 3: Upset. Emotionally upset, depressed, not as tense. Still short with people. Can't really focus on things, drifts. Don't feel like I can do anything about what is going on.

Level 2: Average Day. Kind of grumpy, not upset or short with others. Can deal with good and bad things coming at me. Have control.

Level 1: Really Good Day. Really pleasant, happy to be around. Little things won't get to me. Not grumpy, a lot more relaxed. Confident, can handle things.

Subject # 14 Student Group, Reference Levels and Lead-in Statement:

Lead-in: Over the last day I have been feeling:

Level 4: Fairly anxious. Not succeeding (studies, relationships, work). Thoughts going through my mind. Stomach turning, nausea. Heart beat increased, getting hot, sweaty hands. Loss of control over situation and self. Still do activities, not avoid them but not doing them as easily or willingly.

Level 3: Anxious - Medium. Half control. Butterflies in stomach. Hands not sweaty. Go into situations feeling like there is a chance of succeeding but things may also go in the opposite direction. Mind not totally clear but is at a level of ease.

Level 2: Fairly Low Anxiety. Better control. Stomach OK. Situations still remind me that you may not succeed or that you may. May have one or two things on my mind.

Level 1: A Typical Great Day. Total control, things going right. Feeling good, confident. Happy, pleasant, relaxed.

Subject # 15 Student Group, Reference Levels and Lead-in Statement:

Lead-in: Over the last day I have been feeling:

Level 4: High Anxiety. Worry about a lot of things, blow things out of proportion, still in control. Heart racing, hot, sweaty palms. Want to get away from situation. Tense.

Level 3: Medium Anxiety. Still worried but won't make situations worse than they are. No physical symptoms but still a little tense. Feel I can handle the situation.

Level 2: Mild / Low Anxiety. Things are in the back of my mind but not really worried about them yet. No physical symptoms.

Level 1: Anxiety Free. Feel happy, in a good mood. No physical symptoms. Relaxed.

Subject # 16 Student Group, Reference Levels and Lead-in Statement:

Lead-in: Over the last day I have been feeling:

Level 4: High Anxiety. Worried, concerned, upsetting, distress. Not content. Nervousness. Difficult to concentrate or do things.

Level 3: Medium Anxiety. Concerned, worry and not content with self but not at a high level. Can concentrate because stress isn't as bad.

Level 2: Low Anxiety. Thoughts and concerns are in mind but not really worried about them. Good concentration. Pleasant, tolerable, fun, good attitude.

Level 1: Anxiety Free. Pleasant, happy, personable, patient, tolerable, fun, easy to get along with, sense of humour. Feel more like myself. Relaxed, easy going. Can deal with things and work.

Subject # 17 Student Group, Reference Levels and Lead-in Statement:

Lead-in: Over the last day I have been feeling:

Level 4: Very High Anxiety. Tense, not myself, nervous in stomach, butterflies, worry - waiting to deal with it. Trouble sleeping, wake up with things on my mind. Heart beats faster, sweaty palms, hot. Not content, didn't accomplish something I wanted, for example.

Level 3: Medium Anxiety. Have things on my mind but you can handle them, don't mind doing it. Slightly worried, nervous. To a lesser extent - trouble sleeping and heart racing.

Level 2: Low Anxiety. Worried but not badly, might enjoy the activity (social thing, for example). No physical symptoms.

Level 1: Anxiety Free. Relaxed, happy, good sense of humour. Nothing needed to worry about. Leisure time - do what you feel like doing. No physical symptoms. Still busy.

Subject # 18 Student Group, Reference Levels and Lead-in Statement:

Lead-in: Over the last day I have been feeling:

Level 4: Really High Anxiety. Confused, don't know what to do. Cry a lot, sweat a lot. Panic, pressured to do everything because I feel like I don't have enough time. Hard to concentrate. Stay in room and avoid everything.

Level 3: Medium Anxiety. Not cry but probably worry a lot. Somewhat confused or difficult concentrating but I'd make myself do it. Feel panic but I don't react. Might still avoid doing things unless I have to.

Level 2: Low Anxiety. Just worried, but can still put things out of my mind. Still a little confusion, not as bad. Somewhat panic feeling. Can usually do activities.

Level 1: Anxiety Free. Totally happy, relaxed, no worries. No physical symptoms. Can do activities easily.

Subject # 19 Student Group, Reference Levels and Lead-in Statement:

Lead-in: Over the last day I have been feeling:

Level 4: High Anxiety. Panic, clenched teeth, agitation. Upset stomach, don't want to eat. Smoke more, drink more coffee. Can't make decisions, concentration affected. Need to get away from situation causing the anxiety.

Level 3: Medium Anxiety. Not as panicky. Clenched teeth, agitation would come and go. Would be able to stay in the situation, have more control over it. Can function. No stomach ache.

Level 2: Low Anxiety. "Fight or flight". Knowing panic could happen. Drudgery, not really excited about anything. Take things more calmly. Could function and manage activities OK.

Level 1: Almost Anxiety Free. Feel free, self confident. Content with what I'm doing. Smile more. No physical symptoms. No crisis, so I feel somewhat lost and ask "What do I do now?"

Subject # 20 Student Group, Reference Levels and Lead-in Statement:

Lead-in: Over the last day I have been feeling:

Level 4: Really High Anxiety. Nervous, panic. Feel that there isn't enough time for anything. Sick, short of breath, heart beating faster, hot sweaty palms. Past worry. Have to go away from source of stress, watch TV and chill out.

Level 3: Medium Anxiety. Intensely worried, nervousness, tense. Can't concentrate. Have a hard time talking with others and with work and school. Might skip classes because feeling anxious. Somewhat increase in physical symptoms like heart beating faster, sweaty hands, etc.

Level 2: Mild Anxiety. Feel pressured by time. Butterflies. Worried, wondering if you can meet the deadlines etc. Not as hard to concentrate.

Level 1: Anxiety Free. Not worried. Relaxed and calm as I can get. Can sleep more easily. Can do activities if need be.

Subject # 21 Student Group, Reference Levels and Lead-in Statement:

Lead-in: Over the last day I have been feeling:

Level 4: High Stress. Worry about little things piling up. Nervous, tension in neck. Stomach queasy, butterflies. Can't concentrate at all. Don't eat as much as I usually do.

Level 3: Medium Stress. Not as bad as high stress day but worries are building up a bit more. "Snow-ball effect". Increasing queasiness, tension. Concentration is being affected somewhat.

Level 2: Mild Stress. Starting to worry a little bit over little things. Just a little queasy. Can concentrate on things pretty well.

Level 1: Stress Free. No worries at all, not nervous. Do what I want to do. Relaxed, calm. Work and things flow easily.

Subject # 22 Student Group, Reference Levels and Lead-in Statement:

Lead-in: Over the last day I have been feeling:

Level 4: High Stress. Jittery, leg shaking. Stomach almost sick. Sweaty palms, heart beats faster, hot. Uncomfortable. Distracted easily.

Level 3: Medium Stress. Feeling panic. Constant thought going through my head, I can't block it out. Worry a lot. Stomach not at ease.

Level 2: Worried about things coming up. Not feeling confident, almost like a fear.

Level 1: Stress Free. Great! Relaxing, lazy, sleep a lot. No physical symptoms. Still thinking of what's coming up. Easy going. Not irritable.

Subject # 23 Student Group, Reference Levels and Lead-in Statement:

Lead-in: Over the last day I have been feeling:

Level 4: High Stress. Thoughts in my head that I don't want to be there. Confused, wondering what to do about the situation. Worried about stuff. Anxious if I have to do something. Need to get out (to the gym) to release tension.

Level 3: Medium Stress. Now and then I have worried thoughts going through my head. Especially when certain situations remind you that things aren't well. Mild tension.

Level 2: Low Stress. Still go out, socialize and things are almost out of your mind, not really worried about it. Slight bit of tension if alone and have some time to think about things.

Level 1: Stress Free. Worry free. Happy about a certain event. Manage work (etc.) easier. Occupied mind - with better things.

Subject # 24 Student Group, Reference Levels and Lead-in Statement:

Lead-in: Over the last day I have been feeling:

Level 4: High Stress. Frustrated, hard to concentrate on work. Worried about making it to the end of the day. Get hot and jittery, headaches. Want to get away from stress (go to gym or walk). Tense, can't sit still. Looking at others and wondering how they can be so calm!

Level 3: Medium Stress. A few things due but not really worrying me. Things on mind but not really concerned yet. Still need to get away from stress. No headaches or really upset. Others seem to be having an easier time slightly more than me.

Level 2: Low Stress. Still a busy day but not a day with too many demands. Worries might come and go. Things on my mind that haven't become troublesome or worry yet. More wanting to be around people.

Level 1: Stress Free. Calm, relaxed. Knowing things aren't due. Wanting to be around people more. Can enjoy painting and playing piano on these days.

Subject # 25 Student Group, Reference Levels and Lead-in Statement:

Lead-in: Over the last day I have been feeling:

Level 4: High Anxiety. Want to chuck everything right out the window. Don't want to be in the situation. Feel like I can't deal with it. Extremely discouraged. Isolate myself. Not eat as much, get a headache. Can't function very well.

Level 3: Medium Anxiety. Still quite freaked out. Not isolated from others. Still worried. Still have a headache. Would eat better. Calm down a notch.

Level 2: Low Anxiety. Still worried about some big problem, not so much little things. No headache. Could get over it quickly. Not have to get away from others. A little lack of concentration but can function a lot better.

Level 1: Anxiety Free. Everything seems to be going right. Function normally. Don't worry as much. Not bothered by things.

Subject # 26 Student Group, Reference Levels and Lead-in Statement:

Lead-in: Over the last day I have been feeling:

Level 4: High Stress / Anxiety. I get very irritable, emotional. Would want to stay away from others. Sick feeling, nervousness. Worried things won't work out. Little things get to me. Affects sleep sometimes. Harder to concentrate.

Level 3: Medium Stress / Anxiety. Worried and concerned about not getting things done but I still manage to get through them. Somewhat irritable, emotional. Can be around others. Not as bad a sick feeling or nervousness. Can concentrate to a certain extent.

Level 2: Mild Anxiety. Fairly carefree but things are at the back of my mind - not really worried about it yet. Not sick or nervous. Can concentrate. Being around others is OK.

Level 1: Stress Free. Feel great! Happy. Want to be with people. Not worried. Can concentrate easily.

Subject # 27 Student Group, Reference Levels and Lead-in Statement:

Lead-in: Over the last week I have been feeling:

Level 4: High Anxiety. Get tense, kind of subconscious. Hard to concentrate on other things. Hard to sleep, get tired. Appetite may be affected. Very worried.

Level 3: Medium Anxiety. Tense and worried about things. Still hard to sleep. Appetite not affected. Concentration not quite as bad as high anxiety.

Level 2: Mild Anxiety. Still tense. Ideas in my head are not bad to the point of worry yet. Not as much problem falling to sleep. Able to concentrate.

Level 1: Anxiety Free. I'd feel a lot lighter in my thoughts and whole feeling. Happier. Able to concentrate on things that are more important.

Subject # 28 Student Group, Reference Levels and Lead-in Statement:

Lead-in: Over the last day I have been feeling:

Level 4: Really High Anxiety. Confusing, mind is racing all over the place. Really dramatic, heart racing. Lots of energy - to hit things. Kind of tense. Wouldn't want to go out, not really wanting to be around others. Can't concentrate as well or work as well. Might "freak out" at people sometimes.

Level 3: Medium Anxiety. Have tones of stuff to do, don't want to go out. Worried about getting stuff done. Still tense. Concentration not affected as much. Things will still bug me (for example, if the wrong kind of music is on or something). Not in a good mood.

Level 2: Mild Anxiety. Still pressured by things I have to do. Confused about what I have to do next. Still a little tense. Concentration is OK but could start thinking of other things. Better mood. Not likely to get upset with others.

Level 1: Very Low Anxiety. Still a little indecisive. I have energy to talk to people etc. Relaxed, calm but not fully - still a bit hyper. Clear head sometimes but not always. Fairly good mood - a little happier.

Subject # 29 Student Group, Reference Levels and Lead-in Statement:

Lead-in: Over the last day I have been feeling:

Level 4: High Stress. Get really frustrated, overwhelmed. Try to avoid one or two things that are causing the stress. Headache, loss of sleep, sometimes loss of appetite. Get cranky, low mood, irritable. Feel like getting away from people. Concentration is more difficult.

Level 3: Medium Stress. Can get work done because stress pushes me ahead and makes me not want to give up. A little overwhelmed. Not many physical symptoms, maybe loss of sleep. Pretty good mood. Would be bothered by socializing for non-academic reasons.

Level 2: Mild Stress. Would be most sociable with my friends. A little worry about things but I could forget about it for a night or day. No loss of sleep. Good mood.

Level 1: Almost Stress Free. Might start to talk myself into getting worried about something in the future. No physical symptoms. In a good mood. Concentration is pretty good. Would rather be around friends.

Subject # 30 Student Group, Reference Levels and Lead-in Statement:

Lead-in: Over the last day I have been feeling:

Level 4: High Anxiety. Worried, frustrated, tense, heart rate increases. Stomach hurts, hot sweaty palms. Really hard to get work done. Irritable, snap at people, yell at them. Want to get away from others or the source of stress.

Level 3: Medium Anxiety. Still get tense (muscles). Sometimes heart rate increases. Able to get work done - sometimes it is hard (depending on how much time I have). A little bit less irritable. Could deal with being around people or source of stress. Might want to get away but wouldn't try.

Level 2: Mild Anxiety. Worried about something. Just stomach tension. Able to get into work. Social situations OK. Content.

Level 1: Anxiety Free. Relaxed, happy, peaceful. Feeling of relief. Can socialize.

Subject # 31 Student Group, Reference Levels and Lead-in Statement:

Lead-in: Over the last day I have been feeling:

Level 4: High Anxiety. Emotional, stressed. Worrying, thinking of how I'll do on an exam, for example. Headache, bad stomach. Tensing up fists. Irritable. Hard to concentrate but still do school work.

Level 3: Medium Anxiety. Not quite as emotional. Sort of worn out or tired. Things going through my mind that I need to do, not necessarily worried about them though. Might have a slight headache. Still get along with people. Concentration affected somewhat.

Level 2: Mild Anxiety. Fairly happy and in good mood. Not quite as relaxed. A little distracted, not worn out. Could work well and get along with others. Physically I'd feel pretty good.

Level 1: Anxiety Free. Feeling happy, relaxed. Physically no headache, feeling good. Good mood. Get along well with others. Able to work well.

Subject # 32 Student Group, Reference Levels and Lead-in Statement:

Lead-in: Over the last day I have been feeling:

Level 4: Very Stressed. Angry. Too difficult to sleep. Feeling pressured. Feeling worried about things. Sometimes I get hot, sweaty palms. Do not talk with others. Concentration is affected.

Level 3: Medium Stress. A little pressure. Still worried about what will happen. May still talk to others but not as much. Sometimes it is difficult to sleep. Can concentrate but only for a short time.

Level 2: Low Stress. Still happy. Still rested. Can help others with cutting down their stress but I am getting worse with my own stress. Able to cut down my stress. A little bit pressured. Concentration is no problem but sometimes I can run away from work.

Level 1: No Stress. Rested. Easy-going - can talk with people easily. Very relaxed, happy. Can help others cut down their stress too. Able to concentrate, do work.

