COMPUTERIZED MEASUREMENT OF PSYCHOLOGICAL VITAL SIGNS IN A CLINICAL SETTING

by

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DEDICATION

For my parents.

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IN A CLINICAL SETTING

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ABSTRACT

Due to the increasing demands of third-party payers to show measurable results in a decreased amount of time, mental health practitioners need new tools and techniques to quickly and efficiently assess their client's current status and progress in treatment. The goal of this study was to develop and validate a brief computerized measure of emotional states and personality traits for use as an assessment tool in a clinical setting. Adapted from the State-Trait Personality Inventory (STPI; Spielberger, 1998), the computerized instrument measured state and trait anxiety, anger, depression, and curiosity. The computerized STPI was examined for equivalence with the traditional STPI and compared with therapists' ratings of their clients' emotional states and personality traits. Forty individuals (24 women, 16 men) in psychotherapy were administered either a computerized version of the STPI or the original, paper version. Each client's therapist was asked to rate him or her on the same 4 states and 4 traits measured by the STPI. In addition, clients and therapists answered short questionnaires regarding their reactions to the STPI and the client report generated by the STPI, respectively.

A comparison of mean STPI scale scores between the computerized and paper administration groups showed slightly higher levels of reported state emotion for the computerized administration. There was no other evidence of differences between the two experimental groups. Therapists who had previously conducted assessment with their client demonstrated a significantly higher correlation of their ratings with the corresponding client STPI self-reported scores. Feedback from the client and therapist exit questionnaires suggested that their reactions to the procedure and the usefulness of the STPI were quite favorable. Implications of increasing the use of computers in clinical assessment are discussed.

INTRODUCTION

Since prehistoric times man has understood the importance of physical vital signs such as pulse and temperature. Ancient Egyptian documents indicate that with the advent of written language we had also begun to systematize the healing arts, and had begun trying to understand physical functions such as heart rate (Guthrie, 1946). Between 1602 and 1612 Sanctorius developed an instrument to measure the relative rate of pulse and adapted Galileo's thermometer to the measurement of human patients (Singer & Underwood, 1962). Innovations in the mid 18th century by Stephen Hales and Leopold Auenbrugger lead to the measurement of blood pressure and the stethoscope, respectively. By the late 19th century practical versions of these devices were available and began to see regular clinical use. These inventions became the indispensable tools now routinely used by medical professionals in the assessment of physical health.

Just as medical science had to invent and refine devices to assess the vital functions of their patients, behavioral science must develop practical and effective instruments to measure psychological vital signs. The routine use of such instruments will help to systematize psychiatric science, provide a codified standard of care, and make the process of behavioral health care more quantifiable and accountable. At present we possess a number of instruments of varying degrees of precision to approach this problem, but most are still too cumbersome, labor-intensive, or inaccurate to become standardized clinical tools. Most clinical assessment today is focused on understanding long-standing personality traits and stable psychopathology rather than indicators of the moment to moment fluctuations we all

experience: emotions. Much more so than long-standing personality traits, emotional states are the psychological analog of the physician's vital signs. If measures are developed which can assess the important domains of an individual's *current* emotional and mental states, mental health care providers, like their medical counterparts, will be able to very quickly see and address critical problems. There are a number of instruments in current use that have been developed for the purpose of examining emotional states and/or traits. However, these measures are rarely used in the course of psychiatric treatment, but often are used for the purposes of conducting psychological research. Thus, a necessary next step in the evolution of mental health care will be the adaptation of sound measures of emotion to a clinical setting.

An obvious question to pose is that of exactly which emotions are most critical to psychiatric care. Clinical assessment, as well as many theories of personality, has focused on the assessment of individual differences in a number of traits such as anxiety (neuroticism), anger, and depression. As will be discussed in the following sections of this prospectus, there is strong precedent for the examination of these three emotions during the course of psychotherapy. Also examined is an historical assessment of anxiety, anger, and depression and the role of these emotions as vital signs of psychological well-being that should be carefully monitored in counseling, psychotherapy, and behavioral interventions, diagnostic evaluations, and studies of treatment outcome.

Given the ever increasing limitation of services that third party payers are willing to reimburse, it is important to provide effective treatments much more rapidly than in the past (Acklin, 1995). Health Maintenance Organizations and other third party payers are also coming to expect greater and greater accountability (even "proof" of effectiveness!) for the

services of mental health professionals. This is yet another compelling reason to develop an inventory of psychological vital signs, useful in the delivery and charting of psychiatric treatment.

During a physical examination, an individual's blood pressure is measured, pulse is taken, and fever is assessed quickly with the help of various simple scientific instruments. Psychological measurement now needs to move in a similar direction, making use of the latest technology in the assessment of individuals, such that therapists can rapidly deliver the services that help individuals most. Medical science has progressed thanks to various advances in the physical sciences which allowed clever physicians to create instruments useful and practical in the measurement of bodily variation. As technology has moved forward medicine has kept pace. Sophisticated new methods and devices such as the MRI, laser surgery, ultrasound, and DNA testing are providing an increasingly clear understanding of each individual patient.

Psychology also has access to technologies that will allow us to accomplish heretofore undreamed of diagnostics. Foremost in importance is the personal computer, a device that has become so ubiquitous and affordable that few sizable mental health care providers in the 21st century will be without this valuable tool. The modern computer has the ability to deliver, score, and assist in the interpretation of most psychological instruments. In many cases computers permit these common clinical tasks to be completed much more rapidly, accurately, and with a minimum of clinician time commitment. Using one of these "electronic helpers" will allow professionals, with minimal effort, to make continuing assessment a part of each therapy session.

Assessment of Emotions and Personality

Early theorists struggled with understanding the nature of emotions and the profound role they play in everyday experiences. According to Darwin (1872/1965), animals and man had developed emotions in order to facilitate survival. He identified two emotions that he believed were innate to both humans and animals: rage (anger) and fear (anxiety). Freud (1936) theorized that the perception of danger, either from external sources, or from one's own repressed thoughts and feelings, produced feelings of anxiety. According to Freud, the unpleasant state of anxiety motivated an individual to engage in some sort of adjustment behavior to avoid or cope with the perceived danger. Thus, consistent with Darwin, Freud interpreted anxiety as an innate and adaptive response.

As behaviorism came to dominate the field of psychology over the next 40 years, the study of emotions waned for the reason that mental and emotional processes were unobservable, could not be objectively measured, and thus were considered improper topics of scientific inquiry. The strong bias against measuring experiences that were not directly observable mandated investigators to evaluate the impact of carefully defined stimulus conditions on precisely measured behavioral responses. In a sense, personality, thoughts, and emotions did not exist for the behaviorists.

As a result of the cognitive revolution of the 1960's, a renewed interest in the importance of emotions and internal experiences emerged. In current research emotions are regarded as complex biopsychological states, which are comprised of specific feelings and physiological reactions (Spielberger, 1966). However, because a great deal of variation in behavior may be accounted for by an individual's current emotional state, assessment of both emotional traits and states is essential to developing a comprehensive theory of

emotion and personality. The work of pioneers such as Murray (1938) and Cattell (1966) increased our understanding of emotions by demonstrating the importance of the states and traits in understanding the complexities of human emotion. For example, an individual's appraisal of a particular event or situation as stressful will greatly influence her/his emotional reactions to that circumstance (Lazarus & Opton, 1966; Lazarus & Folkman, 1984). According to Lazarus, Deese, and Osler (1952), differences in personality traits may also influence emotional states by predisposing individuals to respond to similar situations (stimuli) in unique ways. According to Spielberger (1995), the quality and intensity of feelings experienced during emotional arousal are the most distinctive features of a particular emotion. Therefore, in order to accurately assess emotional phenomena, measurement tools must distinguish between qualitatively different emotional states, and also the intensity of these states as they vary over time.

Theories of emotion and personality have typically focused on the assessment of individual differences in a number of traits such as anxiety, anger, and depression. The nature of these dispositions as emotional states and personality traits is reviewed in the first section of this prospectus. The following sections of this prospectus discuss the assessment of anxiety, anger, and depression as emotional vital signs of psychological well-being that should be carefully monitored in counseling, psychotherapy, and behavioral interventions, as well as in diagnostic evaluations and studies of treatment outcome.

Psychological interest in personality assessment has been documented at least as far back as the late 1800's. Wundt (1896) employed the techniques of introspection in order to understand the emotional experiences of individuals, however, these early attempts to use self-report as a psychological measure received serious criticism because of lack of reliability

(Duffy, 1941). In 1906 Heymans and Wiersma developed a list of symptoms theorized to indicate the presence of psychopathology. Such lists were later highly influential in the generation of self-report personality inventories (Lanyon, 1971). Other pioneers, such as Gordon Allport (1921), championed the cause of personality assessment as a method of understanding and treating psychological problems.

The first self-report personality inventory was developed by Robert S. Woodworth (Lanyon, 1971), whose *Personal Data Sheet* was used during World War I to determine whether inductees had the ability to withstand the stresses of military life. The *Personal Data Sheet* (later known as the Woodworth Psychoneurotic Inventory) was a standardized psychiatric interview in the form of a "yes-no" paper and pencil questionnaire. The original form contained 200 questions based on common neurotic symptoms, behaviors and personality traits that had been observed in men who did not adjust well to the stresses of war. After testing this initial set of questions on college men and draftees the number of items was reduced to 116. The *Personal Data Sheet* was the precursor of modern self-report measures of personality, emotion, and psychopathology.

Despite strong forces such as radical behaviorism working to discredit and discourage the measurement of "invisible and intangible cognitions and feelings," the development of self-report measures continued. In general, self-report measures have continued to improve, showing increased attention to methodology and using increasingly sophisticated techniques such as factor analysis to improve item content (Guilford and Guilford, 1939). However, some problems in using proper methodology and a great deal of theoretical debate still persist today. Many of the instruments that have come out of the explosion of new inventories over the past half-century have poor psychometric properties,

are not properly validated, and have been used in research in very careless methodological ways.

One of the first measures to gain widespread acceptance and use was the Minnesota Multiphasic Personality Inventory (MMPI; Hathaway and McKinley, 1942). There is more data (and for that matter more studies) available from this measure and, by extension, its recent revision the MMPI-2 (1989) than any other personality inventory (Butcher & Rouse, 1996). This widely used and well-documented measure was empirically generated by examining the true-false items that best discriminated "normals" from patients having various diagnoses. Using this method, various subscales were constructed of items that differentiated DSM diagnosed categories from other categories and non-clinical populations. The MMPI is scored by summing the "yes" responses for each subscale ("no" for reverse scored items), and converting the raw scores to *T*-scores. Surprisingly, this instrument, once used more widely in research than any other, is not theoretically based, uses many "non-face valid" items, displays mediocre psychometric properties, and is excessively time consuming for both client and clinician. Using these same empirical development methods and more theoretically based methods, many other inventories have since been developed for the purposes of research and clinical use.

Today, clinical assessment most commonly consists of a narrow focus on personality traits and psychopathology as a means of orienting the clinician to a new client. Nonetheless, there are many of instruments that have been developed for the purpose of examining emotional states and traits. A number of these emotional assessment instruments are also in limited use in clinical and research settings. But, with the notable

exception of the Beck Depression Inventory (Beck, et al., 1961), measures of emotion are rarely used in session-to-session clinical assessment.

Anxiety, Anger and Depression as Emotional Vital Signs

The emotional vital signs that are most critical to an individual's well-being are anxiety, anger, and depression. Variations in the intensity and duration of these psychological states provide essential information about a person's mental health and can point to recent events as well as long-standing conflicts that have particular meaning and impact on an individual's life. Since more than 50% of the dropouts in therapy occur between the first and fifth interviews (Garfield & Bergen, 1986), assessing and providing meaningful feedback on readings of emotional vital signs during treatment will enhance patients' awareness and understanding of their feelings. Helping them to cope more effectively with these feelings early in treatment will also minimize dropouts.

