
Chapter 13

State-Trait Anxiety Inventory and State-Trait Anger Expression Inventory

Charles D. Spielberger
Sumner J. Sydeman
University of South Florida

Early studies of emotion endeavored to discover, from an analysis of the introspective reports of trained observers, the qualitative feeling states or "mental elements" that comprised different emotions (Titchener, 1897; Wundt, 1896). Unfortunately, this phenomenological approach generated findings that were obviously artificial and unrelated to other kinds of behavior, and consequently resulted in a discouraging degree of conceptual ambiguity and empirical inconsistency (Plutchik, 1962; Young, 1943). Moreover, subjective reports about emotional states came to be viewed with extreme suspicion because they were unverifiable and easily falsified (Duffy, 1941). Distrust of verbal reports was intensified further by psychoanalytic formulations that emphasized the distortions in mood and thought that may be produced by unconscious mental processes.

With the advent of behaviorism shortly after the turn of the century, together with psychology's acceptance of the physicalistic assumptions of logical positivism, research on emotion shifted from the investigation of subjective feeling states to the evaluation of behavioral and physiological variables. The typical paradigm employed in research on emotion involved the manipulation of experimental conditions designed to influence a particular emotional state, and observation of the effects of these manipulations on behavioral and/or physiological responses that presumably reflected changes in the emotion. This emphasis on behavior and physiology was attributed by Arnold (1960) to the fact that early phenomenological conceptions of emotion did not fit readily with current scientific methods. The epistemology and methodology of stimulus-response (S-R) psychology and, especially, the prevailing bias against subjective experience as a *desideratum* for the science of psychology, required investigators to evaluate the impact of carefully defined and manipulated antecedent (stimulus) conditions on specific physiological and behavioral responses.

Beginning in the 1960s, there has been growing recognition and acceptance of the unique importance of the experiential component of emotions. Most authorities now regard emotions as complex psychobiological states or conditions—reactions in humans that are characterized by specific feeling qualities and widespread bodily changes, particularly in the autonomic nervous system. Clearly, emotional states cannot be defined by stimulus and response operations alone. Differences in personality and past experience also must be taken

into account, because they dispose people to respond to similar stimulus objects and circumstances in radically different ways (Lazarus, Deese, & Osler, 1952). It is now generally accepted that an individual's appraisal of a particular event or situation will greatly influence his or her reactions to that circumstance (Lazarus & Folkman, 1984; Lazarus & Opton, 1966).

In the present context, the term *emotion* is used much as it currently is used in common language: to refer to complex, qualitatively different, psychobiological states or conditions of the human organism that have both phenomenological and physiological properties. The quality and intensity of the feelings experienced in emotional states seem to be their most unique and distinctive features. Therefore, to achieve a comprehensive understanding of emotional phenomena, appropriate methods must be developed to distinguish between qualitatively different emotional states, as well as the intensity of such states as they change over time.

The nature of anxiety and anger as emotional states and the procedures employed in their measurement are reviewed briefly in this chapter. First, the measures of state and trait anxiety are discussed, and the development of the State-Trait Anxiety Inventory (STAI) is described in some detail. Second, we examine conceptual ambiguities in the constructs of anger, hostility, and aggression, briefly evaluate a number of instruments developed to assess anger and hostility, and describe the construction and validation of the State-Trait Anger Scale (STAS). Third, the expression and control of anger are considered, and the development of the Anger Expression (AX) Scale and the State-Trait Anger Expression Inventory (STAXI) are described. The chapter concludes with a discussion of the utilization of anxiety and anger measures in treatment planning and evaluation.

Nature and Measurement of Anxiety

The importance of fear (anxiety) and rage (anger) as scientific constructs is reflected in the writings of Darwin (1872/1965), who considered these emotions to be adaptive characteristics of both humans and animals that had evolved over countless generations through a process of natural selection. Noting that both fear and rage varied in intensity, Darwin observed that fear increased from mild apprehension or surprise to an extreme "agony of terror," and that manifestations of fear included: trembling, dilation of the pupils, increased perspiration, changes in voice quality, erection of the hair, and peculiar facial expression.