Subject # 33 Student Group, Reference Levels and Lead-in Statement:

Lead-in: Over the last day I have been feeling:

Level 4: Panic. I feel like my body is racing, heart beating rapidly, feels like shaking but you're not. Things going through my head a mile a minute. Overly thinking of how to get out of it. Extremely tense. Extremely worried, looking for a solution. Moody, grumpy, irritable.

Level 3: Worry. General worry. Thoughts on my mind. looking for a way to solve the problem. Might have a hard time falling to sleep. Not so stressed or tense. Panic is slowly building. *The pilot light is on!*

Level 2: Aware/ Not Caring. Awareness of future problems and anxiety. Thoughts are there but you are not looking for a solution yet. Mood is OK. Relaxed.

Level 1: Anxiety Free. Carefree, not letting little things get to me. Preoccupied with other thoughts. Relaxed, not tense. Pleasant mood.

Subject # 34 Student Group, Reference Levels and Lead-in Statement:

Lead-in: Over the last day I have been feeling:

Level 4: Extreme Anxiety. Sit and cry for no apparent reason for hours. Get mad at others around me. Easier to be by myself as opposed to with others. Worried about the

tinest little thing. Headache, cramps, hot sweaty palms. Preoccupied, mind wandering so I can't concentrate on my schoolwork.

Level 3: Medium Anxiety. Probably not crying. Not getting mad at others to my knowledge but still wanting to be by myself. Still worried. No headaches or cramps but will sleep a lot. Able to concentrate on my work.

Level 2: Mild Anxiety. Able to go out with friends, socialize without having problems or worries. Put worries aside for time being. Still worried, problems inside and upset but I could hide it.

Level 1: Very Low Anxiety. Less stressed, nothing really bothers me. By myself, my time to relax. Quite quiet and not very social. Mildly upset, able to hide it. Anxiety is still not under my control.

Subject # 35 Student Group, Reference Levels and Lead-in Statement:

Lead-in: Over the last day I have been feeling:

Level 4: High Anxiety. Feel really bad. I can't breathe, sort of like a state of shock. Sick to stomach, small headaches. Can't focus on things, put them off, no concentration at all. Tired, repeat words over and over. Feel like disappearing for a while.

Level 3: Medium to High Anxiety. Tired, confused about my priorities. Put things off, avoid what I have to do. Feel stressed, tense. Tend to eat a lot. Exhausted, wanting to go to sleep. Just frustration. Tell myself to take a deep breath - to think and concentrate.

Level 2: Mild Anxiety. Tense about doing work but have my priorities straight. Know I can do the work, although there is much to do. Concentration better. Calm, (not upset or overjoyed). Will make an effort to socialize to calm myself down more. Sometimes I'm overwhelmed by my work but usually I do get it done.

Level 1: Almost Anxiety Free. Really energetic, high spirits. Active, socializing. Will participate in activities. Concentration is a lot better, can do my homework easily.

Subject # 36 Student Group, Reference Levels and Lead-in Statement:

Lead-in: Over the last day I have been feeling:

Level 4: High Stress. Have a lack of sleep. Smoke constantly. Overexaggerate problems to myself. Rather not be around others. Affects concentration.

Level 3: Medium Stress. Hard to fall asleep. Smoking like a regular smoker. Problems would seem more realistic. Still not wanting to be around others. Most likely able to work.

Level 2: Mild Stress. Things not bothering me that much. Sleeping is OK. Probably wouldn't smoke at all or maybe just a little. Easy going. Most likely able to do work.

Level 1: Stress Free. Easy going. Mellow. Not smoking at all. Friendly. Concentration is good.

Subject # 37 Student Group, Reference Levels and Lead-in Statement:

Lead-in: Over the last day I have been feeling:

Level 4: High Stress. Feel like things are piling up, a lot to do at once. Harder to concentrate and focus. Get mixed up, stressed out. A little nervous, jittery, sweaty palms.

Level 3: Moderate Stress. Things in the back of my mind. Feeling a little guilty because I wasn't doing what I should. A little worried. Not as easy to concentrate at this point.

Level 2: Mild Stress. Still aware of what I have to do but not guilty or worried about them. Able to concentrate easily. Good mood, relaxed.

Level 1: Stress Free. Have no worries at all. Time to relax and not think of what I have to do. Feeling lighter, happier. Not as likely to do work but it would be OK if I did.

Subject # 38 Student Group, Reference Levels and Lead-in Statement:

Lead-in: Over the last day I have been feeling:

Level 4: High Stress. Worry about whether I will or won't get my work done, especially before bed or in the morning. Feel like I want to get home. My mind tends to wander when I do work. In an irritable mood, people tend to get on my nerves.

Level 3: Medium Stress. Somewhat worried about things. Might not take humour in a good way. Mind doesn't wander quite as much but probably once in a while.

Level 2: Mild/Low Stress. Thinking of stuff but not worried about it. Able to concentrate on work. In a good mood but still serious enough to sit and do homework.

Level 1: Stress Free. Not worried or thinking about stressful things or things that bother me. Able to do work with no problems. Happy, play sports.

Subject # 39 Student Group, Reference Levels and Lead-in Statement:

Lead-in: Over the last day I have been feeling:

Level 4: High Anxiety. Feel like I would “pop” or cry anytime no matter where I am or who is there. Heart beats faster, can’t breathe, hot flashes. Can’t eat, get sick, can’t sleep. Can’t concentrate. Might avoid things (like classes) but not always.

Level 3: Medium Anxiety. Still can’t sleep all that well. Could still cry easily. May or may not have trouble breathing. Can’t concentrate. Worried about things.

Level 2: Mild/Low Anxiety. Could probably cry but not as easily. Worry would be there but not thinking about it all the time. Could concentrate but not always. Probably not avoiding things.

Level 1: Anxiety Free. Normal, free-going. Good mood. Able to concentrate but not always. Not avoiding things.

Subject # 40 Clinical Group, Reference Levels and Lead-in Statement:

Lead-in: Over the last day I have been feeling:

Level 4: High Level of Stress. Face gets red, heart beats fast. Thoughts are jumbled, I seem to forget things I should remember, can’t concentrate. Short tempered. Bad attitude. Depending on the situation I may try to get away from it.

Level 3: Medium Stress. May take me a couple of hours to get over an upsetting event. Heart pounding, face red for a while and would need “time out” to get over it. Would be short tempered.

Level 2: Mild Stress. Might react to things and immediately realize that it was inappropriate. Start to feel upset and realize that it wasn’t worth it. Heart beats faster and face gets red - a little.

Level 1: Stress Free. Nothing will bother me, won’t blow things out of proportion. Can deal with almost anything. Totally relaxed.

Subject # 41 Clinical Group, Reference Levels and Lead-in Statement:

Lead-in: Today I feel:

Level 4: Panic and Panic Attacks. Get headaches, shakiness, harder to sleep. Breathing bad, fast heart beat. Lose motivation to do things, hard to get out of the house. Can still manage some household activity.

Level 3: High Anxiety. “You are a wanderer”. Can’t sit still. Can ward off the panic attack by calling friends or getting away from the source of stress. Still have fast breathing, heartbeat. Medium or mild pressure headaches.

Level 2: Mild Anxiety. Have a twinge of anxiety but it doesn’t stop you from doing things, like going to the mall. Don’t have a headache or tension feelings.

Level 1: To Be Able To Do Anything Without Feeling Anxious. Go out freely to do whatever regardless of the weather or stressful events that occur. Would like to *not* anticipate anxiety after stressful-types of events.

Subject # 42 Clinical Group, Reference Levels and Lead-in Statement:

Lead-in: Today I have been feeling:

Level 4: Extremely Anxious - Loss of Control. Symptoms of dizziness, heart increases, hot flashes, depersonalization. Have to get out or away from the situation or source of stress, will leave the room or situation until calm and then go back. Severe lack of focus, can’t pull self out of it, like in a bubble.

Level 3: Fairly Anxious. Mostly dizziness and butterflies in the stomach. Hot all the time. Haven’t reached the point of depersonalization or loss of control. Slight weakness, like you might collapse.

Level 2: Mild Discomfort. Day-to-day. Little bit of anxiety. Body is a little tense. Dizziness comes and goes infrequently - or light-headedness. Still not totally relaxed but functioning really well.

Level 1: Fully Relaxed. Completely happy. Can do things without having to plan it, relax before doing it. Not experience any physical symptoms that are unreasonable. Biggest goal: not to limit self. Completely relaxed. Content. At peace.

Subject # 43 Clinical Group, Reference Levels and Lead-in Statement:

Lead-in: Over the last day (or few days) I have been feeling:

Level 4: Panic Level. Air hunger and dizziness, chest tight, tingling. Feel like I’m going to die, like I’m having a heart attack. Want to get to a hospital. Get away from the situation I’m in.

Level 3: Anxious, On Edge. Feel tight, but not dizzy or passing out. Edgy, on edge. Prevents me from being able to concentrate on my work or relationship. Get away from people.

Level 2: Slight Anxiety. Not worry free but I can't seem to relax. Still feeling that I can't get a deep breath. Managing activities OK but not 100%.

Level 1: Worry Free. Get up worry free, with a clear mind. In control. Able to take deep breaths. Happy.

Subject # 44 Clinical Group, Reference Levels and Lead-in Statement:

Lead-in: Over the last week I have been feeling:

Level 4: Extreme Scenario. Full blown anger, shouting, get very specific with my words. Heaviness in chest, head feels hot, headache, shaking. not in control of breathing. Feel threatened, frightened. Feel like getting away from the situation. Can't concentrate. Tears, feeling cold.

Level 3: Aware of Anxiety. Become aware of the tension and anxiety and physical symptoms. Voice becomes higher. Concentration is affected. Quite anxious. Threat and fear is just starting to come on. Recognize what is happening and may search for a way to change it but have lost control.

Level 2: Anxious But Unaware. Anxiety is building up. but not quite aware of it yet. Confrontation is going to happen. A little anger, fear beginning. Tension. Becoming upset.

Level 1: Anxiety Free. Pleasant, joking, happy-go-lucky, laughing and friendly. No physical symptoms. Concentration is good. Open to conversation with others.

Subject # 45 Clinical Group, Reference Levels and Lead-in Statement:

Lead-in: Over the last day I have been feeling:

Level 4: Out of Control. Feel like I want to die, life has no meaning anymore but my children keep me going. Not sleeping much at all. May take more medication than I should. Can't concentrate or cope with things. Very aware of physical symptoms. Get aggressive and hate the world.

Level 3: High Anxiety With Occasional Breaks. Having an anxious day but occasionally I might feel a little better if a good song comes on the radio, for example. Anxiety, panic and depression are still there. Anger and hurt are still there. Physical symptoms still present.

Level 2: Coping With Anxiety. Having a day good enough to do some home crafts and things to get my mind off of my anxiety. Doing some enjoyable things so I feel worthwhile. Anxiousness is still present.

Level 1: Goal. One or two days with no stress, anxiety or panic. An ordinary day.

Subject # 46 Clinical Group, Reference Levels and Lead-in Statement:

Lead-in: Over the last day (for the most part) I have been feeling:

Level 4: Panic. Escape mechanism kicks in easily. Feel trapped, flushed in the face. Chest feels tight. Have no control, even when aware of it.

Level 3: Prior To Panic. Thinking about how to control the panic attack. Tightness of chest begins to build. About 90% chance for a panic attack. Palms noticeably sweaty, feeling a flush coming to my face. Trying to get control but can't.

Level 2: Awareness. Fidgety, scanning. Trying to grasp for control. A 30-35% chance that panic may occur but I may still be able to gain control before panic comes on (especially if something preoccupies me).

Level 1: Anxiety Free. Normal everyday moments. No worries. Might think about anxiety but I can ignore it also.

Subject # 47 Clinical Group, Reference Levels and Lead-in Statement:

Lead-in: Over the last day I have felt:

Level 4: Panic. Nausea, sick to stomach, shaky, hot flashes. Overwhelming feeling of having to get away from source of anxiety, feel trapped. Scared, frightened. Feel like it is hard to swallow. Can't concentrate.

Level 3: Medium Anxiety. Probably no physical symptoms (except the throat one). Still have a lot of negative thoughts. Not as bad a feeling of needing to get away from things. Could probably go through with things. Concentration isn't affected as badly.

Level 2: Mild Anxiety. Would know in my mind I was going into a situation and it wouldn't bother me too much. Just a few negative thoughts but they wouldn't be able to control me. No physical symptoms.

Level 1: Anxiety Free. Feel fine, normal, no symptoms. Relaxed. Can concentrate.

Appendix D

Pre-designed Discan Impulsivity Measure

“Over the last week
I have been feeling:”

Extremely Impulsive. I hardly ever think of the future before I act. I am careless and reckless and take risks quite often. I am usually bored with things so I will act spontaneously for excitement.

Most Severe Level

Impulsive. I usually enjoy being spontaneous and acting on the spur of the moment. Only sometimes do I think of the consequences of my actions. I find it hard and boring to focus on one thing for too long.

High Intermediate Level

Generally not impulsive. I am usually level headed and think before I act about half of the time. I do enjoy acting spontaneously but I try to be careful too. Sometimes I can sit and work on a single task but I get bored with it half of the time.

Low Intermediate Level

Hardly ever Impulsive. I am always level-headed and like to consider the future before I act. I sometimes act silly or do exciting things but never in a careless way. Also, I can usually work at something for a while without getting bored or restless.

Lowest Level: Goal state.

Appendix E

Handout for Participant Recruitment, Clinical Group

Volunteers needed for a study on “Questionnaires”

Hello! My name is Natasha Harvey and I am a Clinical Psychology Master’s student in my final year at Acadia University. I am conducting a research project which can help to determine whether or not certain questionnaires are useful during therapy. I am hoping that you can volunteer to help me with this project. Here’s what it is all about:

Many people are given **questionnaires** to fill out when they go to visit their doctors, psychologists, counsellors or other health-care professionals.

Some questionnaires may be useful:

Sometimes these questionnaires make it easy for the professional to learn important things about their clients.

Sometimes these questionnaires help to avoid long, drawn-out interviewing.

And some questionnaires may not be very useful:

Sometimes the questionnaires don’t apply to the specific problems that the client wishes to address.

Sometimes the questionnaires may be difficult to understand or to complete.

Sometimes the questionnaires may seem like a waste of time.

In order to address this important issue, I have designed a project that requires people in your program to volunteer to participate in my study.

If you are thinking of giving this project a try,

Here’s what I hope you can do for me:

Meet with me after your group-meeting to discuss a special questionnaire.

Schedule a few more meetings with me to fill out some questionnaires.

Here’s what I hope I can do for you:

Provide one-on-one help with the questionnaires each time.

Give you a chance to look at your life issues from a new perspective.

Help you to monitor how you will make changes over time.

Charting your progress.

If you do decide to participate, it shouldn't take up much time (⌚) and can actually be helpful to you during this time in your life. You will also be contributing to a very important area of scientific research, and I would appreciate this very, very much!

You can withdraw from the study at any time without notice and without explanation if you so choose.

All of the information gathered for the purposes of this study will remain completely confidential. (Note: if you indicate that you plan to harm yourself or others, the staff must be informed.)

Your name won't be released to anyone outside of the staff here.

PLEASE NOTE THAT THIS PROJECT IS COMPLETELY SEPARATE FROM THE SERVICES PROVIDED AT VALLEY MENTAL HEALTH. THIS RESEARCH PROJECT IS NOT A PART OF YOUR THERAPY.