According to de la Torre (1979), dealing with transitory feelings of anxiety (S-Anxiety) should be a major priority in all forms of short-term psychotherapy, including crisis intervention and dynamic treatments that focus on specific problems of the patient or client. Moreover, diverse manifestations of anxiety in various physical and psychological disorders generally require different forms of treatment (Suinn & Deffenbacher, 1988). As de la Torre (1979) has noted:

> The ubiquitousness of anxiety among psychiatric patients demands a careful assessment and diagnosis. The transitory anxiety in a well-compensated individual differs considerably from the intense anxiety that heralds psychotic decompensation. Both situations require

> different kinds of interventions and will have different prognostic outcomes (p. 379).

Recent research findings suggest that problems with anger are equally ubiquitous. In a series of studies, Deffenbacher (1992) and his associates (Deffenbacher, Demm, & Brandon, 1986; Deffenbacher & Stark, 1990; Hazaleus & Deffenbacher, 1986; Hogg & Deffenbacher, 1986) found that persons high in trait anger experienced heightened S-Anger and physiological arousal on a daily basis across a wide range of situations. Treatments designed to assist clients to learn how to reduce their anger by engaging in self-initiated relaxation exercises helped them to function more effectively, and to use problem-solving techniques and social skills that were previously disrupted by their angry feelings.

The assessment and control of anger has also been shown to be a critical factor in the development of serious physical problems such as hypertension (Harburg, et al., 1973, 1979; Gentry, et al., 1981, 1982; Johnson, 1984) and coronary heart disease (Kong, Blumenthal, & Whalen, 1980; Julkunen, et al., 1992). Although less attention has been given to the assessment of anger, the research of Deffenbacher (1992) and others clearly demonstrates that anger can be readily measured and that it is important to do so.

Depression is the most common mental disorder diagnosed (Wolman, 1990) with over 100 million people worldwide currently suffering from some depressive disorder. According to the DSM-IV (1994), lifetime prevalence for Major Depressive Episodes is 10% - 25% for women and 5% - 12% for men. The Epidemiological Catchment Area Survey (1991) calculated the annual prevalence of depressive episodes to be about 6% of the adult population in the U.S. Similar figures are cited for other industrial nations. According

to the World Health Organization (WHO), Depression is estimated to be present in over 10% of all those seeking care at primary health care facilities worldwide. In the United States alone, depression costs some $44 billion annually based on 1990 statistics, which is about the same as the costs resulting from heart disease (NIMH, 1997). This represents some 30% of the total estimated annual cost of $148 billion spent on all mental illness. It should be pointed out that this estimate excludes many hidden, indirect costs such as lost work time spent by family members of depressed individuals. And internationally the situation is of even graver importance. In 1990, unipolar depression was the leading global cause of years lived with a disability (WHO). By the year 2020, WHO estimates predict Unipolar Major Depression to climb to the number two position of global disease burden (and number one for women and persons in developing countries).

The worst consequence of depression is suicide. Together with alcohol and drug abuse and psychosis, depression is implicated in at least 60% of suicides, which in 1990 accounted for 1.6% of the world's deaths. An estimated 15 percent of people hospitalized for depression eventually take their own lives (NIMH, 1997). Major depressive disorder and associated suicides seem to be steadily increasing and there appears to be a worldwide trend towards a decreasing age of onset for Major Depressive Disorder (Cross-National Collaborative Group, 1992; DSM-IV, 1994). In sum, depression is an understated world problem of critical importance and of paramount importance in session-to-session assessment. Considering the financial and emotional strain of depression (both clinical and sub-clinical) and its increasing prevalence, it's not at all surprising that more and more attention is being paid to its careful measurement.

The clinical assessment of emotional vital signs can provide essential information for diagnosis, treatment planning, and monitoring the treatment process. Since management of anxiety, anger, and depression during treatment is a major concern of most mental health care professionals, the continuous assessment of these emotions can facilitate the treatment process (Deffenbacher, et al., 1986; Novaco, 1979). Barlow (1988) emphasizes the importance of utilizing measures that differentiate between depression and anxiety during the course of treatment.

The Nature and Assessment of State and Trait Anxiety, Anger, and Depression

The Assessment of State-Trait Anxiety

In *The Problem of Anxiety*, Freud (1936) conceptualized two types of anxiety, objective and neurotic. Objective anxiety, which Freud equated with fear, was elicited by real dangers in the external world. Neurotic anxiety was an emotional reaction to the individual's own repressed sexual or aggressive impulses, and was regarded as the "fundamental phenomenon and the central problem of neurosis" (Freud, 1936, p. 85).

Cattell and Scheier (1963) included a number of self-report and physiological measures in their multivariate assessment of anxiety. Through factor analysis, relatively independent "state" and "trait" anxiety factors have been found to consistently emerge (Cattell, 1966). Physiological responses (i.e. pulse rate and blood pressure) that fluctuate over time had high loadings on the state-anxiety factor, but only slight loadings on trait-anxiety. In contrast, the scales for which scores were relatively stable when measured under different conditions had strong loadings on the trait anxiety factor.

In early studies of the effects of experimentally induced stress, state anxiety was measured by assessing physiological changes associated with arousal of the autonomic

nervous system. Although a number of different physiological measures have been used in research on S-Anxiety (Lader, 1975; Levitt, 1980; Martin, 1973; McReynolds, 1968; Borkovec, Weerts, & Bernstein, 1977), galvanic skin response and changes in heart rate appear to be the most popular. For example, college students who were told they would be receiving strong electric shocks were found to have a marked increase in heart rate (Hodges & Spielberger, 1966). However, the validity of physiological measures in assessing state anxiety has been critically questioned (Hodges, 1976).

Although state and trait anxiety are usually positively correlated, they are logically quite different constructs. State anxiety (S-Anxiety) refers to the intensity of an unpleasant emotional experience, comparable to the fear and objective anxiety originally conceptualized of by Darwin (1872/1965) and Freud (1936). Anxiety states are comprised of feelings of tension, apprehension, nervousness, and associated activation of the autonomic nervous system (Spielberger, 1972). Emotional states vary in intensity over time in response to perceptions of physical or psychological danger. Trait anxiety (T-Anxiety) relates to the frequency with which anxiety feelings are experienced. Persons high in T-Anxiety tend to perceive a wider range of situations as dangerous or threatening and respond to perceived threats with more frequent and intense feelings of S-Anxiety (Reheiser, 1991).

Self-report questionnaires are by far the most popular procedures for assessing T-Anxiety, and include the Taylor (1953) Manifest Anxiety Scale (MAS) and the Anxiety Scale Questionnaire (ASQ), which Cattell and Scheier (1963) developed to assess anxiety in clinical situations. More labor-intensive clinician rating scales are also typically used in the assessment of pathological anxiety. One such instrument, the Hamilton (1959) Rating Scale, is widely used for evaluating symptoms of anxiety observed in clinical interviews or

psychotherapy sessions, and has been used to assess both S-Anxiety and T-Anxiety. Projective techniques such as the Rorschach Inkblots and the Thematic Apperception Test have also been used extensively in the clinical evaluation of anxiety, but fail to distinguish between S-Anxiety and T-Anxiety. Auerbach and Spielberger (1972) have found that Rorschach indicators of anxiety appear to be confounded with psychological defenses.

Zuckerman's (1960; Zuckerman & Lubin, 1965) Affect Adjective Check List (AACL) was the first instrument designed to assess both state and trait Anxiety. In assessing S-Anxiety, subjects are instructed to check those adjectives that describe how they feel "today"; in measuring T-Anxiety they are asked to report how they "generally" feel. Evidence of the validity of the AACL-Today Form as a measure of S-Anxiety is impressive, but the instructions and format for this scale make it relatively insensitive for assessing momentary changes in the intensity of anxiety as an emotional state. For example, checking or not checking a particular adjective, e.g., "tense," does not accurately distinguish between feeling "somewhat" and "very" tense. The concurrent validity of the AACL General Form as a sensitive measure of T-Anxiety is also questionable, as reflected in relatively small correlations with other trait anxiety measures.

The State-Trait Anxiety Inventory (STAI) was developed by Spielberger, Gorsuch, and Lushene (1970) to provide reliable, relatively brief, self-report scales for assessing both state and trait anxiety. Freud's (1936) Danger Signal Theory and Cattell's concepts of state and trait anxiety (Cattell, 1966; Cattell & Scheier, 1958, 1961, 1963), as refined and elaborated by Spielberger (1966, 1972, 1976, 1977, 1979, 1983), provided the conceptual framework that guided construction of the STAI. The state-trait distinction in anxiety

research has been subsequently validated in numerous studies (e.g., Gaudry, Spielberger, & Vagg, 1975).

In responding to the S-Anxiety items, subjects report how they feel "right now, at this moment" by rating the intensity of their anxiety feelings on the following 4-point scale: (1) Not at all; (2) Somewhat; (3) Moderately so; (4) Very much so. The STAI T-Anxiety Scale instructs subjects to report how they "generally" feel by rating themselves on the following 4-point frequency scale: (1) Almost never; (2) Sometimes; (3) Often; (4) Almost always.

Evidence of construct validity of the STAI S-Anxiety Scale is reflected in findings for patients undergoing surgery whose S-Anxiety scores are substantially higher the day before surgery than five to seven days following successful surgery (Auerbach, Wadsworth, Dunn, Taulbee, & Spielberger, 1973). Similarly, the S-Anxiety scores of college students are significantly higher when they are tested during an examination, and significantly lower after relaxation training, than when they are tested in a regular class period (Spielberger, 1983).

Correlations of scores on the STAI T-Anxiety scale with the ASQ and the MAS range from .73 to .85, indicating a high degree of concurrent validity. Since correlations among these scales approach the scale reliabilities, the three inventories can be considered as more or less equivalent T-Anxiety measures, however, the STAI T-Anxiety scale is comprised of only 20 items as compared with the 43-item ASQ and the 50-item MAS, and thus requires only about half as much time to administer. Moreover, the STAI-Y is less contaminated with feelings of depression and anger than are the MAS and the ASQ.

Evidence of the construct validity of the T-Anxiety scale is reflected in findings that various neuropsychiatric patient (NP) groups have substantially higher mean scores as

compared with normal subjects (Spielberger, 1983). General medical and surgical (GMS) patients with psychiatric complications also have higher T-Anxiety scores than GMS patients without such complications, indicating that the T-Anxiety scale can help to identify non-psychiatric patients with emotional problems. Lower T-Anxiety scores of patients with character disorders, for whom the absence of anxiety is an important defining condition, provide further evidence of the discriminant validity of the STAI.

Test-retest stability coefficients for the STAI-Y S-Anxiety scale are relatively low, with a median of only .33, as would be expected since anxiety states vary in intensity as a function of perceived stress. Alpha coefficients for the STAI-Y S-Anxiety Scale are .90 or higher for large, independent samples of high school and college students, working adults, and military recruits, with a median alpha of .93.

Since its introduction more than a quarter century ago (Spielberger & Gorsuch, 1966), the STAI has become an international standard, translated and adapted in 48 different languages and dialects (Spielberger, 1989). Norms for high school and college students; working adults; military personnel; prison inmates; and psychiatric, medical, and surgical patients are reported in the revised STAI-Y Test Manual (Spielberger, 1983).

The Assessment of State-Trait Anger

While much has been written about the negative impact of anger and hostility on physical health (Deffenbacher, 1994; Friedman, Tucker, & Reise, 1995) and psychological well-being, definitions of these constructs are often ambiguous and contradictory (Biaggio, Supplee, & Curtis, 1981). Spielberger, Johnson, Russell, Crane, Jacobs, and Worden (1985) refer collectively to anger, hostility, and aggression as the AHA! Syndrome. According to Spielberger, Jacobs, Russell, and Crane (1983),

> "Anger usually refers to an emotional state that consists of feelings that vary in intensity, from mild irritation or annoyance to intense fury and rage. Although hostility usually involves angry feelings, this concept has the connotation of a complex set of attitudes that motivate aggressive behaviors directed toward destroying objects or injuring other people...the concept of aggression generally implies destructive or punitive behavior directed towards other persons or objects." (p. 16)

A number of self-report psychometric scales were developed in the 1950s to measure hostility (e.g., Buss, 1957; Buss & Durkee, 1957; Cook & Medley, 1954; Schultz, 1954; Siegel, 1956). Of these measures, the Buss-Durkee Hostility Inventory (BDHI) is generally considered the most carefully constructed measure of hostility.