For Freud (1924), fear and anxiety both referred to "something felt"—a specific unpleasant emotional state or condition that included experiential, physiological, and behavioral components. Fear, which Freud equated with *objective* anxiety, implied an emotional reaction that was proportional in intensity to a real danger in the external world. In contrast, Freud used the term *neurotic* anxiety to describe emotional reactions that were greater in intensity than would be expected on the basis of the objective danger because the source of the danger was the individual's own unacceptable (repressed) sexual or aggressive impulses.

Freud regarded anxiety as the "fundamental phenomenon and the central problem of neurosis" (Freud, 1936, p. 85). He initially believed that anxiety resulted from the discharge of repressed, somatic sexual tensions (libido). When blocked from normal expression, libidinal energy accumulated and was discharged automatically as free-floating anxiety. This view was modified subsequently in favor of a more general conception of anxiety as a signal indicating the presence of a danger situation. The perceived presence of danger evokes an unpleasant emotional state that serves to warn the individual that some form of adjustment is

necessary. In emphasizing the adaptive utility of anxiety as a motivator of behavior that helps individuals avoid or cope with danger, Freud's danger signal theory is quite consistent with Darwin's evolutionary perspective.

For nearly a century, clinical studies of anxiety have appeared in the psychiatric and psychoanalytic literature with increasing regularity, but prior to 1950 there was relatively little experimental research on human anxiety (Spielberger, 1966). The complexity of anxiety phenomena, the lack of appropriate measuring instruments, and ethical problems associated with inducing anxiety in laboratory settings all contributed to the paucity of research. However, since 1950, research on human anxiety has been facilitated on two fronts: Conceptual advances have clarified the nature of anxiety as a theoretical construct, and a number of scales have been created for measuring this construct.

Cattell and Scheier (1963) pioneered the application of multivariate techniques to define and measure anxiety. A variety of self-report and physiological measures of anxiety were included in their factor analytic studies, in which relatively independent state and trait anxiety factors consistently have emerged (Cattell, 1966). Physiological measures that fluctuated over time, such as respiration rate and blood pressure, had strong loadings on the state anxiety factor, but only slight loadings on trait anxiety. In contrast, several psychometric scales had strong loadings on the trait anxiety factor, but not on state anxiety. These scales were stable over time and did not covary over occasions of measurement. Thus, based on Cattell's research, there are two related, yet logically quite different, anxiety constructs. Perhaps most often, the construct of anxiety refers to an unpleasant emotional state or condition, but this construct also describes relatively stable individual differences in anxiety proneness as a personality trait.

The concept of anxiety as an emotional state (S-Anxiety) is comparable in many respects to the conceptions of fear and objective anxiety that were formulated originally by Darwin (1965/1872) and Freud (1936). Anxiety states can be most meaningfully and unambiguously operationally defined by some combination of introspective verbal reports and physiological-behavioral signs (Spielberger, 1972a). As an emotional state, S-Anxiety consists of unpleasant, consciously perceived feelings of tension, apprehension, nervousness, and worry, with associated activation or arousal of the autonomic nervous system. Trait anxiety (T-Anxiety) has the characteristics of a class of constructs that Campbell (1963) called acquired behavioral dispositions and which Atkinson (1964) labeled motives. Measures of T-Anxiety assess individual differences in the tendency to perceive a wide range of situations as dangerous or threatening, and for those high in T-Anxiety to respond to these perceived threats with more frequent and intense elevations in S-Anxiety than persons low in T-Anxiety.

INSTRUMENTS FOR MEASURING ANXIETY

A variety of questionnaires, rating scales, and psychometric tests are employed currently to measure anxiety in research and clinical practice. The Hamilton (1959) Rating Scale is used widely for evaluating symptoms of anxiety observed in clinical interviews or psychotherapy sessions. The severity of each symptom is rated on a 5-point scale, from "none" to "very severe, grossly disabling." The specific anxiety symptoms that are assessed by the Hamilton Scale include: anxious mood (worry, apprehension); tension (inability to relax, trembling, restlessness); and fears (of strangers, animals, traffic, crowds).