NO SPECIAL TREATMENT WILL BE GIVEN TO THOSE WHO PARTICIPATE OR THOSE WHO DON'T. YOU CAN STILL ATTEND YOUR ANXIETY-MANAGEMENT GROUP EVEN IF YOU DON'T PARTICIPATE IN THIS PROJECT. THIS PROJECT IS NOT A PART OF THERAPY OR COUNSELLING.



Please sign your name below if you are willing to consider participation. Natasha Harvey will telephone you to arrange a time to meet.
You have no obligation to participate, even if you check "yes" on the box below.

If you might be open to learning more about this project, please check the YES box below.

YES

If you are not interested in hearing more about this opportunity, check NO.

NO

NAME: _____ **PHONE:** _____



Thank you !

Appendix F

Student Screening Booklet Cover-Sheet

VOLUNTARY SCREENING BOOKLET

PURPOSE OF THIS SCREENING:

This screening is voluntary and can be done during class time. You will NOT receive any extra credit points for filling this in. This is merely a way for the researcher, Natasha Harvey to select a certain group of students who are eligible to participate in a research project that is being conducted.

You may be eligible to participate in Natasha Harvey's research project which will enable you to earn 4 credit points plus a chance to win \$100.00 cash. Only a certain number of you will be telephoned and invited to participate in the research project. If you are interested in participating, you must fill in this screening measure first.

If you decide to proceed you should know that all results of this screening will be kept completely confidential and your name and number will not be released to anyone.

Please answer all of the questions as accurately and honestly as you can.

BEFORE YOU PROCEED WITH THE QUESTIONS INSIDE, PLEASE FILL IN:

(PLEASE PRINT)

YOUR NAME: _____

YOUR PHONE NUMBER: _____

A GOOD TIME TO REACH YOU BY TELEPHONE IS: _____

Appendix G

Pilot Study

Purpose

A pilot study was conducted in order to refine the assessment procedures used in this study and to detect any problems with the proposed measures or the design.

Subjects

Two graduate students at Acadia University volunteered to participate in the pilot study. These individuals were a male biology student aged 28 and a female political science student aged 23. Neither of these students had elevated levels of Trait anxiety as assessed by the STAI-T. Their STAI-T standard scores were 39 and 42 respectively which corresponded with the 25th and 12th percentile ranking. Spielberger's (1983) norms for students and military recruits were used in scoring these scales.

Procedure

Students in the pilot study were assessed individually at the office of the experimenter. As described in the procedures section of this thesis, the Informed Consent form was read and signed by the students. Next the STAI-S, the BPI-ImE were administered. Following this, a set of Discan anxiety reference levels were constructed. This Discan anxiety measure was administered. Finally the Discan impulsivity measure was administered. All of these measures were scored during this time and the students were informed of their results. Finally, the experimenter asked the students if there was anything about any of the measures that was confusing, needed further explanation or changes.

In order to learn about the student's opinions about the process, the experimenter changed the focus of questioning from assessment of anxiety and impulsivity to questions about the study procedures. Students were asked whether or not the assessment procedures were lengthy, complicated or confusing. Subjects were asked about the enjoyment of completing the study. They were also asked to openly provide comments about any aspect of the measures and processes.

Results and Discussion

Both subjects reported that the testing was quick, simple and enjoyable. Neither of the subjects reported having any difficulty with reading, understanding or using any of the measures that were administered. Both of the subjects mentioned that the Discan anxiety cards were an interesting way of getting to the source of the issues that were relevant to that individual. On the basis of these comments, it was decided to proceed with the procedures and the four assessment measures as was planned in the proposal stage of this thesis.

One of the students indicated having a small amount of difficulty with the wording of issues on reference levels one and two of the Discan impulsivity scale. It was decided that the presentation of concepts between Level 1 and Level 2 were too similar to one another. The initial wording of Level 2 was "I am level headed and think before I act about half of the time." and Level 1 was "I am normally level headed and like to consider the future before I act." These reference levels were then reworded and the subject verified that she was able to distinguish between them much more clearly after those changes had been made. The new wording of Level 2 read, "I am usually level headed and

think before I act about half of the time.” and for Level 1, “I am always level headed and like to consider the future before I act.” These changes satisfied the discretion of the two subjects in the pilot study, the experimenter and complied with the guidelines of cascading reference levels set forth by **Bilsbury & Richman (in press)** and **Singh & Bilsbury (1989a)**.

There were no results drawn from the pilot study beyond those used to refine and practice the procedures and administration of measures used in the main study. It was concluded that the pilot study was helpful in meeting the goals set about in its proposal.

Appendix H

Qualitative Questionnaire for Repeated Administration

“Is there any reason, event or circumstance that may have happened over the last week (or recently) that explains the way you are feeling this week? Or that changed things for you on these assessments?”

Appendix I

Qualitative Questionnaire for Final Administration

“Which of the two instruments, the Discan anxiety cards or the paper-and-pencil STAI did you prefer for measuring your stress and anxiety and which one was easiest?”.

Appendix J**Informed Consent Form for Student Group**

My goal is to make this research project as helpful and pleasant for you as it is for me. As a result, I have outlined some terms of our agreement which are designed to safeguard everyone against any possible harm.

- 1. You may stop your participation in this project at any time that you wish. This even includes mid-session if you wish. If you feel like withdrawing from the research project for any reason at any time, please feel free to do so. You do not have to explain your reasons for withdrawal.**
- 2. You can refuse to answer any questions that you feel uncomfortable answering. You are under no obligation whatsoever to answer any questions that you feel uncomfortable about. Feel free to withhold information if you so choose. It is preferred that you withhold information as opposed to making up false information. Your privacy will be respected.**
- 3. Feel free to ask any questions that you wish at any time during this research project or after it is over. All attempts will be made to answer your questions accurately and honestly.**
- 4. No deception or tricks will be used during this research. The purpose of the project will be made clear to you and explained at any time you wish.**
- 5. Any risks that may be involved will be clearly outlined before you engage in this project. It is not anticipated that you are at risk for harm. You should be aware that sensitive**

subjects may be discussed and this may be upsetting or embarrassing at times. If you feel uncomfortable addressing these issues you can stop at any time.

- 6. Feedback from the ongoing assessments will be given to you periodically.
- 7. The results of the research project will be made available to you when they are available.
- 8. Confidentiality will be protected in that your name, personal or identifying information will not be released to anyone.
- 9. The results of your assessments will be kept completely confidential.
- 10. This is a research project and is not a part of therapy. No counselling or therapy will take place during this research project.
- 11. In order to protect everyone, including yourself, staff will have to be notified if you indicate that you plan to hurt yourself or others.

This information has been reviewed with me. I understand the conditions of the research and I accept them. I understand my rights as a participant in this research and accept them also.

Name: _____ Date: _____.

Researcher: _____ Date: _____.

Appendix K

Informed Consent Form For Clinical Group

My goal is to make this research project as helpful and pleasant for you as it is for me. As a result, I have outlined some terms of our agreement which are designed to safeguard everyone against any possible harm.

1. You may stop your participation in this project at any time that you wish. This even includes mid-session if you wish. If you feel like withdrawing from the research project for any reason at any time, please feel free to do so. You do not have to explain your reasons for withdrawal.

2. Participation in this research project will have absolutely no consequences on the treatment or services you receive at Valley Health Services. You will be offered no special treatment whether you participate or not. If you choose not to participate in this project, you can still continue with your program at Valley Health. This research project is completely separate.

3. You can refuse to answer any questions that you feel uncomfortable answering. You are under no obligation whatsoever to answer any questions that you feel uncomfortable about. Feel free to withhold information if you so choose. It is preferred that you withhold information as opposed to making up false information. Your privacy will be respected.

4. Feel free to ask any questions that you wish at any time during this research project or after it is over. All attempts will be made to answer your questions accurately and honestly.

5. No deception or tricks will be used during this research. The purpose of the project will be made clear to you and explained at any time you wish.
6. Any risks that may be involved will be clearly outlined before you engage in this project. It is not anticipated that you are at risk for harm. You should be aware that sensitive subjects may be discussed and this may be upsetting or embarrassing at times. If you feel uncomfortable addressing these issues you can stop at any time.
7. Feedback from the ongoing assessments will be given to you periodically.
8. The results of the research project will be made available to you when they are available.
9. Confidentiality will be protected in that your name, personal or identifying information will not be released to anyone apart from the staff at Valley Mental Health.
10. The results of your assessments will be kept completely confidential. Only information that is normally gathered during your service at Valley Health Services will be shared with the staff.
11. This is a research project and is not a part of your therapy program. No counselling or therapy will take place during this research project.
12. In order to protect everyone, including yourself, staff will have to be notified if you indicate that you plan to hurt yourself or others.

This information has been reviewed with me. I understand the conditions of the research and I accept them. I understand my rights as a participant in this research and accept them also.

Name: _____ Date: _____

Appendix L

Correlation Coefficient Matrices for the Total Group of Subjects Combined

Table L1

Pearson's Correlation coefficients between scores on Discan anxiety scales and State-Trait Anxiety Inventory-State scales for two subject groups combined (n=41).

	Discan Anxiety1	Discan Anxiety2	Discan Anxiety3	Discan Anxiety4	Discan Anxiety5	Discan Anxiety6	Discan Anxiety7	Discan Anxiety8
STAI-S1	.3403*	.2523	-.0062	.0217	-.0564	-.1149	-.0793	.0367
STAI-S2	-.2116	.6897**	.0608	-.0711	.1039	.1261	-.0712	.4165**
STAI-S3	.2354	.0368	.6393**	-.0911	-.1010	-.0810	-.1263	.3264*
STAI-S4	.1026	.1296	.1842	.5767**	.1680	-.0351	-.1565	.1528
STAI-S5	-.0720	.3790*	.0473	.1357	.5939**	.2761	-.2400	.1693
STAI-S6	-.0344	.1130	.1791	.1079	.3772*	.6522**	-.0470	.1879
STAI-S7	-.1725	.0753	-.0956	.0412	-.0633	.0277	.5623**	.2720
STAI-S8	.0226	.1323	.3412*	-.0972	.0471	.0707	-.0551	.7034**

* denotes significance level of .05

** denotes significance level of .01

2-tailed tests

Table L2

Pearson's Correlation coefficients between scores on Discan impulsivity scales and Basic Personality Inventory-Impulse Expression scales for two subject groups combined (n=41).

	Discan Impulse1	Discan Impulse2	Discan Impulse3	Discan Impulse4	Discan Impulse5	Discan Impulse6	Discan Impulse7	Discan Impulse8
BPI- ImE1	.6561**	.4778**	.4399**	.3248*	.4148**	.2430	.4137**	.5063**
BPI- ImE2	.5448**	.6185**	.4409**	.3608*	.5488**	.3648*	.5022**	.5508**
BPI- ImE3	.5258**	.3608*	.5510**	.3715*	.4796**	.3629*	.4894**	.4866**
BPI- ImE4	.5830**	.4866**	.3825*	.5188**	.5088**	.3472*	.5411**	.5042**
BPI- ImE5	.4915**	.5462**	.4803**	.4068**	.5757**	.4550**	.4595**	.4298**
BPI- ImE6	.4515**	.4735**	.4210**	.5171**	.6806**	.6289**	.4887**	.4591**
BPI- ImE7	.4929**	.5113**	.4129**	.3534*	.4491**	.3624*	.6257**	.4395**
BPI- ImE8	.4709**	.3953*	.5190**	.4383**	.5557**	.4062**	.6238**	.5615**

* denotes significance level of .05

** denotes significance level of .01

2-tailed tests

Table L3

Pearson's Correlation coefficients between scores on Discan anxiety scales and Basic Personality Inventory-Impulse Expression scales for two subject groups combined (n=41).

	Discan Anxiety1	Discan Anxiety2	Discan Anxiety3	Discan Anxiety4	Discan Anxiety5	Discan Anxiety6	Discan Anxiety7	Discan Anxiety8
BPI- ImE1	.1135	.1866	.1689	-.4031**	-.1951	.0984	-2218.	.2314
BPI- ImE2	-.0080	.1578	.0323	-.2948.	-.1209	.1966	-.0244	.3892*
BPI- ImE3	.2249	.1164	.1938	-.2015	-.1504	.0569	-.0407	.2702
BPI- ImE4	.1860	.1519	.2919	-.2418	-.0358	.1334	-.0009	.3775*
BPI- ImE5	.2110	.2185	.1879	-.0563	.1691	.2033	-.1436	.3344*
BPI- ImE6	.1254	.2900	.1313	-.1489	.1616	.2362	-.0491	.3464*
BPI- ImE7	.2825	.2524	.3289*	-.0348	.0509	.0299	-.0095	.4015**
BPI- ImE8	.2344	.1288	.2305	-.0440	.0073	.0286	-.0818	.2859

* denotes significance level of .05

** denotes significance level of .01

2-tailed tests

Table L4

Pearson's Correlation coefficients between scores on Discan impulsivity scales and State-Trait Anxiety Inventory-State scales for two subject groups combined (n=41).

	Discan Impulse1	Discan Impulse2	Discan Impulse3	Discan Impulse4	Discan Impulse5	Discan Impulse6	Discan Impulse7	Discan Impulse8
STAI-S1	.4254**	.0954	.3098*	.2999	.2912	.4236**	.1604	.2199
STAI-S2	.2423	.3922*	.3337*	.0881	.4272**	.2395	.1277	.2229
STAI-S3	.4413**	.0363	.1025	.1007	.3652*	.2147	.1949	.2396
STAI-S4	.2330	.0720	.0736	.0390	.3260*	.2600	.1284	.1747
STAI-S5	.1924	.2921	.2516	.0698	.3256*	.1913	-.0085	.0317
STAI-S6	.2466	.4596**	.2329	.1898	.2966	.2399	.1841	.0499
STAI-S7	.0223	.0768	-.0601	.0394	.1881	.0972	.1454	.0155
STAI-S8	.4335**	.2930	.2248	.0446	.4074**	.2080	.2674	.1348

* denotes significance level of .05

** denotes significance level of .01

2-tailed tests

Table L5

Pearson's Correlation coefficients between scores on Discan anxiety scales and Discan Impulsivity scales for two subject groups combined (n=41).

	Discan Anxiety1	Discan Anxiety2	Discan Anxiety3	Discan Anxiety4	Discan Anxiety5	Discan Anxiety6	Discan Anxiety7	Discan Anxiety8
Discan Impulse1	.2366	-.0088	.3371*	-.1920	-.0928	.0410	-.2687	.2247
Discan Impulse2	-.0026	.3805*	.0169	-.0888	.1711	.5499**	.0687	.2485
Discan Impulse3	.2653	.1502	.1987	-.0139	.3012	.1993	-.1551	.0499
Discan Impulse4	.3957*	-.0627	-.0311	-.0555	.1346	.2523	.2051	-.0202
Discan Impulse5	.0424	.1193	.1210	-.1485	.1218	.1992	-.0424	.2531
Discan Impulse6	.3920*	.0746	-.0081	.0634	.0157	.2441	.0811	.0559
Discan Impulse7	.3523*	-.0482	.2181	.0736	.0242	.2060	.2163	.2803
Discan Impulse8	.1355	.0441	.0894	-.0558	-.0061	.1902	.0591	.0943

* denotes significance level of .05

** denotes significance level of .01

2-tailed tests

Table L6

Pearson's Correlation coefficients between scores on Basic Personality Inventory-Impulse Expression scales and State-Trait Anxiety Inventory-State scales for two subject groups combined (n=41).