During the 1970s, three scales were developed which attempted to distinguish between anger and hostility: The Reaction Inventory (RI), the Anger Inventory (AI), and the Anger Self-Report (ASR). The RI was developed by Evans and Stangeland (1971) to assess the degree to which anger was evoked in a number of specific situations. Similar in conception and format to the RI, Novaco's (1975) AI consists of statements that describe anger-provoking incidents. The ASR was designed by Zelin, Adler, and Myerson (1972) to assess both "awareness of anger" and different modes of anger expression.

Two common problems with these measures of anger and hostility are that, in varying degrees, these measures fail to take the state-trait distinction into account and they tend to confound the experience and expression of anger with situational determinants of angry reactions. In a series of studies, Biaggio (1980) and her colleagues (Biaggio & Maiuro,

1985; Biaggio et al., 1981) examined and compared the reliability, concurrent and predictive validity, and the correlates of the BDHI and the RI, ASR, and AI anger scales. On the basis of their research findings, these investigators concluded that the empirical evidence for the validity of the four anger and hostility measures was both fragmentary and limited.

The State-Trait Anger Scale (STAS), which is analogous in conception and similar in format to the STAI (Spielberger, 1983; Spielberger et al., 1970), was developed to assess the intensity of anger as an emotional state, and individual differences in anger proneness as a personality trait (Spielberger et al., 1983). It was assumed that S-Anger fluctuates over time as a function of perceived frustration, whereas Trait anger (T-Anger) was defined in terms of individual differences in the frequency with which anger was experienced. Persons high in T-Anger, as compared to those low in this trait are likely to experience both more frequent and more intense elevations in S-Anger whenever annoying or frustrating conditions are encountered.

Crane (1981) found the T-Anger scores of hypertensive patients were significantly higher than those of medical and surgical patients with normal blood pressure, and that this difference was due entirely to the substantially higher T-Anger/Angry Reaction scores of the hypertensives. No difference was found in the T-Anger scores of the hypertensives and controls.

Deffenbacher (1992) and his colleagues used the STAS T-Anger Scale in a series of studies to assess the correlates and consequences of trait anger. Individuals with high T-Anger scores reported experiencing more intense and more frequent day-to-day anger across a wide range of provocative situations. They also experienced anger-related physiological symptoms two to four times more often than low T-Anger subjects. When

provoked, the high T-Anger individuals manifested stronger general tendencies to both express and suppress anger, and more dysfunctional physical and verbal antagonism. Negative events such as failure appeared to have a more devastating (catastrophizing) impact on the high T-Anger individuals (Story & Deffenbacher, 1985), who also reported experiencing higher levels of anxiety than persons low in T-Anger.

The importance of distinguishing between the experience and expression of anger has also long been recognized in psychophysiological investigations of the effects of anger on the cardiovascular system. In the classic studies of anger expression, Funkenstein and his co-workers (Funkenstein, King, & Drolette, 1954), exposed healthy college students to anger-inducing laboratory conditions. Those who became angry and directed their anger toward the investigator or the laboratory situation were subsequently classified as anger-out; those who suppressed their anger and/or directed it at themselves were classified as anger-in. The increase in pulse rate was three times greater for students classified as anger-in than for the anger-out group.

Anger directed outward involves both the experience of S-Anger and its manifestation in some form of aggressive behavior. Anger-out can be expressed in physical acts such as slamming doors, destroying objects, and assaulting or injuring other persons, or in verbal behavior such as criticism, threats, insults, or the extreme use of profanity. These physical and verbal manifestations of anger may be directed toward the source of provocation or expressed indirectly toward persons or objects associated with, or symbolic of, the provoking agent.

Harburg and his associates have reported impressive evidence demonstrating that anger-in and anger-out have different effects on the cardiovascular system (Harburg, Erfurt,

Hauenstein, Chape, Schull, & Schork, 1973; Harburg, Blakelock & Roeper, 1979; Harburg & Hauenstein, 1980; Harburg, Schull, Erfurt & Schork, 1970). Gentry (1972) and his colleagues (Gentry, Chesney, Hall, & Harburg, 1981; Gentry, Chesney, Gary, Hall & Harburg, 1982) subsequently corroborated and extended Harburg's findings. It should be noted, however, that Harburg and Gentry classified individuals as anger-in who did not report feeling angry, along with those who indicated that they experienced and suppressed their angry feelings. Very different personality dynamics have been attributed to "impunitive" persons, who do not experience anger in anger-provoking situations, and "intrapunitive" persons, who turn anger in and often blame themselves for the anger that is directed toward them by others (Rosenzweig, 1976, 1978).

From the foregoing review, it may be noted that anger expression has been implicitly defined as comprising a single dimension (e.g., Funkenstein et al., 1954; Harburg et al., 1973; Gentry et al., 1982), varying from extreme suppression or inhibition of anger (anger-in) to the expression of anger in destructive behavior (anger-out). The first step in constructing a scale to assess anger expression, Spielberger et al. (1985) was the formulation of working definitions of anger-in and anger-out. Anger-in was defined in terms of how often an individual experiences but holds in (suppresses) angry feelings. Anger-out was defined on the basis of the frequency that an individual expresses angry feelings in verbally or physically aggressive behavior. Consistent with these working definitions, the content of the items for the Anger Expression (AX) Scale ranged from strong inhibition or suppression of angry feelings (AX/In) to extreme expression of anger toward other persons or objects in the environment (AX/Out).

The rating scale format for the AX Scale was the same as that used with the STAS T-Anger scale, but the instructions differed markedly from those used in assessing T-Anger. Rather than asking subjects to indicate how they generally feel, they are instructed to report "...how often you generally react or behave in the manner described when you feel angry or furious" by rating themselves on the following standard four-point frequency scale: (1) Almost never; (2) Sometimes; (3) Often; (4) Almost always.

Factor analyses of the AX items identified two independent factors that were labeled Anger/In and Anger/Out. The selection of the items for the AX Anger-In (AX/In) and Anger-Out (AX/Out) subscales was based on the results of further factor analyses and subscale item-remainder correlations (Spielberger et al., 1985). The AX/In subscale items had uniformly high loadings for both sexes on the Anger/In factor and negligible loadings on Anger/Out; median loadings of the 8 Anger-In items on the Anger/In and Anger/Out factors were .665 and -.045, respectively. Similarly, the median loadings for the 8 Anger-Out items were .59 on the Anger/Out factor and -.01 on the Anger/In factor. Alpha coefficients for these brief 8-item measures varied from .73 to .84, indicating good internal consistency. Jacobs et al. (1988) have reported test-retest stability coefficients for the AX subscales, ranging from .64 to .86. Essentially zero correlations between the AX/In and AX/Out subscales have been reported for large samples of high school and college students (Johnson, 1984; Knight, Chisholm, Paulin, & Waal-Manning, 1988; Pollans, 1983; Spielberger, 1988). Thus, the anger-in and anger-out factors are factorially and empirically independent, suggesting that these scales assess two different dimensions of anger-expression.

A study by Johnson (1984) investigated the relationship between anger expression and blood pressure (BP). The AX Scale was administered to a large sample of high school students, and measures of systolic (SBP) and diastolic (DBP) blood pressure were obtained during the same class period. The correlations of AX/In scores with SBP and DBP were positive, curvilinear, and highly significant for both sexes. Inverse correlations of AX/Out scores with BP were significant but quite small. Height, weight, dietary factors (e.g., salt intake), racial differences, and family history of hypertension and cardiovascular disorders also correlated significantly with BP. However, after partialling out the influence of these variables, AX/In scores were still positively and significantly associated with elevated SBP and DBP. Moreover, multiple regression analyses indicated that AX/In scores were better predictors of blood pressure than any other measure.

Three items included in the AX Scale to measure the middle range of the anger-in/anger-out dimension ("I control my temper," "I keep my cool;" "I calm down faster") had substantial loadings in early studies on both the Anger/In and Anger/Out factors (Spielberger et al., 1985). In subsequent research, these items coalesced to form the nucleus of an anger control factor (Spielberger, 1988), stimulating further work to construct additional anger-control items. This resulted in the development of an 8-item Anger Control (AX/Con) subscale, which correlated negatively with AX/Out ($r = -.59$ for males; $-.58$ for females) in a large sample of university students (Spielberger, Krasner, & Solomon, 1988). The correlations of the AX/In and AX/Out subscales were essentially zero for both sexes.

The STAS and the AX Scale were recently combined to form the State-Trait Anger Expression Inventory (STAXI), which measures the experience, expression, and control of

anger (Spielberger, 1988). Fuqua, Leonard, Masters, Smith, Campbell, and Fischer (1991) administered the 44-item STAXI to a large sample of college students and factored their responses to the individual items. The first six factors identified by Fuqua et al. (1991), in the order that they emerged, were: S-Anger, Anger/Con, Anger/In, Anger/Out, T-Anger/Temperament and T-Anger/Reaction. The STAXI has proven useful for assessing anger in both normal and abnormal individuals (Deffenbacher, 1992; Moses, 1992), and in evaluating the components of anger in a variety of disorders, including alcoholism, hypertension, coronary heart disease, and cancer (Spielberger, 1988).

Although the impact of anger and hostility on the etiology of hypertension have been recognized for more than a half-century (Alexander, 1948), empirical verification of this relationship was difficult to obtain because valid measures of anger and hostility were lacking. With the development of better measures of the experience, expression and control of anger, the critical role of anger in hypertension and cardiovascular disorders has now been clearly demonstrated (Booth-Kewley & Friedman, 1987; Hartfield, 1985; Janisse, Edguer, & Dyck, 1986; Williams, Haney, Lee, Kong, Blumenthal, & Whalen, 1980). Consistent with these findings, high scores on the STAXI AX/In subscale are associated with elevated blood pressure in high school students (Johnson, 1984). Very high scores on both the AX/In and AX/Out scales (above the 90th percentile) may place an individual at risk for coronary artery disease and heart attacks.

The Assessment of State-Trait Depression

According to man's oldest records, depression has been a part of the human experience from our earliest history. The Iliad, which dates back to 800 BC, describes depressive symptoms in the Greek warrior Achilles such as insomnia, depressed mood, loss

of appetite, loss of pleasure or interest, and fatigue. It also contains reference to using drug-laced wine as a possible treatment for such conditions (perhaps the earliest recorded use of pharmacotherapy). For many cultures depressed mood was long considered a curse from god or gods. In fact psychopathology in general was thought to be indicative of possession by demons the work of evil spirits or a form of divine punishment. Throughout the Bible there are a number of instances of God punishing his followers with an enduring sorrow. For example, in the first book of the Old Testament, Genesis, God tells Adam "cursed is the ground for thy sake; in *sorrow* shalt thou eat of it all the days of thy life." And the prophet Jerimiah in the book of Lamentations (1:12) says "Behold, and see if there be any sorrow like unto my *sorrow*, which is done unto me, *wherewith the Lord hath afflicted me* in the day of his fierce anger" (italics added).

Hippocrates in the 4th century BC espoused a theory that chronic depressed affect—known for centuries as melancholia—was due to an excess of black bile in the body. This point of view was largely unchallenged by competing theories until the middle ages, when the theological explanation regained popularity (Wetzel, 1984). Witch-hunts, severe punishment, and other untoward deeds were prescribed as treatment for the afflicted.

In 1621 Robert Burton published his immensely popular *Anatomy of Melancholy*, a work considered by many scholars to be a critically important monograph on the subject. Although his *Anatomy* is steeped in superstition and religion, Burton and some of his contemporaries did much to promote the humane treatment of the mentally ill.

Further progress towards rational understanding and treatment of depression occurred in the late 1800's when Emil Kraepelin classified mental disorders under a disease model. This implied that all mental disorders had physical causes, which while not

completely true, was a step in the right direction. This was truly a milestone for the understanding of psychopathology and psychometric theory—after all, you can't measure demonic possession or black bile.