	BPI- ImE1	BPI- ImE2	BPI- ImE3	BPI- ImE4	BPI- ImE5	BPI- ImE6	BPI- ImE7	BPI- ImE8
STAI-S1	.2846	.2794	.3606*	.2620	.4083**	.3544*	.3318*	.3237*
STAI-S2	.4079**	.5121**	.4250**	.4410**	.5193**	.5445**	.4259**	.4137**
STAI-S3	.3245*	.2793	.4044**	.4612**	.4190**	.3422*	.4100**	.4142**
STAI-S4	.0138	.1613	.1329	.1654	.3148*	.2237	.2147	.2551
STAI-S5	.1176	.2494	.1400	.2613	.4743**	.4584**	.2381	.1960
STAI-S6	.2255	.3880*	.2964	.3801*	.5597**	.4654**	.2706	.2793
STAI-S7	-.0397	.2244	.2100	.2155	.1457	.2115	.2033	.1278
STAI-S8	.3422*	.5155**	.4454**	.4696**	.5807**	.4473**	.4168**	.4215**

* denotes significance level of .05

** denotes significance level of .01

2-tailed tests

Appendix M

Correlation Coefficient Matrices for the Student Group

Table M1

Pearson's Correlation coefficients between scores on Discan anxiety scales and State-Trait Anxiety Inventory-State scales for the student subject group (n=35).

	Discan Anxiety1	Discan Anxiety2	Discan Anxiety3	Discan Anxiety4	Discan Anxiety5	Discan Anxiety6	Discan Anxiety7	Discan Anxiety8
STAI-S1	.2838	.3017	-.1693	-.0969	-.0217	-.1688	.0241	-.0353
STAI-S2	-.1819	.7425**	-.0500	.0272	.0746	-.0141	.1510	.3198
STAI-S3	.1405	.0330	.6634**	-.2152	-.1587	-.1925	-.1364	.3569*
STAI-S4	-.1958	.1873	.1789	.6403**	.4279*	.0688	.0781	.1742
STAI-S5	-.0021	.2205	-.1039	.3659*	.6673**	.2404	.0702	.0573
STAI-S6	-.0913	-.0218	.0343	.2223	.3988*	.6698**	.0566	.0338
STAI-S7	-.0711	.1599	-.0586	.0788	.0518	-.0207	.5672**	.3139
STAI-S8	-.0848	.0210	.2420	-.1181	-.0138	-.0733	.1277	.6948**

* denotes significance level of .05

** denotes significance level of .01

2-tailed tests

Table M2

Pearson's Correlation coefficients between scores on Discan impulsivity scales and Basic Personality Inventory-Impulse Expression scales for the student subject group (n=35).

	Discan Impulse1	Discan Impulse2	Discan Impulse3	Discan Impulse4	Discan Impulse5	Discan Impulse6	Discan Impulse7	Discan Impulse8
BPI- ImE1	.6842**	.4201*	.4023*	.3592*	.4221*	.2710	.5040**	.5312**
BPI- ImE2	.5744**	.5940**	.3829*	.3909*	.6030**	.4180*	.5848**	.5611**
BPI- ImE3	.5559**	.3387*	.5496**	.3583*	.5029**	.3664*	.5434**	.4773**
BPI- ImE4	.6307**	.4381**	.3085	.5587**	.5362**	.3824*	.6424**	.5078**
BPI- ImE5	.4162*	.4246*	.4154*	.4489**	.6224**	.4491**	.5698**	.4166*
BPI- ImE6	.4059*	.3667*	.3287	.5417**	.7274**	.7019**	.5568**	.4351**
BPI- ImE7	.4794**	.4676**	.3736*	.3395*	.4745**	.3652*	.7079**	.4221*
BPI- ImE8	.4472**	.3339*	.4872**	.3977*	.5502**	.3885*	.6891**	.5530**

* denotes significance level of .05

** denotes significance level of .01

2-tailed tests

Table M3

Pearson's Correlation coefficients between scores on Discan anxiety scales and Basic Personality Inventory-Impulse Expression scales for the student subject group (n=35).

	Discan Anxiety1	Discan Anxiety2	Discan Anxiety3	Discan Anxiety4	Discan Anxiety5	Discan Anxiety6	Discan Anxiety7	Discan Anxiety8
BPI- ImE1	.1452	.0996	.0133	-.3768*	-.3565*	.0138	-1669.	.1705
BPI- ImE2	.0135	.0772	-.0452	-.2481	-.2530	.0929	.0134	.3230
BPI- ImE3	.2515	.0878	.1237	-.1943	-.2566	-.0403	-.0825	.2380
BPI- ImE4	.2202	.0736	.2132	-.1972	-.1950	-.0012	.0120	.3398*
BPI- ImE5	.1534	.0932	.0102	-.0074	.0242	.0766	.0037	.2475
BPI- ImE6	.0668	.2151	-.0195	-.1050	.0237	.1209	.0344	.2805
BPI- ImE7	.2452	.2121	.2384	-.0035	-.0731	-.0865	.0095	.3954*
BPI- ImE8	.1603	.0858	.1070	-.0227	-.1427	-.0863	-.0893	.2717

* denotes significance level of .05

** denotes significance level of .01

2-tailed tests

Table M4

Pearson's Correlation coefficients between scores on Discan impulsivity scales and State-Trait Anxiety Inventory-State scales for the student subject group (n=35).

	Discan Impulse1	Discan Impulse2	Discan Impulse3	Discan Impulse4	Discan Impulse5	Discan Impulse6	Discan Impulse7	Discan Impulse8
STAI-S1	.3339*	.0157	.3671*	.3499*	.3317	.2909	.1588	.1765
STAI-S2	.1849	.3030	.2743	.1431	.5193**	.2361	.2574	.2216
STAI-S3	.3884*	-.0876	.0075	-.0467	.3251	-.0422	.1602	.1606
STAI-S4	.1266	.0996	.1303	.0527	.3577*	.0831	.2400	.2113
STAI-S5	.1176	.1034	.2151	.2044	.4273*	.3129	.1856	.0536
STAI-S6	.1478	.3680*	.0948	.1717	.2582	.1535	.2213	-.0791
STAI-S7	.1332	.2000	-.0807	.0510	.3417*	.1527	.1829	-.0136
STAI-S8	.3217	.1213	.0932	-.0239	.4111*	.0102	.2993	.0181

* denotes significance level of .05

** denotes significance level of .01

2-tailed tests

Table M5

Pearson's Correlation coefficients between scores on Discan anxiety scales and Discan impulsivity scales for the student subject group (n=35).

	Discan Anxiety1	Discan Anxiety2	Discan Anxiety3	Discan Anxiety4	Discan Anxiety5	Discan Anxiety6	Discan Anxiety7	Discan Anxiety8
Discan Impulse1	.1098	-.0703	.2484	-.2795	-.1721	-.0203	-.2116	.1523
Discan Impulse2	-.1325	.2922	-.1620	-.0238	.0078	.4900**	.2470	.1271
Discan Impulse3	.2306	.1048	.0897	.0569	.2057	.0454	-.2405	-.1167
Discan Impulse4	.3177	-.0184	-.1760	-.0832	.0502	.2034	.1253	-.0861
Discan Impulse5	-.1204	.1552	-.0146	-.1757	.0000	.1397	-.0619	.2281
Discan Impulse6	.2703	.1435	-.1747	-.0593	.0562	.2570	.1421	-.0673
Discan Impulse7	.2358	.0240	.1713	.0335	-.0152	.1474	.0886	.2603
Discan Impulse8	.0095	.0579	-.0069	-.0820	-.0695	.1043	-.0069	-.0072

* denotes significance level of .05

** denotes significance level of .01

2-tailed tests

Table M6

Pearson's Correlation coefficients between scores on Basic Personality Inventory-Impulse Expression scales and State-Trait Anxiety Inventory-State scales for the student subject group (n=35).

	BPI- ImE1	BPI- ImE2	BPI- ImE3	BPI- ImE4	BPI- ImE5	BPI- ImE6	BPI- ImE7	BPI- ImE8
STAI-S1	.3075	.3016	.3146	.2103	.3245	.3082	.2693	.2472
STAI-S2	.3345*	.4440**	.3758*	.3349*	.4059*	.4891**	.4222*	.4138*
STAI-S3	.3465*	.2682	.3018	.3997*	.3051	.2338	.3272	.2950
STAI-S4	-.0309	.2017	.0956	.1823	.3015	.2297	.2518	.2710
STAI-S5	-.0912	.1181	.0500	.1179	.3085	.3637*	.1563	.1054
STAI-S6	.1058	.2804	.1361	.1933	.4117*	.3185	.1145	.1188
STAI-S7	-.0301	.2181	.1212	.1548	.2450	.2720	.2198	.1344
STAI-S8	.2713	.4774**	.3921*	.3923*	.4422**	.3222	.3464*	.3507*

* denotes significance level of .05

** denotes significance level of .01

2-tailed tests

Appendix N

Correlation Coefficient Matrices for the Clinical Group

Table N1

Pearson's Correlation coefficients between scores on Discan anxiety scales and State-Trait Anxiety Inventory-State scales for the clinical subject group (n=6).

	Discan Anxiety1	Discan Anxiety2	Discan Anxiety3	Discan Anxiety4	Discan Anxiety5	Discan Anxiety6	Discan Anxiety7	Discan Anxiety8
STAI-S1	.8136*	.0452	.7564	.4940	.0071	.2210	-.1625	.2804
STAI-S2	.0311	.6998	.6794	-.5614	.6385	.9748**	-.1831	.8249*
STAI-S3	.6314	.0323	.7640	.2903	.1312	.3286	-.0198	.2746
STAI-S4	.8777*	-.2024	.7050	.5989	.0152	-.0130	-.1910	.0892
STAI-S5	.0514	.9570**	.7113	-.6695	.9378**	.7334	-.6830	.5103
STAI-S6	.2450	.5778	.7970	-.3274	.5379	.8449*	-.1627	.6861
STAI-S7	-.3968	-.2501	-.2050	-.1204	-.3467	.2817	.8281*	.1464
STAI-S8	.5502	.5408	.8976*	-.0729	.4574	.7899	-.3390	.7976

* denotes significance level of .05

** denotes significance level of .01

2-tailed tests

Table N2

Pearson's Correlation coefficients between scores on Discan impulsivity scales and Basic Personality Inventory-Impulse Expression scales for the clinical subject group (n=6).

	Discan Impulse1	Discan Impulse2	Discan Impulse3	Discan Impulse4	Discan Impulse5	Discan Impulse6	Discan Impulse7	Discan Impulse8
BPI- ImE1	.4946	.9069*	.8152*	.3184	.5228	.1655	.0426	.4244
BPI- ImE2	.3742	.8122*	.8549*	.3417	.4471	.1971	.1968	.5579
BPI- ImE3	.3636	.4834	.6051	.5201	.4580	.3903	.2987	.5825
BPI- ImE4	.3730	.6729	.6980	.4119	.4466	.2511	.1465	.5085
BPI- ImE5	.7754	.9300**	.7493	.3762	.4875	.4697	.2092	.5826
BPI- ImE6	.6667	.8803*	.8090	.4665	.5687	.4272	.2310	.6066
BPI- ImE7	.6096	.7243	.5771	.3579	.3797	.4058	.1389	.4997
BPI- ImE8	.6258	.6403	.6292	.5763	.5947	.5098	.2663	.5724

* denotes significance level of .05

** denotes significance level of .01

2-tailed tests

Table N3

Pearson's Correlation coefficients between scores on Discan anxiety scales and Basic Personality Inventory-Impulse Expression scales for the clinical subject group (n=6).

	Discan Anxiety1	Discan Anxiety2	Discan Anxiety3	Discan Anxiety4	Discan Anxiety5	Discan Anxiety6	Discan Anxiety7	Discan Anxiety8
BPI- ImE1	.0765	.8560	.7513	-.6551	.9086*	.8461*	-.5535	.6652
BPI- ImE2	-.0803	.7171	.6063	-.6574	.6758	.9789**	-.1734	.8117*
BPI- ImE3	.1477	.3087	.6538	-.2491	.3743	.6748	.1051	.4631
BPI- ImE4	.0492	.5776	.7042	-.4905	.6174	.8149*	-.1060	.5641
BPI- ImE5	.4611	.7380	.9496**	-.2791	.7283	.7652	-.5709	.6649
BPI- ImE6	.3276	.7024	.9055*	-.3862	.7493	.8194	-.4406	.6650
BPI- ImE7	.3828	.5748	.8741*	-.2174	.5808	.6652	-.3224	.4762
BPI- ImE8	.4499	.4314	.8978*	-.1414	.5796	.5717	-.3026	.3922

* denotes significance level of .05

** denotes significance level of .01

2-tailed tests

Table N4

Pearson's Correlation coefficients between scores on Discan impulsivity scales and State-Trait Anxiety Inventory-State scales for the clinical subject group (n=6).

	Discan Impulse1	Discan Impulse2	Discan Impulse3	Discan Impulse4	Discan Impulse5	Discan Impulse6	Discan Impulse7	Discan Impulse8
STAI-S1	.7730	.3944	.2793	.4065	.2739	.7606	.4535	.5941
STAI-S2	.4636	.8360*	.8493*	.3619	.4416	.2876	.2439	.6120
STAI-S3	.6392	.3621	.4245	.6121	.4844	.7127	.4838	.6511
STAI-S4	.7435	.2127	.3241	.7202	.6196	.8584*	.6181	.6300
STAI-S5	.4284	.8865*	.5948	.0424	.2703	-.0230	-.2344	.1751
STAI-S6	.5659	.7652	.7345	.4155	.4263	.4260	.2766	.6366
STAI-S7	-.3430	-.2317	.0495	.1062	-.1102	-.0253	.1729	.1977
STAI-S8	.8431*	.8637*	.7857	.4667	.4835	.6744	.4755	.7865

* denotes significance level of .05

** denotes significance level of .01

2-tailed tests

Table N5

Pearson's Correlation coefficients between scores on Discan anxiety scales and Discan impulsivity scales for the clinical subject group (n=6).

	Discan Anxiety1	Discan Anxiety2	Discan Anxiety3	Discan Anxiety4	Discan Anxiety5	Discan Anxiety6	Discan Anxiety7	Discan Anxiety8
Discan Impulse1	.8780*	.3258	.8774	.3156	.3034	.4154	-.5495	.5858
Discan Impulse2	.3366	.8538*	.8194*	-.3995	.7498	.8278*	-.6477	.7899
Discan Impulse3	.2212	.4650	.6792	-.3539	.5573	.8501*	-.2117	.8506*
Discan Impulse4	.4306	-.2075	.5144	.1747	.1367	.2812	.0917	.3348
Discan Impulse5	.3740	.0352	.5924	-.0398	.4082	.3683	-.1615	.3781
Discan Impulse6	.8342*	-.1817	.6380	.5723	-.1087	.2427	-.0555	.4841
Discan Impulse7	.5276	-.3671	.3288	.4627	-.2786	.2614	.2734	.5276
Discan Impulse8	.5381	.0250	.6275	.1925	.0689	.6027	.0594	.7639

* denotes significance level of .05
 ** denotes significance level of .01
 2-tailed tests

Table N6

Pearson's Correlation coefficients between scores on Basic Personality Inventory-Impulse Expression scales and State-Trait Anxiety Inventory-State scales for the clinical subject group (n=6).