Moving into the 20th century, Freud developed his psychoanalysis and a theory of depression including etiology and treatment. Once this gateway had been opened, theories of psychopathology, depression, and treatment proliferated, each with its own preferred modality of measurement (dream analysis, interview, neurochemical analysis, self-report, projective test, etc.). And somewhere in this process of exploration and variegation the concept of depression became so much more complex and difficult to agree upon.

Although many of us know what it is to feel "depressed," this is only one aspect of the word. According to the American Psychiatric Glossary (1994), depression can be used to describe a normal mood state of sadness and despair, a symptom (seen in another disorder), a syndrome (associated symptoms seen in another disorder), or a mental disorder such as Major Depressive Disorder. The semantic difficulties this can create are confusing enough that some researchers tend to circularly define depression in terms of symptoms of the syndrome and the symptoms as signs of depression.

One set of generally accepted standards for identifying the clinical syndrome of depression that has been refined over the years is the Diagnostic and Statistical Manual of Mental Disorders (DSM) criteria for Mood Disorders. The current edition (IV) includes the following criteria for a Major Depressive Episode: **(1)** Depressed mood or **(2)** loss of interest or pleasure, and (3) weight loss (without dieting), (4) insomnia or hypersomnia, (5) psychomotor agitation or retardation, (6) fatigue or loss of energy, (7) feelings of worthlessness or excessive guilt, (8) difficulties in thinking or concentrating, or (9) recurring

thoughts of death. Self-report instruments such as the Beck Depression Inventory propose to measure depression based on this definition. Unfortunately, even using the best instruments to poll a construct so carefully defined by the DSM, there are still large problems to solve in measurement such as the high correlation between depression and anxiety.

A fairly recent conceptualization of depression considers depression to be one of three parts of a depression/anxiety syndrome. Since instruments measuring these two emotional states are often highly correlated (sometimes more so than with other measures of the same construct!) Clark and Watson (1991) have tried to extricate the experience of depression from the experience of anxiety as expressed on self-report inventories. Clark and Watson's tripartite model breaks down symptoms of the depression/anxiety syndrome into *general nonspecific distress, anhedonia/low positive affect* (specific to depression), and *Physiological hyperarousal* (specific to anxiety). Clark and Watson's Positive Affectivity/Negative Affectivity Scale (PANAS) and the depression subscales in the State-Trait Personality Inventory (STPI; Spielberger, 1998) both measure the lack of positive affect that is specific to depression.

Depression is the most common mental disorder diagnosed (Wolman, 1990) with over 100 million people worldwide currently suffering from some depressive disorder. According to the DSM-IV (1994), lifetime prevalence for Major Depressive Episodes is 10% - 25% for women and 5% - 12% for men. The Epidemiological Catchment Area Survey (1991) calculated the annual prevalence of depressive episodes to be about 6% of the adult population in the U.S. Similar figures are cited for other industrial nations. According to the World Health Organization (WHO), Depression is estimated to be present in over

10% of all those seeking care at primary health care facilities worldwide. In the United States alone, depression costs some $44 billion annually based on 1990 statistics, which is about the same as the costs resulting from heart disease (NIMH, 1997). This represents some 30% of the total estimated annual cost of $148 billion spent on all mental illness. It should be pointed out that this estimate excludes many hidden, indirect costs such as lost work time spent by family members of depressed individuals. And internationally the situation is of even graver importance. In 1990, unipolar depression was the leading global cause of years lived with a disability (WHO). By the year 2020, WHO estimates predict Unipolar Major Depression to climb to the number two position of global disease burden (and number one for women and persons in developing countries).

The worst consequence of depression is suicide. Together with alcohol and drug abuse and psychosis, depression is implicated in at least 60% of suicides, which in 1990 accounted for 1.6% of the world's deaths. An estimated 15 percent of people hospitalized for depression eventually take their own lives (NIMH, 1997). Major depressive disorder and associated suicides seem to be steadily increasing and there appears to be a worldwide trend towards a decreasing age of onset for Major Depressive Disorder (Cross-National Collaborative Group, 1992; DSM-IV, 1994). In sum, depression is an understated world problem of critical importance. Considering the financial and emotional strain of depression (both clinical and sub-clinical) and its increasing prevalence, it's not at all surprising that more and more attention is being paid to its careful measurement.

In 1930, Jasper developed the first self-report measure of depression, which is a 40-item questionnaire that he claimed measures the trait of "depression-elation." Jasper developed the questionnaire specifically to assess the relationship between "depression-

elation" and the trait dimension of "extraversion-introversion". From his first study with this measure Jasper concluded that, "the individual whose behavior is characteristically introverted has a higher probability of being depressed in affective quality than elated." Chant and Myers (1936) conceptualized depression as an aspect of a dimensional rather than categorical personality trait, with elation/optimism on one side and depression on the other. Their contribution was the construction of a more refined 22-item measure of depression, scored by taking an average of all endorsed items.

In general, self-report depression measures have continued to improve, showing increased attention to methodology and using increasingly sophisticated techniques such as factor analysis to improve item content (e.g. Guilford and Guilford, 1939). However, some problems in using proper methodology and a great deal of theoretical debate still persist today. Many of the instruments that have come out of the explosion of new inventories over the past half-century have poor psychometric properties, are not properly validated, or have been used in very careless methodological ways. There are many critical examples of such research problems. There are also modern day foibles in the study of depression that hamper progress and understanding of this ailment. Consider, for instance, that before 1970 most research on depression used psychiatric patients as subjects and that since then studies have come to rely on dysphoric "normal" university students (Gotlib, 1984). The general belief that various studies of depression across time are comparable is based upon an assumption that subsyndromal depressive affect is <u>not</u> qualitatively different from a major depressive episode. And yet some researchers are actually still treating data from these two groups as equivalent.

One of the first personality measures to gain widespread acceptance and use was the Minnesota Multiphasic Personality Inventory (MMPI; Hathaway and McKinley, 1942). There is more data (and for that matter more studies) available from this measure and, by extension, its recent revision the MMPI-2 (1989) than any other personality inventory (Butcher & Rouse, 1996). The depression scale of the MMPI, one of 10 clinical subscales, has 60 true-false items (57 in the MMPI2) that inquire about depressive symptoms, cognitions, behaviors, and affect. It can be administered in less than 15 minutes when given separately from the entire battery. Usually the entire test (571 items) is administered (which can take from 1 ½ to 2 hours), making the MMPI less attractive for research and rather cumbersome in the monitoring of mood states. The depression subscale does appear to measure depressive state, but it has been criticized for lack of a specific time reference period (McNair, 1974). Although the MMPI-D appears to have acceptable reliability (split-half correlation > .70), various other criticisms have been made regarding its unreliable factor structure and its sensitivity to the effects of drugs (since many items tap somatic functioning). Another criticism is that factor analytic studies have revealed various unrelated factors such as cynicism, apathy, and hostility in the MMPI-D scale. Fortunately, at least one area of concern in the original MMPI was corrected in the validation of the MMPI2; in the development of the first measure, relatives of patients in the various test groups served as the "norm" group. Although a great deal of informative data exists on this measure, considering its shortcomings, it doesn't appear to be the best measure for the examining various aspects of depression.

The next major self-report of depression to be developed was the Beck Depression Inventory (BDI; Beck, et al., 1961). Beck intended to develop an instrument that would

measure depression as a construct that cuts across a variety of diagnostic categories. The general critical consensus is that the BDI performs this task adequately. The BDI is considered the standard in the clinical assessment of depression; it is usually used to establish the validity of new measures related to depression. The BDI is currently the most popular instrument for assessment of depression in general, with annual estimated use in clinical and research settings at least twice as great as any other measure (Ritterband, 1997). It has been used in outcome studies, private practice, hospital settings, and a multitude of other purposes. The BDI has been translated into Arabic, Bulgarian, Chinese, Danish, Dutch, Finnish, French, German, Hmong, Indian, Iranian, Japanese, Korean, Polish, Russian, Spanish, Swedish, Turkish, Xhosa and several other languages (Sartorius & Ban, 1986).

The BDI contains a total of 21 items, each item theoretically derived from clinical observations of depressed patients. Each item is actually a collection of four related self-referent statements arranged in increasing severity of the symptom, cognition, or affect being measured. These statements are scored from 0 to 3. Total score is simply the sum of all items, with the possible exception of one item concerning weight loss that is not counted in the case of dieting. On average, the BDI takes about 10 minutes to complete.

The BDI underwent revision in 1978 to clarify language and put all items on a 4-point scale (0 to 3) for a total of 84 self-statements. At this time Beck, et al. also changed the general instructions from state instructions (subjects were instructed to respond according to how they felt at the time of administration) to more long-term state instructions ("during the past week"). The current instrument displays good psychometric properties and has been consistently shown to have satisfactory clinical utility and reliability.

There are 2 subscales described in the manual for the BDI: Cognitive-Affective (first side—13 items) and Somatic-Performance (back side—8 items), but there is little support for their validity. Factor analysis of the BDI generally yields 3 major factors: (1) negative view of self and future, (2) physiological symptomatology, and (3) physical withdrawal, but this isn't always consistent. The BDI has excellent validity and good split-half reliability (.87). Test-retest reliability (.60) is acceptable, yet brings to attention the fact that the BDI is not a purely state or trait measure and therefore neither completely stable in trait measurement nor completely sensitive to subtle changes in depressive affect. Most criticism in this regard is directed towards the BDI's poor sensitivity to detect subtle differences in low levels of depression.

The Zung Self-Rating Depression Scale (SDS; Zung, 1965) consists of 20 items developed from previous factor analytic studies of clinical depression. The 20 items (10 positive, 10 negative) are on a 4-point scale ranging from "none or a little of the time" to " most or all of the time" to assess frequency of each item. Scoring is based on the total of the item scores divided by the maximum possible score (80). The scale appears to assess *pervasive affect, physiological equivalents or concomitants,* and *psychological concomitants* (Gotlib and Cane, 1989).

The SDS takes about 30 minutes to complete. Instructions for the SDS are to select the answer "which applies best to how you have been feeling during the past week." However, many items could be interpreted as unclear in time, so the SDS is not really an ideal measure of change in affect or a stable measure of long standing depression. There is some disagreement over whether the SDS's psychometric properties are sufficient for general use and whether it is capable of differentiating different levels of depression (Carroll,

et al., 1973). The SDS does not appear to have a stable factor structure. Furthermore, gender and age variables have different effects on scores in patient and non-patient populations, with the elderly and adolescents tending to score in the clinical range on the SDS. Another criticism is that the SDS items were never tested for internal reliability, and often separate into factors based on positive and negative phrasing of the items (Gotlib and Cane, 1989). Because of these numerous psychometric flaws, the SDS has seen a decline in use and is not considered one of the better measures of depression.

The Depression Adjective Checklists (DACL; Lubin, 1965) consist of 7 lists of affectively related adjectives which subjects are instructed to check if a particular adjective describes their current feelings ("how you feel now—today"). The lists are divided into two sets, with the lists in one set consisting of 32 items (the first four lists) and the lists in the other set consisting of 34 items (the last 3 lists). In each list there are groups of negative adjectives (which indicate depressive affect when checked) and groups of positive adjectives (which should be more neutral). Scores are obtained by adding the number of checked positive items to the number of unchecked negative items. Items inquire about affective state, notably ignoring physiological symptoms and other aspects of the depressive syndrome. Scoring is based on a total of checked items and unchecked reverse scored items. Time to complete one of the DACL lists is about 2 ½ minutes. Lubin (1965) indicates that normative data is extensive and good, internal consistency (split-half) is strong, and intercorrelations of the lists are high. The instrument is generally a good measure of state depressive affect.