	BPI- ImE1	BPI- ImE2	BPI- ImE3	BPI- ImE4	BPI- ImE5	BPI- ImE6	BPI- ImE7	BPI- ImE8
STAI-S1	.2060	.2169	.6149	.4750	.6273	.5600	.7375	.7337
STAI-S2	.8887*	.9899**	.8020	.9192**	.8499*	.9126*	.8030	.7341
STAI-S3	.3320	.3827	.8287*	.6816	.6561	.6729	.8268*	.8802*
STAI-S4	.1254	.0302	.4430	.2807	.4664	.4297	.5145	.6640
STAI-S5	.9463**	.7932	.5019	.7343	.8586*	.8523*	.7344	.6527
STAI-S6	.7863	.8791*	.9278**	.9640**	.8954*	.9413**	.9493**	.8933*
STAI-S7	-.1141	.2827	.5773	.4220	-.0894	.0544	.2150	.1597
STAI-S8	.7391	.7699	.7413	.7780	.9339**	.9067*	.8661*	.8183*

* denotes significance level of .05

** denotes significance level of .01

2-tailed tests

Appendix P

Correlation Coefficient Matrices for Individual Subjects

Table P1

Subject #1 correlation matrix.

scale:	Discan Anxiety	Discan Impulse	STAI-S	BPI- ImE
Discan Anxiety	1.0000	----	----	----
Discan Imp.	.7472*	1.0000	----	----
STAI-S	.5366	.6138	1.0000	----
BPI- ImE	.5916	.3675	.1497	1.0000

Table P2

Subject #2 correlation matrix.

scale:	Discan Anxiety	Discan Impulse	STAI-S	BPI- ImE
Discan Anxiety	1.0000	----	----	----
Discan Imp.	.1183	1.0000	----	----
STAI-S	.9196**	.2985	1.0000	----
BPI- ImE	.2843	.1741	.3872	1.0000

Note. For all Tables in Appendix P, n=8 unless otherwise specified. Double asterisks (**) are used to denote .01 significance and a single asterisk (*) is used to denote .05 level of significance.

Table P3

Subject #3 correlation matrix.

scale:	Discan Anxiety	Discan Impulse	STAI-S	BPI- ImE
Discan Anxiety	1.0000	----	----	----
Discan Imp.	-.1021	1.0000	----	----
STAI-S	.7570*	.0883	1.0000	----
BPI- ImE	.0000	.8321**	.3429	1.0000

Table P4

Subject #4 correlation matrix.

scale:	Discan Anxiety	Discan Impulse	STAI-S	BPI- ImE
Discan Anxiety	1.0000	----	----	----
Discan Imp.	-.7039*	1.0000	----	----
STAI-S	.5105	-.1326	1.0000	----
BPI- ImE	-.2655	.7237*	.1967	1.0000

Table P5

Subject #5 correlation matrix.

scale:	Discan Anxiety	Discan Impulse	STAI-S	BPI- ImE
Discan Anxiety	1.0000	----	----	----
Discan Imp.	.5516	1.0000	----	----
STAI-S	.4187	.5967	1.0000	----
BPI- ImE	.1529	.3239	.1000	1.0000

Table P6

Subject # 6 correlation matrix (n=5).

scale:	Discan Anxiety	Discan Impulse	STAI-S	BPI- ImE
Discan Anxiety	1.0000	----	----	----
Discan Imp. STAI-S	-.1502	1.0000	----	----
BPI- ImE	.7955	.3712	1.0000	----
	.7638	.3769	.9950**	1.0000

Table P7

Subject # 7 correlation matrix.

scale:	Discan Anxiety	Discan Impulse	STAI-S	BPI- ImE
Discan Anxiety	1.0000	----	----	----
Discan Imp. STAI-S	.0000	1.0000	----	----
BPI- ImE	.8154**	-.0656	1.0000	----
	.1267	.5678	.2502	1.0000

Table P8

Subject # 8 correlation matrix.

scale:	Discan Anxiety	Discan Impulse	STAI-S	BPI- ImE
Discan Anxiety	1.0000	----	----	----
Discan Imp. STAI-S	.5811	1.0000	----	----
BPI- ImE	.8602**	.7266*	1.0000	----
	.2804	.7059*	.5868	1.0000

Table P9

Subject # 9 correlation matrix (n=5).

scale:	Discan Anxiety	Discan Impulse	STAI-S	BPI- ImE
Discan Anxiety	1.0000	----	----	----
Discan Imp.	.9702**	1.0000	----	----
STAI-S	.5305	.5028	1.0000	----
BPI- ImE	.8092*	.6566	.5449	1.0000

Table P10

Subject # 10 correlation matrix.

scale:	Discan Anxiety	Discan Impulse	STAI-S	BPI- ImE
Discan Anxiety	1.0000	----	----	----
Discan Imp.	-.0903	1.0000	----	----
STAI-S	.7276*	.1130	1.0000	----
BPI- ImE	-.0735	.2328	.1191	1.0000

Table P11

Subject # 11 correlation matrix.

	Discan Anxiety	Discan Impulse	STAI-S	BPI- ImE
Discan Anxiety	1.0000	----	----	----
Discan Imp.	.0277	1.0000	----	----
STAI-S	.8961**	.0914	1.0000	----
BPI- ImE	-.1352	.8799**	.1125	1.0000

Table P12

Subject # 12 correlation matrix.

scale:	Discan Anxiety	Discan Impulse	STAI-S	BPI- ImE
Discan Anxiety	1.0000	----	----	----
Discan Imp.	-.6300*	1.0000	----	----
STAI-S	.8784**	-.3693	1.0000	----
BPI- ImE	.1837	.2074	.4125	1.0000

Table P13

Subject # 13 correlation matrix.

scale:	Discan Anxiety	Discan Impulse	STAI-S	BPI- ImE
Discan Anxiety	1.0000	----	----	----
Discan Imp.	.2670	1.0000	----	----
STAI-S	.7363*	-.0851	1.0000	----
BPI- ImE	.4447	.6528*	.2672	1.0000

Table P14

Subject # 14 correlation matrix.

scale:	Discan Anxiety	Discan Impulse	STAI-S	BPI- ImE
Discan Anxiety	1.0000	----	----	----
Discan Imp.	-.6230*	1.0000	----	----
STAI-S	.9245**	-.7926**	1.0000	----
BPI- ImE	-.6869*	.5674	-.6375*	1.0000

Table P15

Subject # 15 correlation matrix.

scale:	Discan Anxiety	Discan Impulse	STAI-S	BPI- ImE
Discan Anxiety	1.0000	----	----	----
Discan Imp.	.2843	1.0000	----	----
STAI-S	.5832	.5890	1.0000	----
BPI- ImE	.1816	.7607*	.0544	1.0000

Table P16

Subject #16 correlation matrix.

scale:	Discan Anxiety	Discan Impulse	STAI-S	BPI- ImE
Discan Anxiety	1.0000	----	----	----
Discan Imp.	.2622	1.0000	----	----
STAI-S	.6934*	-.1798	1.0000	----
BPI- ImE	.0731	.1260	-.3910	1.0000

Table P17

Subject #17 correlation matrix.

scale:	Discan Anxiety	Discan Impulse	STAI-S	BPI- ImE
Discan Anxiety	1.0000	----	----	----
Discan Imp.	-.4652	1.0000	----	----
STAI-S	.8381**	-.7343*	1.0000	----
BPI- ImE	.4849	.3536	.2620	1.0000

Table P18

Subject #18 correlation matrix.

scale:	Discan Anxiety	Discan Impulse	STAI-S	BPI- ImE
Discan Anxiety	1.0000	----	----	----
Discan Imp.	.1716	1.0000	----	----
STAI-S	.6874*	-.2038	1.0000	----
BPI- ImE	-.0209	.4345	.1808	1.0000

Table P19

Subject #19 correlation matrix.

scale:	Discan Anxiety	Discan Impulse	STAI-S	BPI- ImE
Discan Anxiety	1.0000	----	----	----
Discan Imp.	.6620*	1.0000	----	----
STAI-S	.9113**	.5882	1.0000	----
BPI- ImE	.7770*	.9367**	.7702*	1.0000

Table P20

Subject #20 correlation matrix (n=5).

scale:	Discan Anxiety	Discan Impulse	STAI-S	BPI- ImE
Discan Anxiety	1.0000	----	----	----
Discan Imp.	.7272	1.0000	----	----
STAI-S	.6138	.5759	1.0000	----
BPI- ImE	.6543	.8770*	.6673	1.0000

Table P21

Subject #21 correlation matrix.

scale:	Discan Anxiety	Discan Impulse	STAI-S	BPI- ImE
Discan Anxiety	1.0000	----	----	----
Discan Imp.	.1301	1.0000	----	----
STAI-S	.9559**	.1579	1.0000	----
BPI- ImE	.1048	-.4454	.2619	1.0000

Table P22

Subject #22 correlation matrix.

scale:	Discan Anxiety	Discan Impulse	STAI-S	BPI- ImE
Discan Anxiety	1.0000	----	----	----
Discan Imp.	-.2816	1.0000	----	----
STAI-S	.5638	-.0537	1.0000	----
BPI- ImE	-.2117	.2582	.5914	1.0000

Table P23

Subject #23 correlation matrix.

scale:	Discan Anxiety	Discan Impulse	STAI-S	BPI- ImE
Discan Anxiety	1.0000	----	----	----
Discan Imp.	.7079*	1.0000	----	----
STAI-S	.8747**	.3203	1.0000	----
BPI- ImE	-.1965	.0800	-.2119	1.0000

Table P24

Subject #24 correlation matrix.

scale:	Discan Anxiety	Discan Impulse	STAI-S	BPI- ImE
Discan Anxiety	1.0000	----	----	----
Discan Imp.	-.2474	1.0000	----	----
STAI-S	.9614**	-.2916	1.0000	----
BPI- ImE	.2455	-.2362.	.3111	1.0000

Table P25

Subject #25 correlation matrix.

scale:	Discan Anxiety	Discan Impulse	STAI-S	BPI- ImE
Discan Anxiety	1.0000	----	----	----
Discan Imp.	.0595	1.0000	----	----
STAI-S	.6846*	-.3455	1.0000	----
BPI- ImE	-.7087*	.3298	-.4258	1.0000

Table P26

Subject #26 correlation matrix.

scale:	Discan Anxiety	Discan Impulse	STAI-S	BPI- ImE
Discan Anxiety	1.0000	----	----	----
Discan Imp	-.1867	1.0000	----	----
STAI-S	.9519**	-.1787	1.0000	----
BPI- ImE	.5659	-.3145	.6832*	1.0000

Table P27

Subject #27 correlation matrix.

scale:	Discan Anxiety	Discan Impulse	STAI-S	BPI- ImE
Discan Anxiety	1.0000	-----	-----	-----
Discan Imp.	.3322	1.0000	-----	-----
STAI-S	.8644**	.6792*	1.0000	-----
BPI- ImE	.5413	-.0643	.4921	1.0000

Table P28

Subject #28 correlation matrix.

scale:	Discan Anxiety	Discan Impulse	STAI-S	BPI- ImE
Discan Anxiety	1.0000	-----	-----	-----
Discan Imp.	-.0570	1.0000	-----	-----
STAI-S	.9364**	-.0925	1.0000	-----
BPI- ImE	.2056	-.0925	.1111	1.0000

Table P29

Subject #29 correlation matrix.

Subject # 29	Discan Anxiety	Discan Impulse	STAI-S	BPI- ImE
Discan Anxiety	1.0000	-----	-----	-----
Discan Imp.	.1755	1.0000	-----	-----
STAI-S	.8383**	.0470	1.0000	-----
BPI- ImE	-.0426	.0000	-.1425	1.0000

Table P30

Subject #30 correlation matrix.

scale:	Discan Anxiety	Discan Impulse	STAI-S	BPI- ImE
Discan Anxiety	1.0000	----	----	----
Discan Imp.	-.6162	1.0000	----	----
STAI-S	.6658*	-.5010	1.0000	----
BPI- ImE	.1269	.0739	.4683	1.0000

Table P31

Subject #31 correlation matrix.

scale:	Discan Anxiety	Discan Impulse	STAI-S	BPI- ImE
Discan Anxiety	1.0000	----	----	----
Discan Imp.	-.7287*	1.0000	----	----
STAI-S	.6020	-.7444*	1.0000	----
BPI- ImE	-.2874	.6281*	-.7298*	1.0000

Table P32

Subject #32 correlation matrix.

scale:	Discan Anxiety	Discan Impulse	STAI-S	BPI- ImE
Discan Anxiety	1.0000	----	----	----
Discan Imp.	-.1154	1.0000	----	----
STAI-S	.9027**	.0185	1.0000	----
BPI- ImE	.4838	.3149	.5783	1.0000

Table 33

Subject #33 correlation matrix.

scale:	Discan Anxiety	Discan Impulse	STAI-S	BPI- ImE
Discan Anxiety	1.0000	----	----	----
Discan Imp.	.1124	1.0000	----	----
STAI-S	.8699**	.1817	1.0000	----
BPI- ImE	.4510	.5257	.7747*	1.0000

Table P34

Subject #34 correlation matrix (n=4).

scale:	Discan Anxiety	Discan Impulse	STAI-S	BPI- ImE
Discan Anxiety	1.0000	----	----	----
Discan Imp.	-.6412	1.0000	----	----
STAI-S	.8759	-.7720	1.0000	----
BPI- ImE	-.0513	.1155	-.3809	1.0000

Table P35

Subject #35 correlation matrix.

scale:	Discan Anxiety	Discan Impulse	STAI-S	BPI- ImE
Discan Anxiety	1.0000	----	----	----
Discan Imp.	.6337*	1.0000	----	----
STAI-S	.8668**	.8413**	1.0000	----
BPI- ImE	.8242**	.7343*	.8424**	1.0000

Table P36

Subject #36 correlation matrix.

scale:	Discan Anxiety	Discan Impulse	STAI-S	BPI- ImE
Discan Anxiety	1.0000	----	----	----
Discan Imp.	-.2404	1.0000	----	----
STAI-S	.7781*	-.0611	1.0000	----
BPI- ImE	-.4092	.3478	-.3615	1.0000

Table P37

Subject #37 correlation matrix.

scale:	Discan Anxiety	Discan Impulse	STAI-S	BPI- ImE
Discan Anxiety	1.0000	----	----	----
Discan Imp.	-.4862	1.0000	----	----
STAI-S	.9096**	-.5715	1.0000	----
BPI- ImE	-.3624	.4082	-.1355	1.0000

Table P38

Subject #38 correlation matrix.

scale:	Discan Anxiety	Discan Impulse	STAI-S	BPI- ImE
Discan Anxiety	1.0000	----	----	----
Discan Imp.	-.1400	1.0000	----	----
STAI-S	.9282**	-.2844	1.0000	----
BPI- ImE	-.3573	-.1552	-.2537	1.0000

Table P39

Subject #39 correlation matrix (n=5).

scale:	Discan Anxiety	Discan Impulse	STAI-S	BPI- ImE
Discan Anxiety	1.0000	-----	-----	-----
Discan Imp.	-.1220	1.0000	-----	-----
STAI-S	.4615	.1006	1.0000	-----
BPI- ImE	.5834	.6498	.6852	1.0000

Table P40

Subject #40 correlation matrix.

scale:	Discan Anxiety	Discan Impulse	STAI-S	BPI- ImE
Discan Anxiety	1.0000	-----	-----	-----
Discan Imp.	.7759*	1.0000	-----	-----
STAI-S	.8113**	.4420	1.0000	-----
BPI- ImE	.6102	.4915	.7327*	1.0000