The Center for Epidemiologic Studies –Depression scale (CES-D; Radloff, 1977) is a 20-item scale designed to measure depressive symptoms in general (non-psychiatric)

populations. Its construction is very similar to that of the DACL and SDS. Items are on a 4-point scale indicating how frequently the subject has experienced the symptom item in the last week, from "rarely or none of the time" to "most or all of the time." Created from items borrowed from other measures (BDI, SDS, MMPI), the CES-D was not intended as a diagnostic or assessment instrument (although Radloff suggests that a score of 16 indicates the presence of depression), but as a epidemiological research tool. Items assess depressed mood, feelings of guilt, loneliness, hopelessness, worthlessness, psychomotor retardation, concentration problems, appetite loss, and sleep disturbance. Factor analysis reveals indicates that the CES-D has three strong factors: depressed affect, positive affect, and somatic/retarded activities (Radloff, 1977). According to Radloff, the CES-D has high internal consistency (.84+), and good sensitivity (.90). Many researchers feel the CES-D is fine for research purposes, but shouldn't be used as a clinical diagnostic instrument, mainly because of too many false positives and negatives (Gotlib and Crane, 1989).

Clinical Assessment of Emotional Vital Signs

Clinical Assessment has historically focused on the measurement of individual differences in various personality traits such as neuroticism, anxiousness, and other relatively stable characteristics. Since much of our behavior and mental well-being is stable over time, initial measurement of various personality traits allows some prediction of future behavior, response to various treatments, etc. However, despite this knowledge of an individual's predisposition to act, feel, and think in a certain manner, there is still a great deal of variation which is accounted for by their current emotional state. Although the strategy of measuring emotional and personality traits can be rather useful in the diagnosis and

treatment of a number of mental disorders, it completely ignores important dynamic elements of a patient's treatment.

When clinicians possess some knowledge of both the personality traits *and* the emotional states of an individual, they have a much more accurate picture of that individual's mental health. As a brief, illustrative example: imagine an individual in a therapy session who, according to various measures of intelligence and trait personality, should have no difficulty attending to and processing important information during a therapy session. If this individual were to show up for a session in an extremely angry, anxious, or depressed mood it could have a very serious effect on that individual's ability to process information during the session. Clinicians who are able to discern such an internal state in their clients would be wise to begin by addressing these states early in the session. Moreover, using assessment tools from session to session would provide clinicians with critical emotional state information that would make it easier to address such disruptive emotional states and to determine their antecedents.

Just as a physician's routine measurement of physical vital signs (e.g., pulse rate, blood pressure, and temperature) in medical examinations is used to assess general physical health, it is essential to monitor emotional states, in order to evaluate psychological well-being. Elevations in temperature that define a fever are interpreted by physicians as indicative of the presence of infection that requires immediate attention (Guyton, 1977). Similarly, symptoms of extreme emotion indicate the presence of pervasive unresolved conflicts that result in an emotional fever. And, just as fevers can usually be reduced by antipyretics (e.g., aspirin, acetaminophen) in patients with colds or the flu, depressed mood,

anxiety, etc. when detected, can be decreased by pharmacological or psychotherapeutic intervention.

Assessment, Therapy, and Accountability

In the last 20 years, Managed Care Organizations (MCOs) and other types of third party payers have become the predominant source of health care funding (Moreland, Fowler, &Honaker 1994). Mental health care is the fastest rising cost in health care (Winslow, 1989) and individuals in emotional distress are twice as likely to seek medical services (VandenBos & DeLeon, 1988). Because of the recognized increased need for mental health care and its documented effect on physical health care costs, third party payers have made the control of mental health costs one of their top agenda items for the coming decade (Kesler, 1986).

When striving to reduce the cost of mental health care, clinical assessment makes an easy target, being one of the more costly and time consuming aspects of psychological services (Moreland et al., 1994). In fact, early in the relationship between MCOs and mental health services the process of assessment was viewed as an inordinate expense and payment was often rejected (Marcus, 1993). Although there is substantial evidence to support the value and effectiveness of assessment in clinical settings, MCOs and others are demanding that the cost of assessment be very well justified from a financial standpoint. According to Moreland et al. "... there is no surer way to justify testing than to go straight to the bottom line: does test feedback have a direct positive impact on the client and is it ultimately cheaper than simply forging ahead with therapy in the absence of testing?" (p.597). Given the constraints of cost-effectiveness, therapy today is under ever increasing accountability and pressure to effect results in just a few sessions and to provide objective evidence of

effectiveness. To this end, clinicians must give increasing attention to using assessment instruments that are treatment-relevant, cost-effective, and clinically proven.

Clinical Assessment and Computerized Testing of Psychological Vital Signs

A major improvement in psychological testing is the development and increased use of Computer Based Assessment (CBA). The numerous advantages CBA offers include increased speed and efficiency, easier administration, improved access to assessment data, potential for remote administration, lowered expense, innovative types of assessment (e.g. measuring exact latency of responses), elimination of redundant data entry, and instant feedback (Weber, et al., 2003). Furthermore, the science of clinical psychology will advance through improved standardization of assessment (providing real comparability of studies), improved data quality, and increased availability of data (Dow, et al., 1996).

Computers have already been a part of psychological assessment longer than most clinicians have been in practice (Butcher, 1993) and are continually demonstrating increased capability to perform routine assessment tasks. Although the use of computers in psychological testing goes back as far as the early 1970's (e.g. J. Johnson and colleagues' work at the Salt Lake City VA Hospital), CBA is still not widely used (Fowler, 1993). Some of the likely reasons for this include: a lack of familiarity with computers, fear of client reaction to computers, uncertainty regarding computerized testing issues, legal/ethical concerns, misguided fear of clinician obsolescence, and general resistance to change. It is likely that many of these concerns were felt as self-report questionnaires began to supplant direct clinician interviews, forever changing the nature of psychological assessment (viz. Krug, 1993).

Although CBA is still not being utilized by a majority of clinicians, there is growing support for the development and use of CBA. Spielberger and Piotrowski (1990) assessed the attitudes of 476 members of the Society for Personality Assessment towards computerized testing, and found that the majority of clinicians considered CBA useful in their work. As CBA and other technologies become increasingly important and commonplace, many improvements and wholly new methods of assessment will become available to clinicians everywhere.

One key area of improvement will be easier, more efficient administration. Just as new technologies have lightened administrative time burdens in other areas, the incorporation of various automated procedures will create more time for the behavioral health care system to attend to real client problems rather than paperwork. Clients as well as psychologists will also appreciate not having to re-enter a great deal of information from various paperwork. Some of the expense from printing, data entry, and administration costs will also be salvaged. Also, for individuals who have difficulty making frequent visits to the clinic office, remote administration of assessment devices will provide improved coverage and monitoring between sessions.

The facility with which assessments can be entered and recorded will allow much easier tracking of client progress as well as the generation of data for practitioners to do research on their own methods and efficacy. An excellent example of such an initiative is The Psychological Corporation's (1997) Optaio software package that contains various CBA measures and a "practice manager" module for this very purpose. Management of records will of course be greatly simplified too, resulting in cost and time-savings for mental health care providers and researchers. The orderly storage of data will allow easier access to

assessment data, client records, and medical data. Records will be instantly accessible from remote locations, eliminating the need to search for client files in volumes of filing cabinets or waiting days to get the records through the mail. In addition to being easy to access, computerization will allow for greater security for confidential information and easy anonymitization of records for various research purposes.

Clinical psychology research will become easier and more efficient as improved standardization of assessment allows meta-analyses and follow-up studies to be conducted on existing data sets. In addition, CBA will bring an end to missing or illegible data from poorly completed forms; since computerized measures can be programmed to require completion of every item, inadvertent bad data can be eliminated completely. Vast stores of quality data will be readily available to researchers around the world (e.g. the Florida Mental Health Institute's initiative to freely provide data from all institute research via the World Wide Web). The volumes of standardized data generated by computerized assessments will be easy to examine for clinical research such as outcome studies, resulting in greatly enhanced accountability at all levels. As researchers, institutions, and individual therapists make use of these data, techniques and policies that don't work can be tracked, recognized, and eliminated. The outcome of this improved, automated assessment and record keeping will be the betterment and vertical development of behavioral health care.

Widely used computer scoring programs such as the Personality Assessment Inventory (PAI) computerized diagnostic report are already helping therapists by providing almost instant assessment feedback on the measure. Considering the impinging time limits of managed care and the therapeutic value of being able to jump more quickly into therapy, such tools will be of great value to psychology. As systems become more sophisticated and

well integrated, regular and repeated computerized assessment will become part of standard therapy procedure. Marcus (1993) states that "[he] believe[s] that computerized psychological testing is the only viable way to generate the objective data needed to end the adversarial relationship between psychology and managed care organizations."

Although it is not unusual for a client's level of depression to be examined before each therapy session, the measurement of other critical emotional states before therapy sessions is very rare. Just like depressive emotion, other emotions such as anger and anxiety are critical indicators of current mental well being, but since there are few quick and adequate measures of these emotions, they are generally not assessed on a regular pre-session basis. If there was an instrument that tapped all these psychological vital signs in a quick and efficient manner, it could be of great value to the therapist in bringing attention to immediate problems with their client at the beginning of each session.

The assessment of psychological vital signs at the beginning of the intake procedure will make it possible provide feedback and help the client learn to cope with these feelings early in treatment. If a patient is depressed or experiencing intense anxiety or anger, it is imperative for the examiner to deal immediately and directly with these feelings. Intense emotional feelings can greatly interfere with judgment and reality testing, and can result in injuries to the patient or others. Feedback concerning patients' emotional vital signs, as revealed by assessing anxiety, anger, and depression, can help them to recognize and report relationships between their thoughts and feelings and the events which give rise to them, and thus facilitate the therapeutic process. The therapeutic process would also be facilitated if emotional vital signs were taken at the beginning of each treatment session. With such information available at the beginning of a session, the therapist will be alerted to special

problems that require immediate attention. Dealing with elevations in a client's emotional vital signs should take precedence over regular therapeutic procedures since these signs indicate more immediate needs that must be addressed. Charting sequential levels of S-Anxiety, S-Anger and S-Depression over the course of treatment, and providing patients with feedback about these emotional vital signs can also help to identify significant problem areas, thereby facilitating the patients' understanding of how specific problems influence their emotions.

In order to take the science of clinical psychology forward to meet the new expectations of third-party payers, new tools and techniques must be devised and implemented (Moreland, Fowler, & Honaker, 1994). An ideal instrument should be fairly brief, psychometrically sound, easy to administer and score, and should provide quick, valuable information on the client's mental condition (Marcus, 1993). Unfortunately, most clinical assessment devices in current use fall short of these ideals. Therefore, new and improved instruments must be designed and implemented in order to forward the practice of clinical psychology.

STATEMENT OF THE PROBLEM

The goals of this study were to administer and validate a brief computerized measure of emotional states and personality traits for use as an assessment tool in a clinical setting. Adapted from the State-Trait Personality Inventory (STPI; Spielberger, 1998), this instrument measures state and trait anxiety, anger, depression, and curiosity. The computerized STPI (STPI-Cp) was administered and scored by computer rather than in the conventional pencil-and-paper format. The following hypotheses were evaluated:

1. The psychometric characteristics (means and standard deviations) of the STPI-Cp will be comparable to those for this instrument when it is administered in the conventional pencil-and-paper format.
2. Client scores and Therapist ratings will correlate positively and significantly on all eight measures of emotional states and personality traits.
3. Correlation of therapist ratings with client scores on the computerized state-trait measure of psychological vital signs will be comparable to those of clients who responded to the conventional paper-and-pencil format of the measure.
4. Clients completing the STPI-Cp will report that it was easy to understand and that responding to the measure was easily accomplished.

METHOD

Participants

There were two categories of participants in the present study, therapists and clients, who were recruited from one of two settings at a large Southeastern university: (1) The Counseling Center for Human Development (CCHD), or (2) the Psychological Services Center (PSC). The CCHD is a student services center that provides free counseling for university students. The PSC is a training clinic that provides therapy and other services to both students and the general community. The 40 clients (24 females; 16 males), ranging in age from 21 to 77 years old (*mdn age* = 29) were currently receiving psychological treatment at the CCHD or the PSC. Based on their self-reports of demographic characteristics, 93% of the clients were Caucasian (n=37); the remaining 7% (n = 3) were either Asian American or African American. Although females outnumbered the males by a ratio of 3:2, the distribution for each sex across experimental conditions and data collection sites was approximately even. Clients at the CCHD were all receiving free counseling sessions, while clients at the PSC were receiving treatment with payment on a sliding scale.

The 18 therapists who participated in this study were mental health service providers who were employed by the CCHD (n=9) or in training at the PSC (n=9). The CCHD therapists were either interns or staff members; therapists at the PSC were all advanced graduate students enrolled in an APA approved doctoral program in clinical psychology. All therapists had seen their clients at least twice before participating in the present study. Since most therapists saw multiple clients, several therapists participated more than once in the study.

Apparatus, Instruments, and Measures

State-Trait Personality Inventory (STPI). The STPI (Spielberger, 1979, 1998) is a self-report inventory comprised of eight 10-item scales for assessing state and trait anxiety, anger, depression, and curiosity. The STPI state scales are designed to measure the intensity, at a particular moment, of the respondent's feelings. Respondents rate themselves using items (e.g. "I feel tense.") on the following 4-point scale: (1) "not at all," (2) "somewhat," (3) "moderately so," and (4) "very much so." The STPI trait scales measure individual differences in anxiety, anger, depression, and curiosity by evaluating how often these emotions are experienced. Respondents rate themselves on trait items (e.g. "I feel tense.") with the following 4-point frequency scale: (1) "almost never," (2) "sometimes," (3) "often," and (4) "almost always." The STPI has good internal consistency (Spielberger, 1998) with alpha coefficients ranging from .80 to .96. with stability coefficients of Test-retest reliability is also very good for trait scales, but lower for state scales, in accordance with the definition of these constructs.

The standard STPI is presented on a double-sided test form. Participant demographics, the state scale instructions, and 40 state items are on the front side; the trait scale instructions and 40 trait items are on the reverse side (see Appendix C). Respondents blacken in circles (labeled 1 through 4) next to each question to indicate the intensity (state) or frequency (trait) response for each item. Since respondents can view the entire instrument at once, they are able to complete items out of order or change their responses if they desire to do so.

Computerized State Trait Personality Inventory (STPI-Cp). The STPI-Cp is a direct adaptation of the conventional pencil-and-paper STPI, which includes the same instructions, rating scales and items, which are presented in the same order as the original version, but, unlike the paper STPI, the STPI-Cp items are presented one at a time and each item must be answered before the respondent is presented with the next item. It is not possible to complete the items out of sequence. The STPI-Cp instructions and items are presented on a computer screen. Participants respond to each STPI-Cp item simply by using the mouse to point and click on their response to each item.

The STPI-Cp program was developed using Microsoft Access97, a database application that compiles the clients' responses and serves as the interface for the questionnaire items that are presented on-screen. The STPI-Cp was administered to participants using IBM compatible computers with Pentium class processors and the Windows 95 operating system. All computers were equipped with 15-inch VGA color monitors set at 800 x 600 resolution for optimal visibility. Screenshots of the STPI-Cp application can be found in Appendix A.

Client Assessment (CA) Report. The Client Assessment report provides graphical and tabular summaries of each client's STPI state and trait anxiety, anger, depression, and curiosity scale scores, as compared with graphical and tabular norms for the STPI, which were based on large samples of undergraduate students (STPI; Spielberger, 1998). For the traditional paper administration of the STPI, the CA report is generated based on the client's responses, which are manually entered by the experimenter. For the STPI-Cp, client

responses are used to automatically generate the CA report. An example of the CA report can be found in Appendix A

Client and Therapist Exit Questionnaires. The Client Exit Questionnaire (CEQ) consisted of the following 3 items that were administered immediately after each client completed the STPI and before client debriefing: (1) "Was the self-analysis-questionnaire easy to understand?"; (2) "Was it easy to complete the questionnaire?"; and (3) "How familiar are you with using computers?" Responses to each CEQ item are made on a 9-point Likert-type scale with end points of (1) "not at all" and (9) "very much so;" the intermediate points were labeled "somewhat" and "moderately so." (CEQ can be found in Appendix A.)

The Therapist Exit Questionnaire (TEQ) consisted of 4 items regarding their agreement with the CA report and the usefulness of this report; their judgment of how their client reacted to the assessment procedure; the approximate number of therapy sessions they have had with their client; and when they had last administered clinical assessment tools such as the Beck Depression Inventory to their client. Therapist responses to each TEQ item are recorded using a 9-point Likert-type scale with end points of (1) "not at all" and (9) "very much so," and intermediate points labeled "somewhat" and "moderately so." (TEQ can be found in Appendix A.)

Therapist Ratings of Client's Emotional States and Personality Traits. Therapists rated their clients on each of the four STPI state and trait dimensions (anxiety, anger, depression, and curiosity) using a 9-point scale. This brief rating scale consisted of 8 items that described

the client's emotional states and personality traits. The meaning of each of the emotional states and personality traits were explained in an attached cover sheet. The anchor points for rating the 4 state items were: "Not at All" (1) and "Very Much" (9), with "Somewhat" and "Moderately" as intermediate points. State instructions indicated the respondents should evaluate the client's emotional states during the first 10 minutes of the therapy session. For the trait items, the anchor points were: "Almost Never" (1) and "Almost Always" (9), with "Sometimes" and "Often" as intermediate points. Trait instructions indicated that respondents should provide an evaluation of the client's general personality traits.

Procedure

The procedures for this study consisted of three main stages: The first stage involved the recruitment of therapist and clients, the second stage was client participation, and the third stage therapist rating of clients and feedback. Each of these phases is described below:

Stage 1: Recruitment of Therapists and Clients

Therapists at the PSC and CCHD were provided information that explained the procedure of the study and the amount of time required for participation. The therapists who volunteered to participate were asked to approach their clients at the end of the next therapy session to explain the study, and to ask if the client would be willing to participate in the study. Clients who agreed to take part in the study were asked to arrive at least 15 minutes early before their next scheduled session in order to complete the client

instruments before their therapy session was scheduled to begin. Before the client arrived, therapists signed an informed consent form to indicate that the study had been explained to them, they had had an opportunity to ask questions, and that they had consented to participate in the study.

Stage 2: Client participation

The 40 clients who were recruited by their therapists to participate in the study were randomly assigned by the experimenter to complete either the computerized form of the STPI (STPI-Cp) or the conventional pencil-and-paper form (STPI). Clients were told they would be given a short questionnaire regarding their feelings that would in no way effect their treatment; that their responses to this questionnaire would take about 10 minutes to complete and would be strictly confidential; and that participation was voluntary. Clients then signed an informed consent form to indicate the study had been explained to them, they had had an opportunity to ask questions, and had consented to participate in the study. After giving their informed consent to participate, each client was familiarized with the rating procedures for the assessment tool that they would be given. Several key differences between the paper and computerized administrations of the STPI should be noted. First, the STPI-Cp items would be presented one at a time, and clients responded to each item in the sequence as they appeared. Also unlike the paper version, the clients who responded to the STPI-Cp would not have the opportunity to view the entire questionnaire at once, nor could they review or revise their responses to previous items.

The instructions printed on the test form for the paper STPI (see Appendix A) were explained to the clients, who responded to each state and trait STPI item by blackening a circle that corresponded to their response on the instrument's 4-point scale. Instructions

for the computerized STPI were presented on-screen and, like the paper version, were explained to the clients. Clients responded to each state and trait STPI item by pointing and clicking with the computer mouse on graphical buttons, each of which displayed an anchor of the appropriate 4-point scale. Screenshots of the STPI-Cp are located in Appendix A.

After the client had finished responding to either the computer or paper STPI, they were given the 3-item CEQ to assess their impression of the assessment device and procedure. Once the STPI and the CEQ were completed, all clients were thanked for their participation, and debriefed. The clients were informed about the potential value of measuring psychological vital signs, the major hypotheses of the study, and that their STPI state and trait scale scores would be shared with their therapists who might discuss these with the client in an upcoming session. All clients were encouraged to return to the experiment area after their therapy session if they wished to see their STPI scale scores or discuss the study further. Following this debriefing, the clients proceeded immediately to their scheduled therapy session. After the client had left for their therapy session, client responses were entered into the STPI-Cp by the experimenter if the client was given the paper STPI and a Client Assessment (CA) report was automatically generated for the therapist's review.

Stage 3: Therapists rating of Clients

After the client's therapy session, each therapist was asked to rate his perception of the client's mood during the first ten minutes of the session for each State dimension and the client's general mood for each Trait dimension. Each therapist provided ratings of their client's state and trait anxiety, anger, depression, and curiosity using a 9-point rating scale (See Appendix B) that was designed to assess the same constructs as the STPI state and trait

scales. The therapist then received a printed report (see Appendix C) of their client's scale scores on the State-Trait instrument. After viewing the STPI report, each therapist completed the 5-item TEQ. After the therapists had finished responding to the TEQ, they were thanked for their participation in the study and debriefed about the potential value of measuring psychological vital signs and the major hypotheses of the study.

RESULTS

A major goal of the present study was to determine whether responses to the paper STPI test form were comparable to those for the computerized version (STPI-Cp). The means and standard deviations for scores on the paper and computerized STPI state and trait scales are reported in Table 1. Differences between the clients' mean scale scores on the STPI and the STPI-Cp were evaluated with *t*-tests for which the results are also reported in Table 1. As may be noted, the mean scores for all but 1 of the 8 STPI-Cp scales were somewhat higher than the corresponding scores for the paper STPI scales. Although none of these differences were statistically significant, the differences for the S-Anger, S-Anxiety, and T-Curiosity scales approached significance. Potential differences in responses to the STPI and STPI-Cp due to gender or testing location (PSC versus CCHD) were also evaluated with *t*-tests. No significant differences were found for any of the STPI or STPI-Cp state or trait scale scores as a function of either gender or the data collection site.

Table 1. Means and Standard Deviations for Clients Who Responded to Paper vs. Computerized Measures

SCALE	STPI (n = 20)		STPI-Cp (n = 20)		
	Mean	SD	Mean	SD	*t*
SANX	26.50	6.03	30.50	7.74	-1.82†
SDEP	12.80	3.69	14.60	4.65	-1.36
SANG	11.20	2.09	13.25	4.38	-1.89†
SCUR	22.35	4.57	23.90	4.89	-1.04
TANX	25.20	4.71	25.70	5.69	-0.30
TDEP	24.15	5.49	23.60	7.97	0.25
TANG	20.70	5.92	21.15	6.20	-0.24
TCUR	24.35	4.15	26.75	4.62	-1.73†

†p < .10

Correlations of Therapist Ratings with Client Self-Reports

Pearson product-moment correlations of therapist ratings of their client's emotional states and personality traits with the clients' STPI scale scores are reported in Table 2. For the total sample, therapist ratings and client STPI scores correlated positively for all 4 STPI trait scales and for S-Depression. Other State scales were essentially unrelated. Correlations of therapist ratings with client scores were statistically significant for T-Anxiety, T-Depression, and S-Depression ($p < .05$), while approaching significance for T-Anxiety and T-Curiosity ($p < .10$).

Table 2. Correlations Between Therapist Ratings and Client STPI Scores for the Total Sample and for the Paper vs. Computerized groups

SCALE	Total Sample (n=40)	Paper & Pencil (n=20)	Computer (n=20)	z-test
SANX	.088	.007	.124	-0.34
SDEP	.430*	.272	.460*	-0.64
SANG	-.019	-.011	-.101	0.26
SCUR	-.170	-.087	-.315	-0.70
TANX	.475*	.519*	.441†	0.30
TDEP	.437*	.422†	.513*	-0.34
TANG	.297†	.396†	.203	0.62
TCUR	.274†	-.031	.361	-1.19

†p < .10 * p < .05

For the traditional paper STPI, therapists' ratings showed positive correlations with clients' STPI scores for the T-Anxiety, T-Depression, and T-Anger scales, with a significant correlation for T-Anxiety ($p < .05$). Positive correlations were also found between therapists' ratings and clients' scores for the S-Depression, T-Anxiety, and T-Depression scales of the computerized STPI. To determine whether the correlations between therapist ratings and client scores differed due the testing modality, differences in these correlations

were compared using Fisher's r to z transformations, with z-tests. No significant differences were found between any of the scales of the computerized and paper STPI.