Table P41

Subject #41 correlation matrix (n=2).

scale:	Discan Anxiety	Discan Impulse	STAI-S	BPI- ImE
Discan Anxiety	1.0000	-----	-----	-----
Discan Imp.	-1.0000	1.0000	-----	-----
STAI-S	1.0000	-1.0000	1.0000	-----
BPI- ImE	-1.0000	1.0000	-1.0000	1.0000

Table P42

Subject # 42 correlation matrix.

scale:	Discan Anxiety	Discan Impulse	STAI-S	BPI- ImE
Discan Anxiety	1.0000	-----	-----	-----
Discan Imp.	.7514*	1.0000	-----	-----
STAI-S	.8684**	.6557*	1.0000	-----
BPI- ImE	.2558	.5819	.2010	1.0000

Table P43

Subject # 43 correlation matrix.

scale:	Discan Anxiety	Discan Impulse	STAI-S	BPI- ImE
Discan Anxiety	1.0000	-----	-----	-----
Discan Imp.	-.0117	1.0000	-----	-----
STAI-S	.9543**	.0821	1.0000	-----
BPI- ImE	-.2311	.2332	-.0627	1.0000

Table P44

Subject # 44 correlation matrix.

scale:	Discan Anxiety	Discan Impulse	STAI-S	BPI- ImE
Discan Anxiety	1.0000	-----	-----	-----
Discan Imp.	.4619	1.0000	-----	-----
STAI-S	.7850*	.2663	1.0000	-----
BPI- ImE	.1636	.2231	.4881	1.0000

Table P45

Subject # 45 correlation matrix.

scale:	Discan Anxiety	Discan Impulse	STAI-S	BPI- ImE
Discan Anxiety	1.0000	-----	-----	-----
Discan Imp.	.4637	1.0000	-----	-----
STAI-S	.8801**	.4246	1.0000	-----
BPI- ImE	.0976	.5980	.0673	1.0000

Table P46

Subject # 46 correlation matrix.

scale:	Discan Anxiety	Discan Impulse	STAI-S	BPI- ImE
Discan Anxiety	1.0000	-----	-----	-----
Discan Imp.	.3545	1.0000	-----	-----
STAI-S	.5883	-.3047	1.0000	-----
BPI- ImE	-.5543	-.7909**	.1234	1.0000

Table P47

Subject # 47 correlation matrix.

scale:	Discan Anxiety	Discan Impulse	STAI-S	BPI- ImE
Discan Anxiety	1.0000	-----	-----	-----
Discan Imp.	-.2315	1.0000	-----	-----
STAI-S	.7471*	-.2897	1.0000	-----
BPI- ImE	.3274	-.0482	.2674	1.0000

Appendix Q

Scatterplots

Note. Scatterplots contained within this Appendix present data for (a) anxiety scales and (b) impulsivity scales. In the legends, DISA represents Discan anxiety scores and STAI represents the State Trait Anxiety Inventory - State scores. DISI represents Discan Impulsivity scores and BPI represents the BPI-ImE scores. The “S” followed by a numeric value represents the subject number whose data are presented.

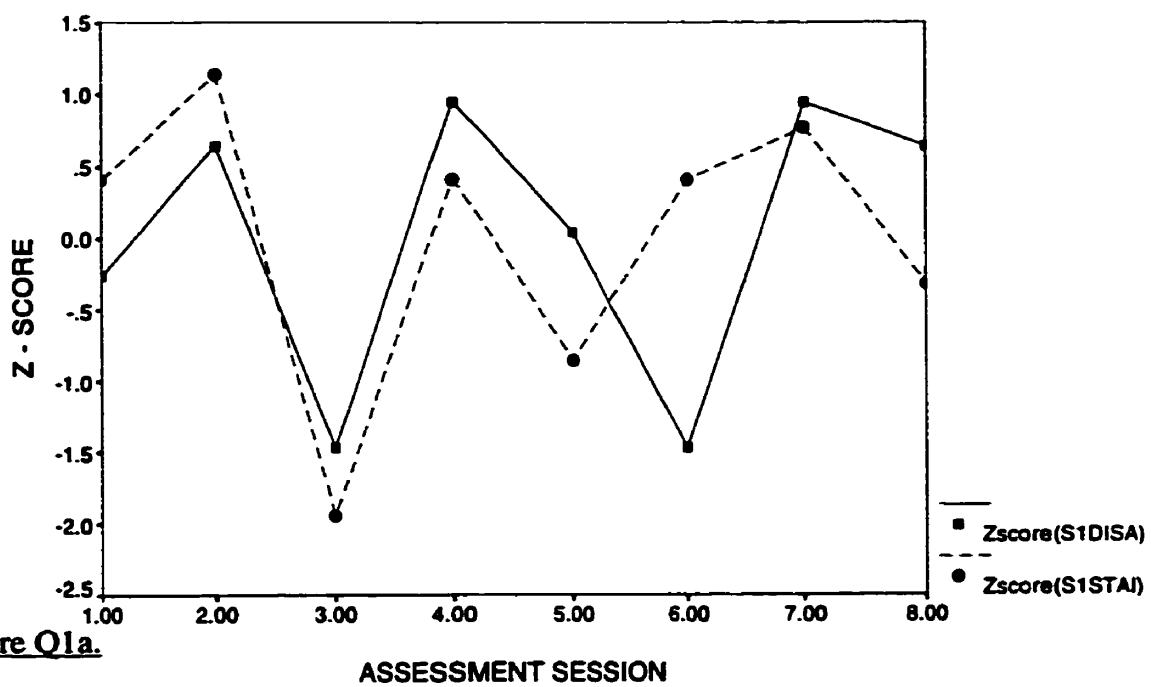


Figure Q1a.

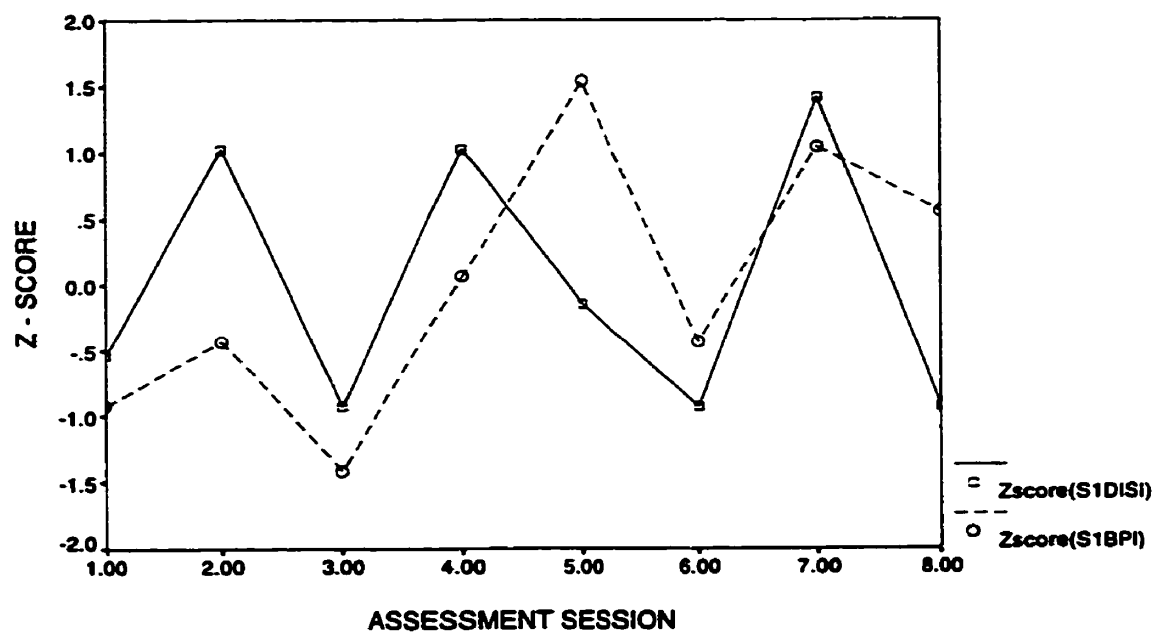


Figure Q1b.

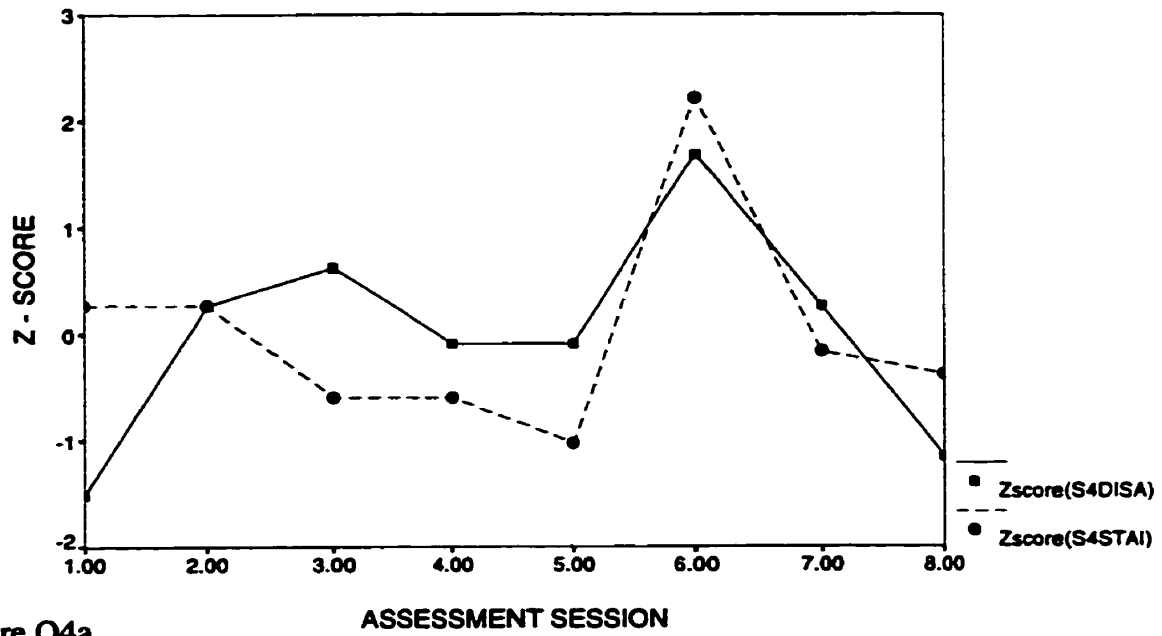


Figure Q4a.

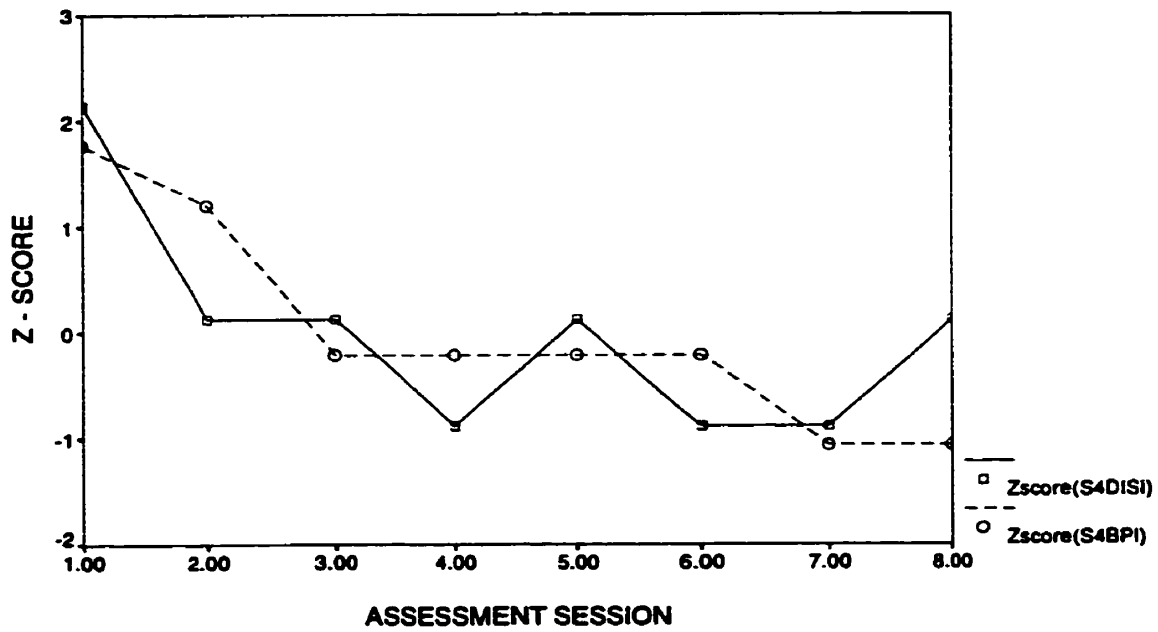


Figure Q4b.

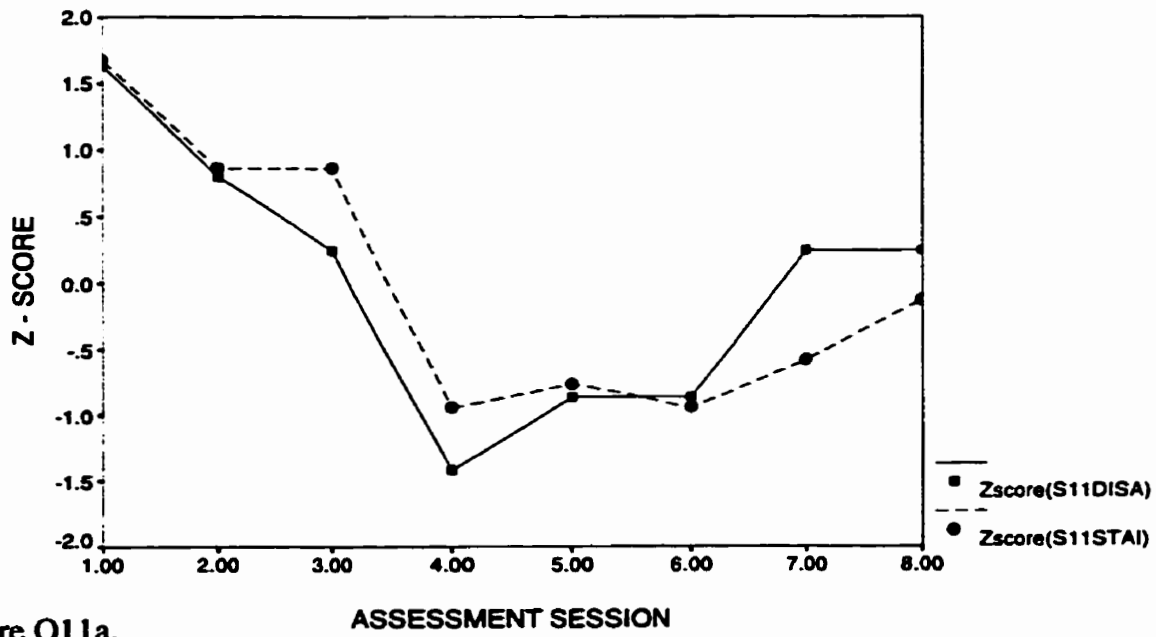


Figure Q11a.