Of the therapists who participated in this study, 14 had conducted previous clinical assessments using the Personality Assessment Inventory (PAI) and/or the Beck Depression Inventory (BDI) as indicated by their responses to the Therapist Exit Questionnaire. The remaining 26 therapists included in the study had not previously conducted any assessment with their clients. Table 3 compares the correlations between the therapist ratings of their clients with the clients' STPI scores for therapists who had, or had not, conducted previous clinical assessments. Correlations for the total sample are again reported, for comparison, along with separate correlations for assessors versus non-assessors and z-test differences between these correlations as evaluated using Fisher's r to z transformations.

Table 3. Correlations Between Therapist Ratings and STPI scores of Client States and Traits for Therapists who had and had not Conducted Previous Clinical Assessments

SCALE	Total Sample (n=40)	Previous Assessment		z-test
		Yes (n=14)	No (n=26)	
SANX	.088	.494†	-.039	1.58†
SDEP	.430*	.619**	.318	1.07
SANG	-.019	-.061	.086	-0.40
SCUR	-.170	-.232	-.112	-0.34
TANX	.475*	.779**	.238	2.18*
TDEP	.437*	.634*	.283	1.25
TANG	.297†	.610*	.093	1.68*
TCUR	.274†	.320	.233	0.26

†p < .10 * p < .05 ** p < .01

The therapists who had previously conducted clinical assessments ("Yes") were generally more accurate in predicting their client's emotional states and personality traits scores as may be noted in table 3. The therapists who had previously used assessment

measures with their client displayed significant correlation on three out of four of their clients' personality traits (T-Anx, T-Dep, T-Ang). Assessing therapists' ratings also showed significant correlation with client S-Depression ($p < .05$) and nearly significant correlation with S-Anxiety ($p < .10$).

The therapists who had not previously assessed their clients failed to show significant predictions in any of the correlations of their ratings with clients' reported emotional states or traits. Comparing the strength of the correlations using z-tests, therapists who had previously conducted assessment had higher correlation for 3 out of 4 Trait scales, and the correlations of their ratings with T-Anxiety and T-Anger were significantly higher ($p < .05$). Therapists who had previously assessed also showed higher correlations for S-Anxiety and S-Depression, with S-Anxiety approaching significance ($p < .10$).

Therapist Ratings of the Usefulness of the Client Assessment (CA) Reports

The STPI-Cp generated Client Assessment (CA) reports, consisting of graphical and tabular displays of the clients' state and trait scale scores, which were given to therapists for review after they had completed their ratings of their clients. Therapists evaluated the utility of the CA report by responding to two Therapist Exit Questionnaire (TEQ) items which asked them to indicate their "agreement with" information from the CA report and perceived "usefulness of" this report as a clinical tool. The correlation for the total sample between ratings of "agreement" and "usefulness" was near zero ($r = .06$, Agree: $M = 5.79$, $SD = 1.42$; Useful: $M = 6.53$, $SD = 1.11$), indicating that these items were essentially unrelated. This finding suggests that therapists were relatively unbiased since they did not

rate the usefulness of the CA report more positively or negatively on the basis of the accuracy of their prediction of clients' assessment scores.

Client Ratings of Usability for the Paper and Computerized STPI

Clients also evaluated the usability of the computerized or paper STPI by responding to the Client Exit Questionnaire (CEQ), which asked them to rate whether the STPI was "easy to understand" and "easy to complete." In addition, clients also rated themselves on their computer experience. Means and standard deviations for the CEQ items are reported in Table 4. For both the paper and computer conditions, means for the usability items were high, with a modal response of 9 (on a scale of 1 to 9). No significant differences in the mean CEQ ratings were found between the computerized and traditional STPI. However, the clients who responded to the STPI-Cp tended to rate it as being somewhat easier to complete and also reported more computer experience.

Table 4. Means and standard deviations for Client's Usability Ratings for the paper and computerized (Cp) State Trait Personality Inventory (STPI)

CEQ item	Paper M (SD)	Computer M (SD)	t-test
Easy to Understand	8.30 (0.87)	8.25 (0.97)	0.172
Easy to Complete	7.75 (2.12)	8.60 (0.82)	-1.669
Computer Experience	6.90 (1.89)	7.70 (1.98)	-1.308

$^{\dagger}p < .10$

In examining the correlations among the client usability ratings, it is interesting to note that for clients who responded to the STPI-Cp, there was a substantial positive correlation between the two usability ratings ($r=.80$, $p < .001$). This suggests that ease of completing the STPI-Cp was strongly related to clients' understanding of how to respond to

the computerized administration of the test. In contrast, for clients who responded to the traditional paper STPI, ratings of ease of understanding this test were unrelated to their ratings for ease of completion (r=.01). However, when two extreme outliers in the paper STPI condition, with scores of 1 and 3 (responses otherwise ranged from 7 to 9) on "Ease of Completion," were eliminated from the analysis, the mean "Ease of Completion" rating increased to 8.39 (SD = 0.78) and a similar high correlation (r=.81, $p < .001$) was found between these two items for the traditional paper STPI.

DISCUSSION

A major goal of the present study was to determine whether responses to the computerized version of the STPI were comparable to those for the traditional paper form. Although no significant differences were found in any of the eight scale scores for the STPI and STPI-Cp, it is interesting to note that the mean scores for the four STPI-Cp state scales were somewhat higher than the corresponding scale scores for the traditional STPI (see Table 1) and that two of these differences (S-Anx and S-Ang) approached significance ($p < .10$). Given that relatively high anxiety, anger, and depression scores are generally expected for clinical outpatients, these findings suggested that the respondents were somewhat more forthright in reporting their emotional states when responding on the computer, as has been found in previous research (Kobak, et al., 1997; Turner, C.F., et al., 1998). Means for the four STPI trait scales showed little difference between the STPI-Cp and the corresponding scale scores for the traditional STPI, with the exception of T-Curiosity, which was over two points higher for the STPI-Cp. Perhaps the novelty of the computerized assessment influenced clients to report a higher degree of curious thoughts and behaviors.

For the total sample, therapist ratings of their clients' emotional states and personality traits correlated positively with the clients' self-reports for the state depression scale and all four STPI trait scales, with significant correlation ($p < .05$) for the S-Dep, T-Anx, and T-Dep scales. For the paper STPI, therapist ratings of their clients' states and traits correlated positively with the clients' self-reports for the trait anxiety, anger, and depression measures and for the state depression scale. Positive correlations were also found between therapist ratings and client self-reports for the STPI-Cp state depression

scale, and for the anxiety and depression trait scales. No significant differences were found between the correlations of therapist ratings and client scores for any scales of the computerized and paper STPI, suggesting that the assessment modality had relatively little influence on therapist accuracy in predicting client scores.

A second comparison of therapists' ratings with clients' STPI scores examined correlations for therapists who had previously assessed their clients for depression and/or general psychopathology versus correlations for therapists who had not done assessment. Therapists who had previously conducted clinical assessments were generally more accurate in assessing their client's emotional states and personality trait scores, as reflected by higher correlations of therapist ratings with client scores. As may be noted in Table 3, for previous assessors, the correlations were significant or approached significance for five out of the eight STPI scales. Therapists who had previously conducted assessment had significantly stronger correlations of therapist ratings with client scores for T-Anxiety and T-Anger and a nearly significant difference in their assessment of S-Anxiety. Considering that the previous assessment devices used by the therapists were the PAI and/or the BDI, it stands to reason that therapists who previously assessed would have better knowledge of their clients for the emotional states and traits that are measured by these inventories –or at least a good chance of remembering the client's previous assessment scores. Therapists who had not assessed their clients failed to show significant prediction for any of their clients' emotional states or traits. Assuming self-reports such as the STPI accurately reflect a therapy client's emotions, these findings demonstrate the potential value of performing psychological assessment as a bridge to better understanding individuals in therapy.

In evaluating the usability of the STPI and the STPI-Cp as clinical tools, client ratings were quite favorable, suggesting that completing this inventory as part of therapy was practical and did not represent a difficulty for the clients. In both the administration of the STPI-Cp and the paper form of the STPI, the client's ease of understanding the STPI was highly related to their ease in responding to the instrument. There was no difference in client ratings of how easy it was to understand the two forms. However, clients who responded to the computerized administration rated this procedure as somewhat easier to complete.

Therapist ratings of how useful the STPI would be in a therapeutic setting were less favorable, but still suggested that the therapists recognized some value to assessing the emotional well being of their clients at the beginning of therapy. Although most therapists involved in the study were not currently conducting assessment as part of their intake procedure, informal comments and ratings of the procedure suggested that therapists would be agreeable to using a short self-report with their future clients.

Unfortunately, the current study had several major shortcomings in large part due to the difficulty of obtaining data from therapists and clients. These problems included small sample size, a fairly heterogeneous sample, uneven subgroups, and statistical difficulties (such as insufficient power) due to these limitations. In retrospect, a Multi-Level Model analysis of the experiment data would probably have been a more powerful method of examining differences in the various groupings, but when this study was proposed MLM analyses were not in common use. Future, better-powered studies of computerized assessment might examine the causes of higher levels of reporting of emotion on

computerized questionnaires and the various factors that effect client and therapist reaction to the use of the computer in a clinical setting.

Even though computerized psychological assessment has been used for more than 30 years, it is still not widely used (Fowler, 1993). As previously noted, lack of familiarity with computers, concerns about client reaction to computers, uncertainty regarding computerized testing issues, legal/ethical concerns, misguided fear of clinician obsolescence, and general resistance to change are likely reasons for the infrequent use of computerized assessment in clinical settings. The findings of the present study provide evidence that computerized assessment is as easy to use as traditional paper-and-pencil instruments, that the information it provides about clients is just as reliable as that obtained with traditional assessment procedures, that it is far more efficient to administer, and it is much easier to score. With regard to therapist resistance, the most frequent reason given by therapists, during recruitment, for not participating in the study was their concern that this would disrupt therapy or be discomfiting to their client.

The improved efficiency of computerized assessment procedures could help reduce the data entry and test-scoring burdens of behavioral health care professionals, which would leave clinicians with more time to spend in treating clients' problems rather than on sorting their paperwork. The facility with which assessments can be entered and recorded will allow much easier tracking of client progress while also generating data for practitioners to do research on their own methods and efficacy. In running this experiment, the advantages of computerized administration were obvious. Thanks to automatic scoring and the fact that the client had already entered all scale data, the experimenter typically spent considerably less time administering the STPI on the computer, despite having to provide

more assistance to some participants in that condition. The biggest difficulty encountered during the administration of the experiment by computer was acquiring access to a printer, which was occasionally difficult to access at one of the testing locations.

The assessment of psychological vital signs at the beginning of the intake procedure can facilitate therapists' ability to provide immediate feedback to their clients. If a patient is depressed or experiencing intense anxiety or anger, it is imperative for the therapist to deal immediately and directly with these emotional feelings, which can greatly interfere with judgment and reality testing, and can result in injuries to the patient or others. Feedback concerning patients' emotional vital signs, as revealed by assessing anxiety, anger, and depression, can help them to recognize and report relationships between their thoughts and feelings and the events which give rise to them, and thus facilitate the therapeutic process. With the use of computerized testing, the assessment of emotional vital signs, as measured by levels of state anxiety, anger, and depression, can be taken at the beginning of each treatment session, and may alert the therapist to special problems that require immediate attention. Charting sequential levels of state anxiety, anger, and depression over the course of treatment, and providing patients with feedback about their emotional vital signs, may also help identify significant problem areas, which can facilitate the patients' understanding of how specific problems influence their emotions.

Given the increasing demands of managed care to show measurable results and the decreased amount of time practitioners have for client contact, a quick assessment of current status and client progress in treatment would make a valuable clinical tool. If this type of data can be regularly gathered with relatively little effort or cost on the part of the clinician, it takes nothing away from the therapeutic process while increasing value,

accountability, and insight. Computerization of standard clinical measures holds great promise for clinical research and practice, but first, many questions must be explored in more detail such as whether computerized adaptations of existing tests are equivalent to traditional formats (Weber, et al., 2003) and what important new factors must be considered (Carroll, J.M., 2001) when individuals are responding to computer-based assessments.

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APPENDICES

Appendix A: Client Materials

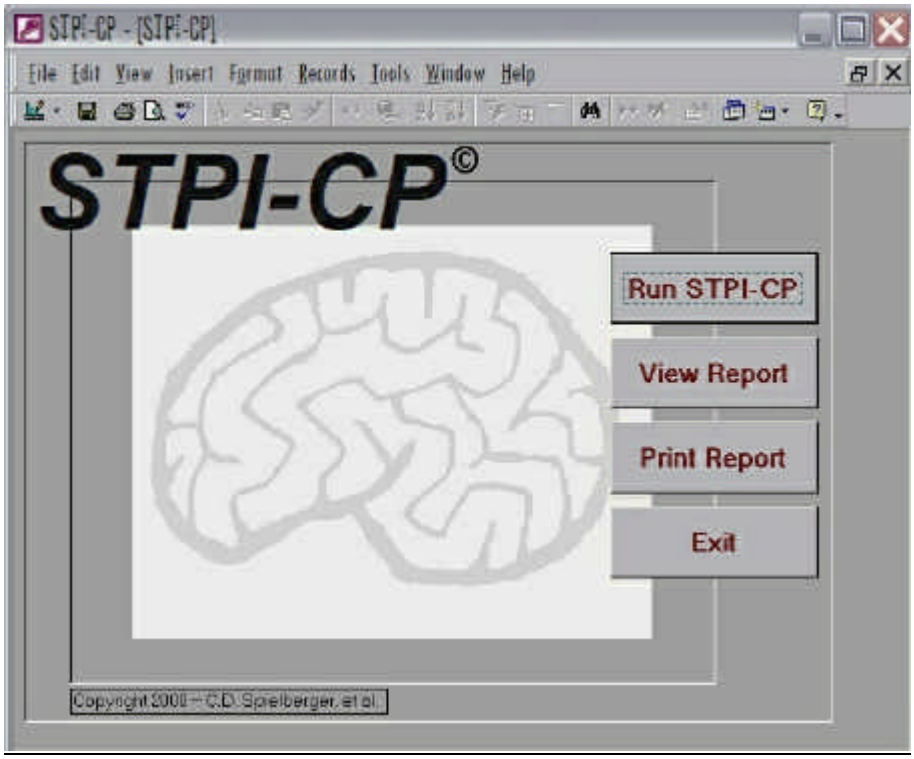
1- Screen shots of computerized State Trait Personality Inventory (STPI-Cp)

2- Client Exit Questionnaire (CEQ)

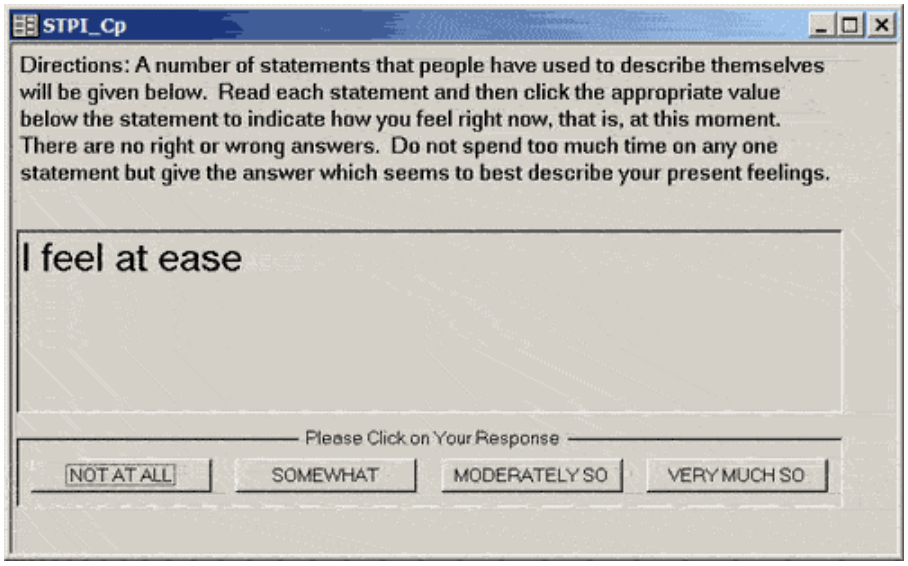
3- STPI-Cp Output

Appendix A: (Continued)

STPI-CP: Main Menu (Screen Shot)



STPI-CP: State Instructions and Response screen (Screen Shot)



Appendix A: (Continued)

Initials: _____ **Date:** _____

Dear Client:

Thanks again for your help with this study.

Please respond to this 2-item questionnaire. Remember, your responses to this questionnaire are strictly confidential and are used only for the purposed of this study.

Please rate the **Self-Analysis Questionnaire** on the following characteristics.

WAS THE SELF-ANALYSIS-QUESTIONNAIRE EASY TO UNDERSTAND?

Did you find the Questionnaire instructions easy to understand? Did you feel, after reading the instructions, you knew how to respond to the Questionnaire?

Easy to Understand?:	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
	not at all		somewhat			moderately			extremely

WAS IT EASY TO COMPLETE THE QUESTIONNAIRE?

Did you have any difficulty completing the questionnaire? Was the task of responding to the items straightforward and easily accomplished?

Easy to Use?:	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
	not at all		somewhat			moderately			extremely

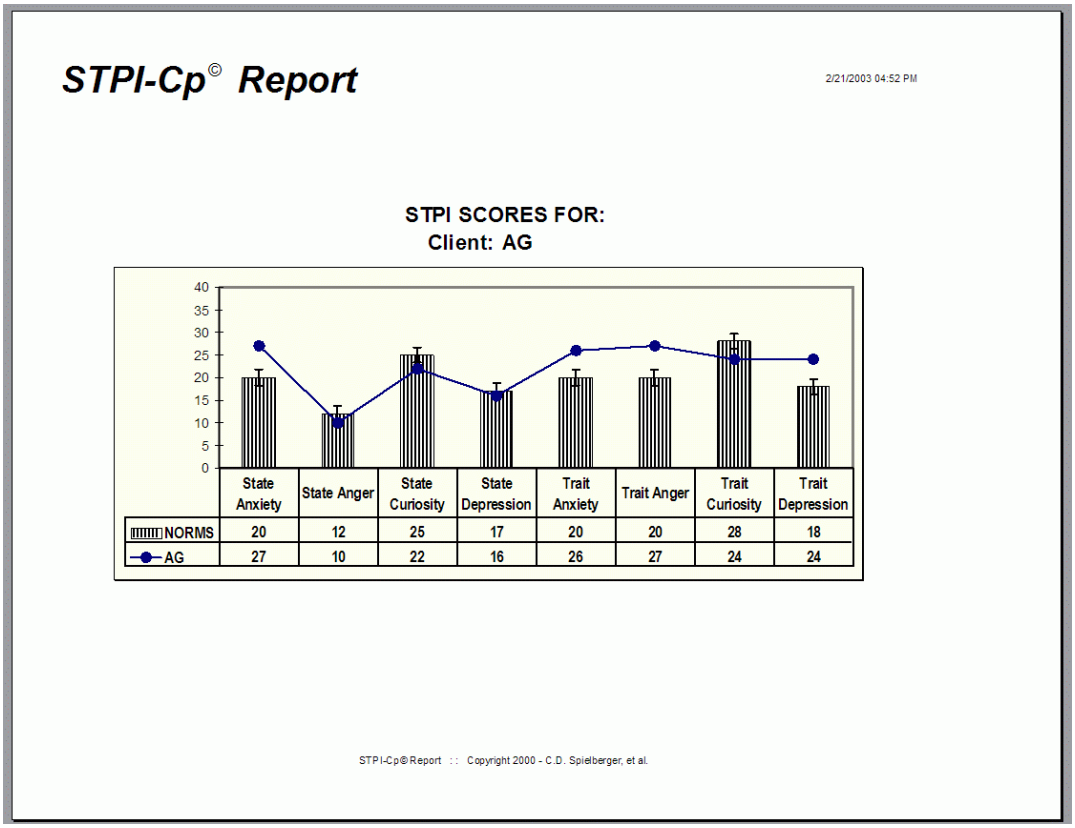
HOW FAMILIAR ARE YOU WITH USING COMPUTERS?

How much experience do you have using some type of computer?

Computer Familiarity:	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
	not at all		somewhat			moderately			extremely

Appendix A: (Continued)

STPI-CP: Sample Output



STPI-Cp© Report

2/21/2003 04:52 PM

STPI SCORES FOR:
Client: AG

	State Anxiety	State Anger	State Curiosity	State Depression	Trait Anxiety	Trait Anger	Trait Curiosity	Trait Depression
NORMS	20	12	25	17	20	20	28	18
AG	27	10	22	16	26	27	24	24

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Appendix B: Therapist Materials

1- Therapists Rating of Clients Emotional States and Traits

2- Therapist Exit Questionnaire

Appendix B: (Continued)

Dear Therapist:

On the next page please rate your client on the following characteristics.

STATE ANXIETY: An emotional state or condition that consists of feelings of tension, apprehension, and worry, and associated activation (arousal) of the autonomic nervous system as reflected in increased heart rate and trembling.

TRAIT ANXIETY: Individual differences in the frequency that state anxiety is experienced over time.

STATE DEPRESSION: An emotional state or condition characterized by feeling sad, gloomy, down, etc. and the absence of happy feelings.

TRAIT DEPRESSION: Individual differences in the frequency that state depression is experienced over time.

STATE CURIOSITY: An emotional state or condition of stimulus seeking and general intellectual interest in exploring one's environment.

TRAIT CURIOSITY: Individual differences in the frequency that state curiosity is experienced over time.

STATE ANGER: An emotional state or condition that consists of subjective feelings of tension, annoyance, irritation, fury and rage, with concomitant activation or arousal of the autonomic nervous system.

TRAIT ANGER: Individual differences in the frequency that state anger is experienced over time.

Appendix B: (Continued)

Client Initials_____ Client ID#_____ Date_____

Please rate your client's mood during the first 10 minutes of your current session.

Anxious:	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
	Not at all		somewhat			moderately			very much
Angry:	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
	Not at all		somewhat			moderately			very much
Depressed:	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
	Not at all		somewhat			moderately			very much
Curious:	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
	Not at all		somewhat			moderately			very much

Now please rate your client's general mood.

Anxiety:	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
	Almost never		sometimes			often			almost always
Depression:	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
	Almost never		sometimes			often			almost always
Anger:	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
	Almost never		sometimes			often			almost always
Curiosity:	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
	Almost never		sometimes			often			almost always

Appendix B: (Continued)

Client Initials:_____ Client ID#:_____ Date:_____

Dear Therapist:

Thanks again for your help and your client's help with this study.

As a final procedure, please examine the attached assessment report and then respond to this 4-item questionnaire. Please return this completed questionnaire (this sheet only) to the experimenter. You may keep the assessment report to discuss with your client if you would find it useful to do so.

Please rate the feedback from the Assessment report on the following characteristics.

AGREEMENT WITH ASSESSMENT: How close was the information provided by the assessment report to your perception of the client's emotional state at the beginning of the therapy session?

Agreement with Assessment:	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
	not at all		somewhat			moderately			extremely

OTHER ASSESSMENTS: When were the PAI and BDI administered to your client?

PAI Administered:	**Never**	**1-2 weeks ago**	**3-4 weeks ago**	**more than 4 weeks ago**
BDI Administered:				

USEFULNESS OF ASSESSMENT: If the information generated by the assessment report was available at the beginning of each therapy session, how clinically useful would this be?

Usefulness of Assessment:	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
	not at all		somewhat			moderately			extremely

CLIENT REACTION: Based on your observations, how did your client react to the assessment procedure?

Client Reaction:	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
	unfavorable			couldn't tell					favorable

NUMBER OF SESSIONS: Approximately how many sessions have you seen this client?

Number of Sessions:	**3**	**4-5**	**6-7**	**8-9**	**10-12**	**13-17**	**18-25**	**26-35**	**36+**

✠ **Note:** Please return this sheet to the experimenter when complete