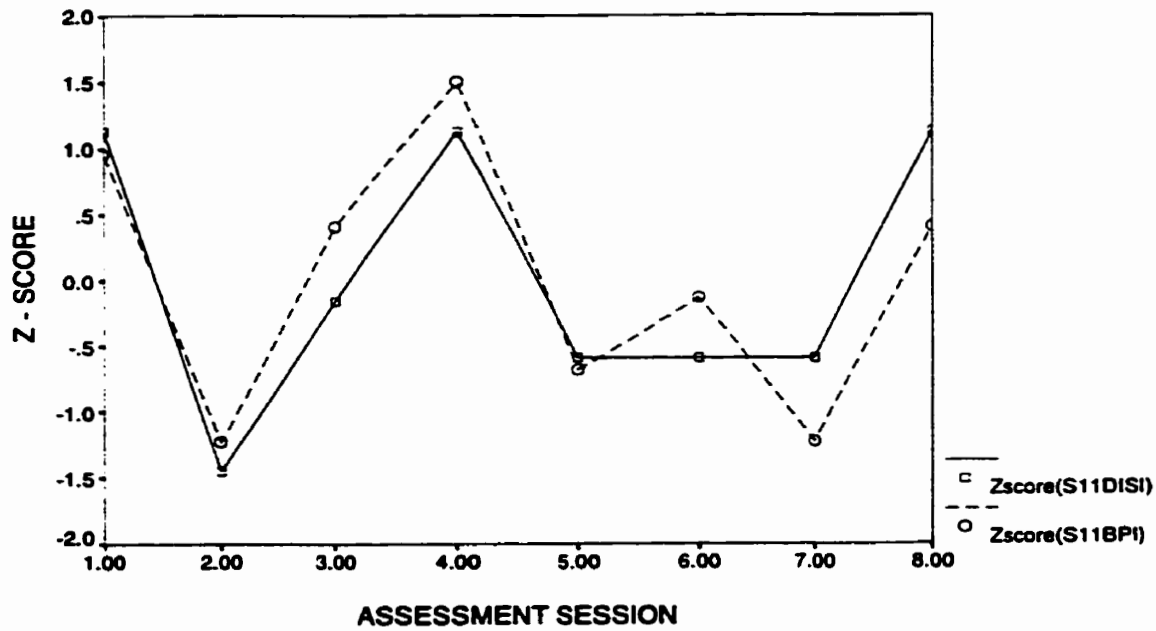


Figure Q11b.

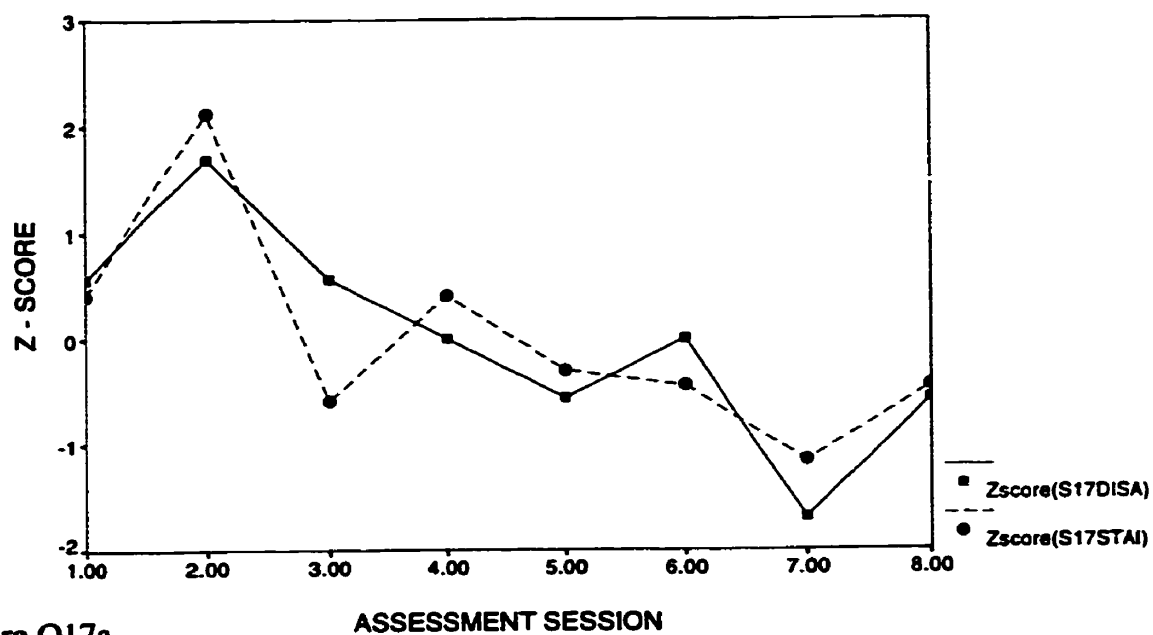


Figure Q17a.

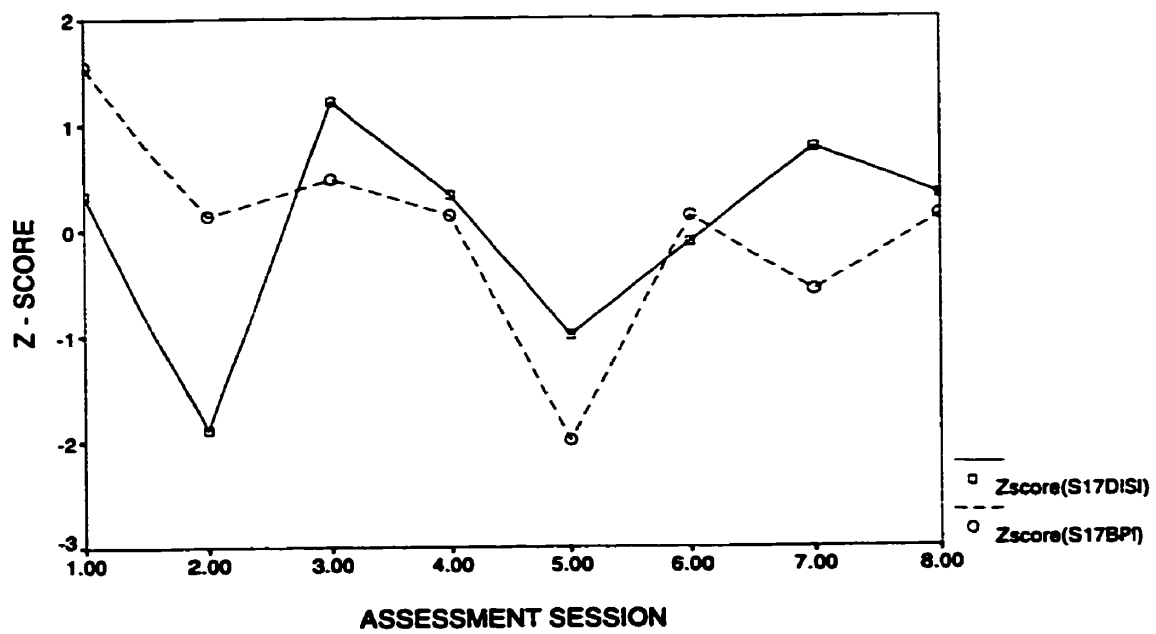


Figure Q17b.

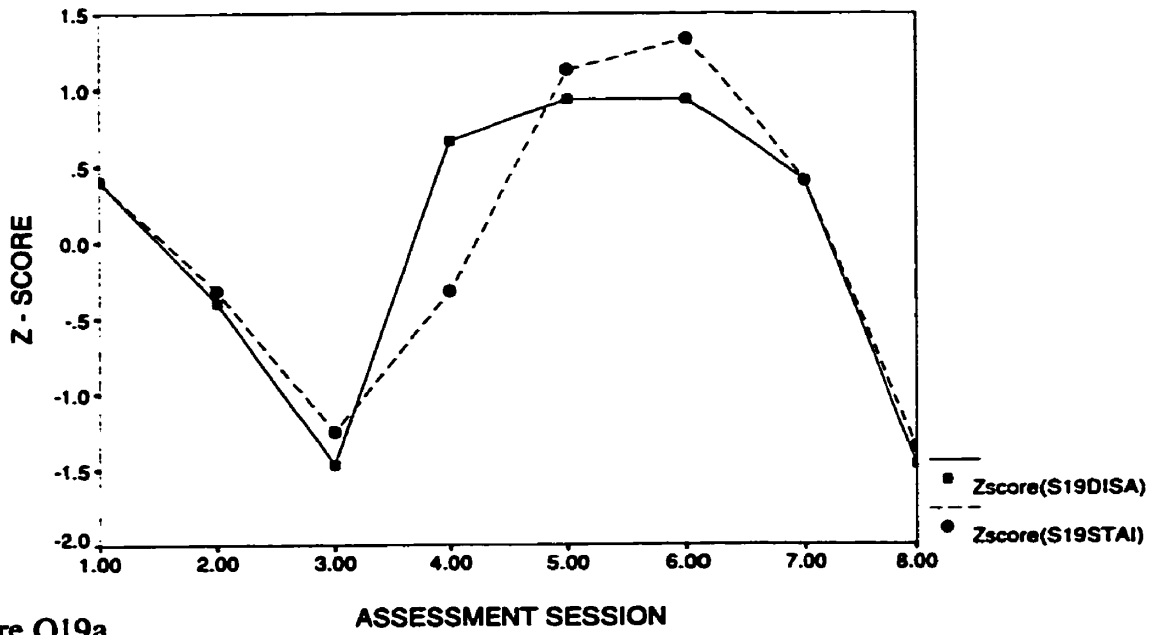


Figure Q19a.

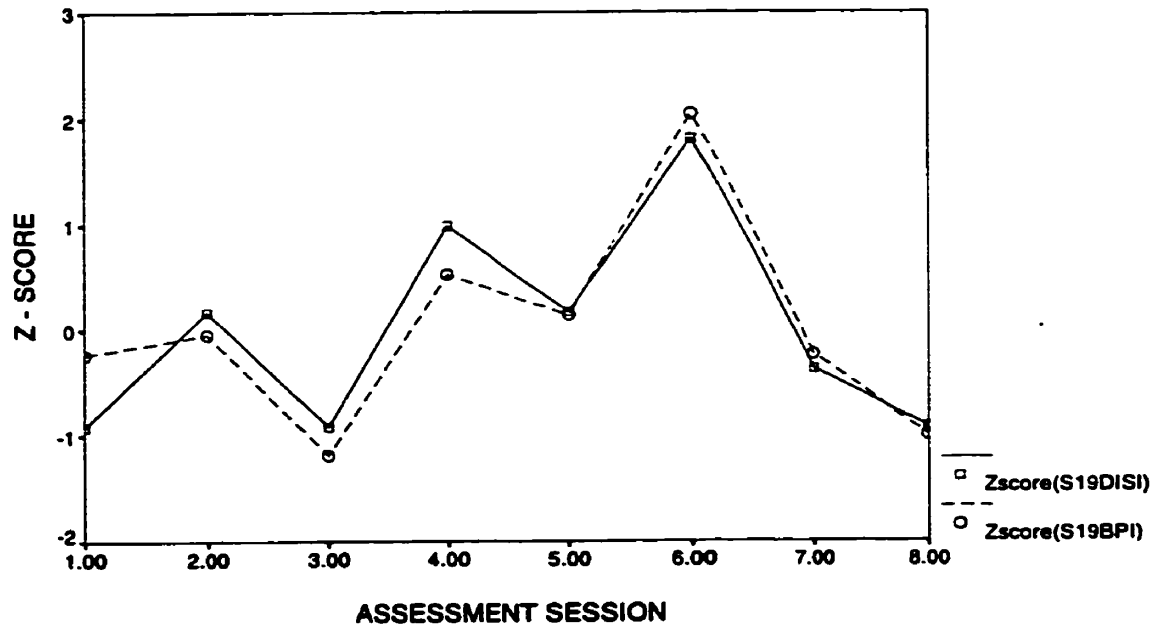


Figure Q19b.

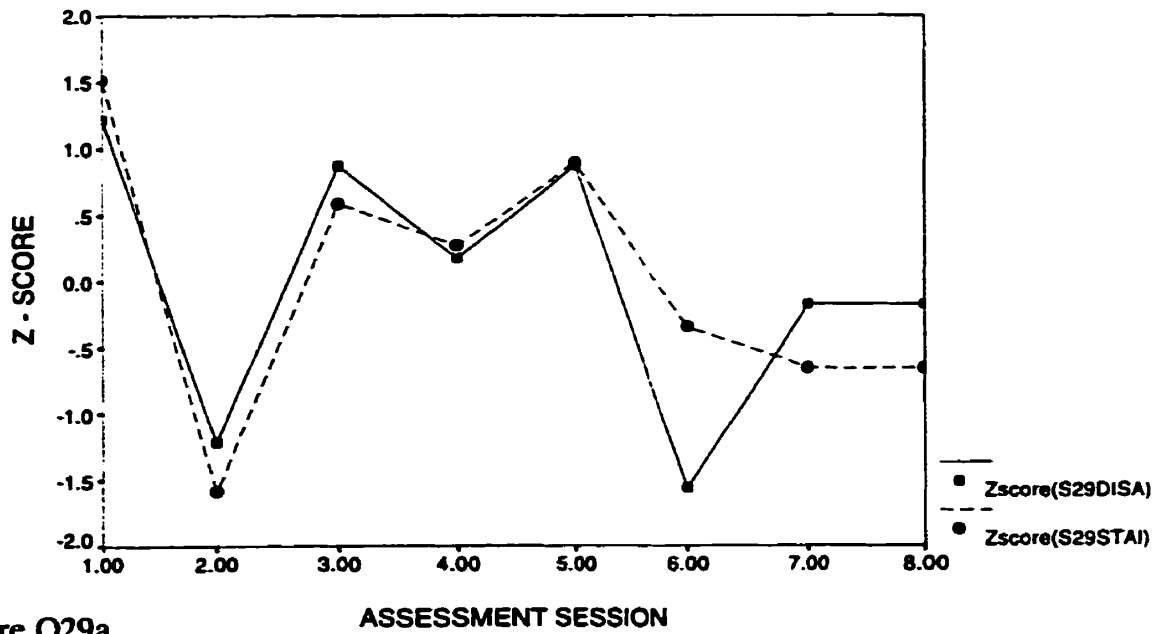


Figure Q29a.

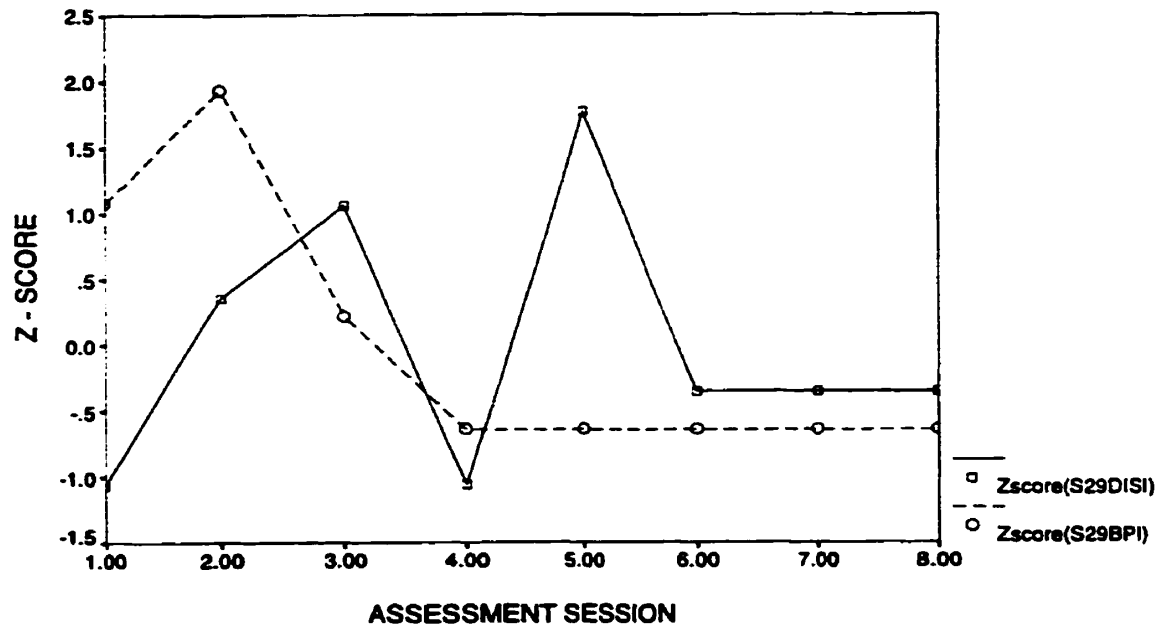


Figure Q29b.

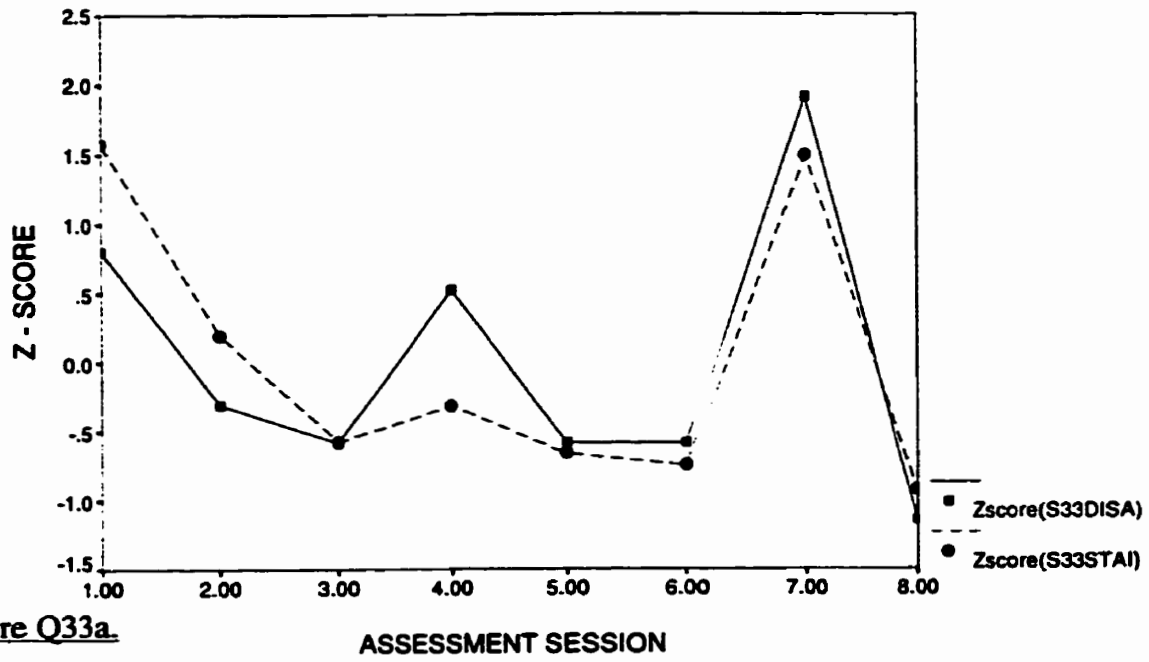


Figure Q33a.

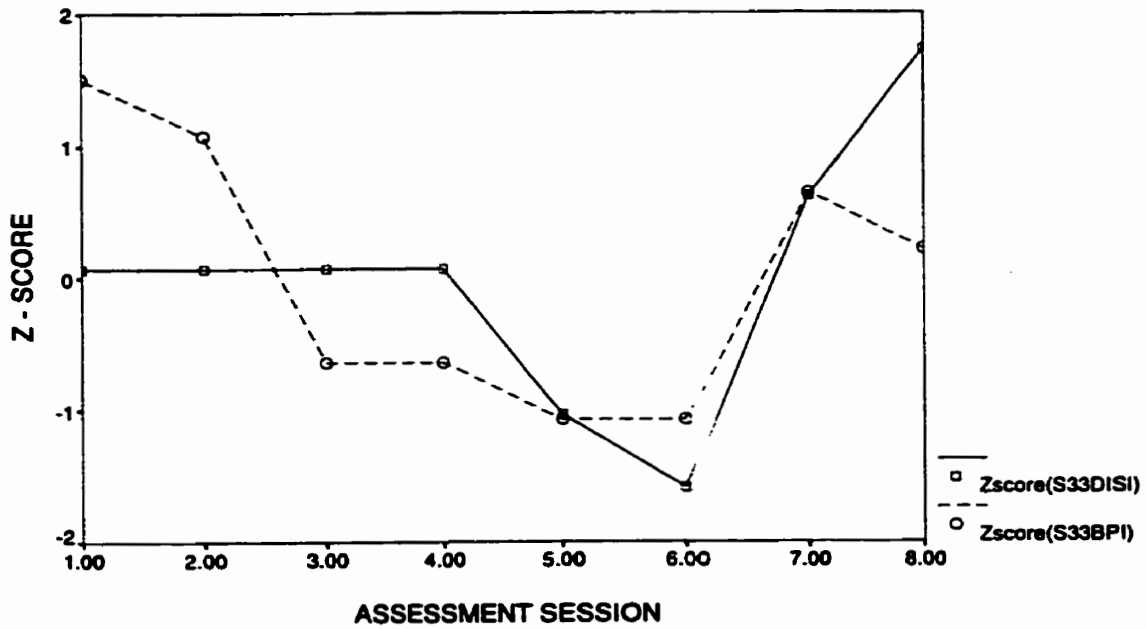


Figure Q33b.

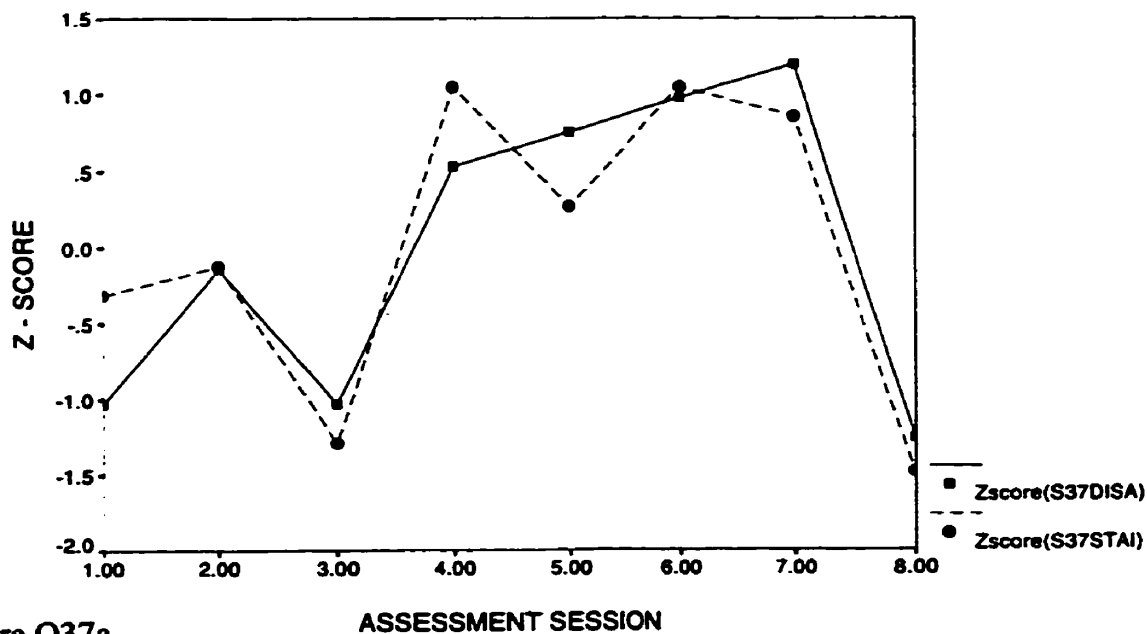


Figure Q37a.

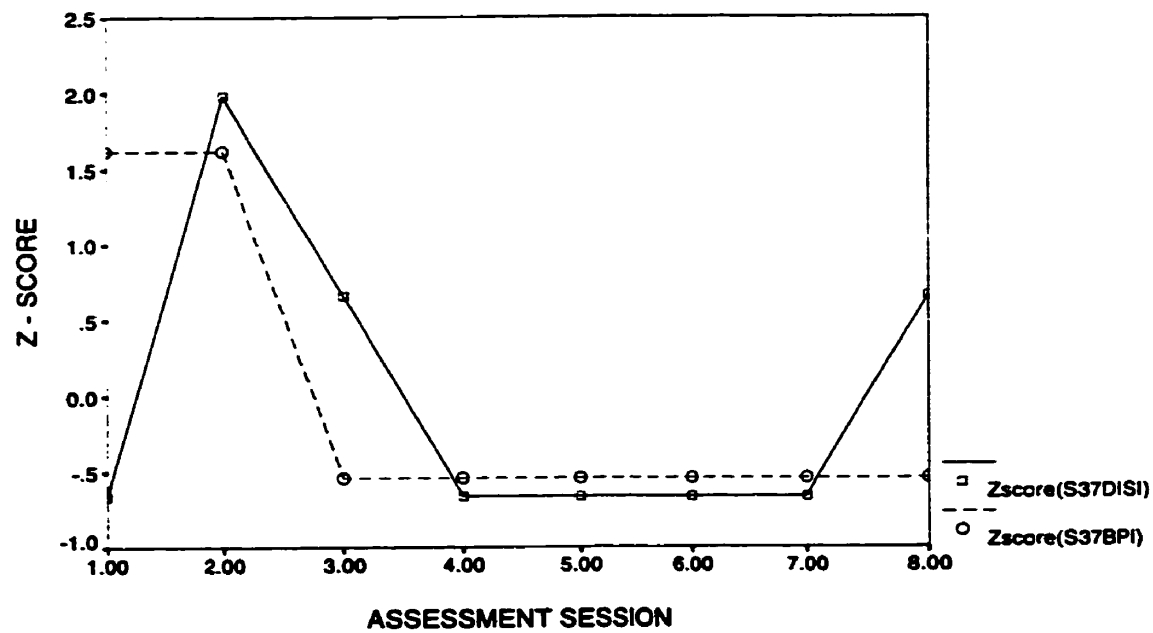


Figure Q37b.

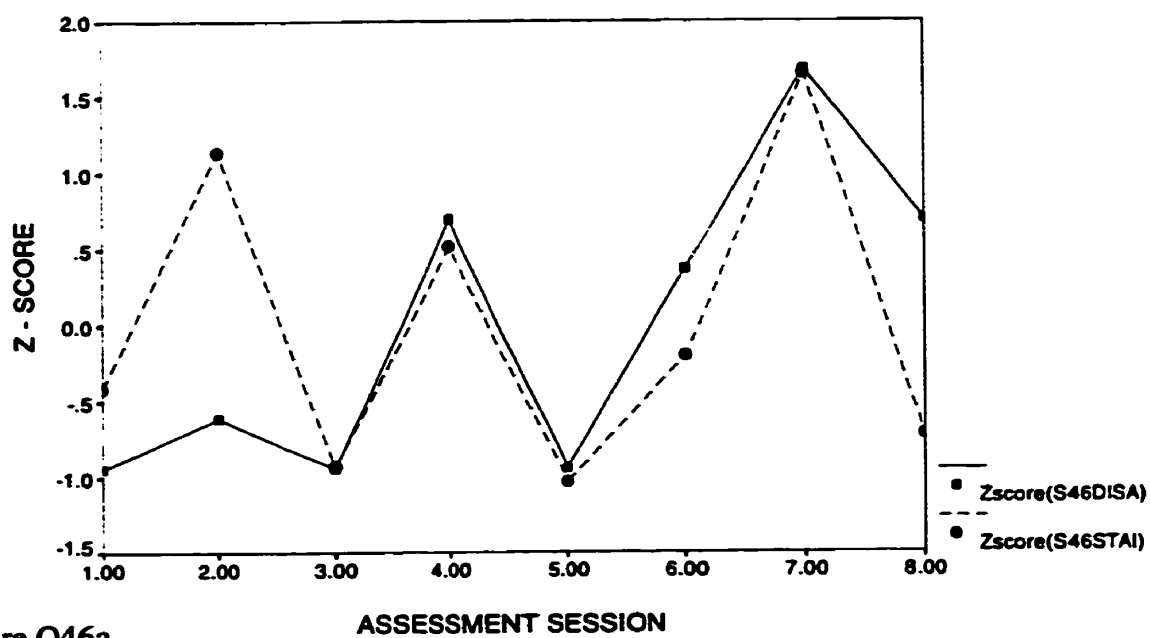


Figure Q46a.

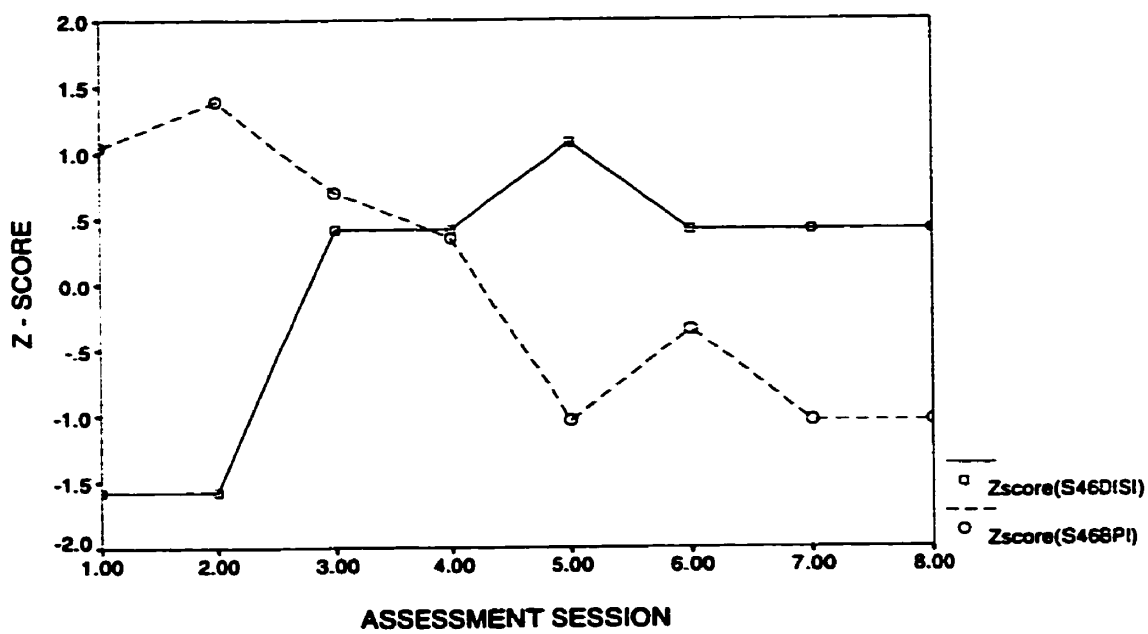


Figure Q46b.

Appendix R

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