Projective techniques such as the Rorschach Inkblots and the Thematic Apperception Test also are used extensively in the clinical evaluation of anxiety, but self-report psychometric questionnaires are by far the most popular procedures for assessing anxiety. Among these, the Taylor (1953) Manifest Anxiety Scale (MAS) has been used extensively in experimental

research. The MAS consists of 50 items selected by clinical psychologists from the 566 items of the Minnesota Multiphasic Personality Inventory (MMPI) on the basis of item content reflecting symptoms of anxiety that are characteristic of individuals with anxiety neuroses. In responding to the MAS, subjects indicate how they *generally* feel by reporting either true or false for each MAS item.

The Anxiety Scale Questionnaire (ASQ) was developed by Cattell and Scheier (1963) to assess anxiety in clinical situations. They assembled a large number of multiple-choice items presumed to be related to anxiety phenomena, and employed factor analytic procedures as the primary basis for item selection. Correlations between the ASQ and the MAS are typically .80 or higher, despite major differences in the authors' conceptions of anxiety, method of test construction, and item format. Because these correlations approach the reliabilities of the individual scales, the MAS and the ASQ may be considered equivalent measures. The MAS and the ASQ were constructed before the importance of the state-trait distinction was established, but both instruments require subjects to report how often they experience anxiety symptoms, suggesting that these scales measure T-Anxiety.

In early studies, S-Anxiety was measured most often by assessing physiological changes associated with activation (arousal) of the autonomic nervous system. Although a number of different physiological measures have been used as indicators of S-Anxiety (Borkovec, Weerts, & Bernstein, 1977; Hodges, 1976; Lader, 1975; Levitt, 1980; Martin, 1973; McReynolds, 1968), the galvanic skin response and changes in heart rate appear to be the most popular. The utility of physiological measures of S-Anxiety have been evaluated critically by Hodges (1976). A number of questionnaires, rating scales, psychometric inventories, and physiological measures that have been used to assess anxiety are described by Levitt (1980). Many of these measures also have been reviewed and evaluated by McReynolds (1968) and Borkovec et al. (1977).

The Affect Adjective Check List (AACL) developed by Zuckerman (1960) and his associates (Zuckerman & Biase, 1962; Zuckerman & Lubin, 1965) was the first instrument designed to measure both S-Anxiety and T-Anxiety. Although evidence of the validity of the AACL-Today form as a measure of S-Anxiety is impressive, the format of this scale, which only requires subjects to check adjectives that describe them, makes it somewhat insensitive in assessing the intensity of anxiety as an emotional state. Moreover, relatively low correlations of the AACL General Form with the MAS and the ASQ raise questions about the concurrent validity of this component of the AACL as a measure of T-Anxiety.

THE STATE-TRAIT ANXIETY INVENTORY (STAI)

The STAI was developed by Spielberger, Gorsuch, and Lushene (1970) to provide reliable, relatively brief self-report scales to assess both state and trait anxiety in research and clinical practice. 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, 1972a, 1972b, 1976, 1977, 1979a, 1983), provided the conceptual framework that guided the STAI test-construction process.

State anxiety (S-Anxiety) was defined by Spielberger et al. (1970) as a temporal cross section in the emotional stream of life of a person, consisting of subjective feelings of tension, apprehension, nervousness, and worry, and activation (arousal) of the autonomic nervous system. It was assumed further that S-Anxiety would vary in intensity and fluctuate over time as a function of perceived threat. Trait anxiety (T-Anxiety) was defined in terms of relatively stable individual differences in anxiety proneness (i.e., differences between people in the tendency to perceive stressful situations as dangerous or threatening, and in the

disposition to respond to such situations with more frequent and intense elevations in S-Anxiety). It was assumed further that differences in T-Anxiety are reflected in the frequency that anxiety states have been experienced in the past, and in the probability that S-Anxiety reactions will be manifested in the future.

When test construction for the STAI began in 1964, the initial goal was to develop an inventory consisting of a single set of items that could be administered with different instructions to assess both state and trait anxiety. A large pool of items was selected and adapted from other anxiety measures, mostly from the existing trait measures. In addition, a number of new items were written using adjectives from the AACL that were considered appropriate for assessing S-Anxiety. For each of these new items, the essential psychological content was retained, but the format was modified so that the item could be given with different instructions to assess either S-Anxiety or T-Anxiety.

In selecting the items for the preliminary form of the STAI, the item pool was administered to a large sample of undergraduate university students, first with state and then with trait instructions. The state instructions required subjects to report the *intensity* of their feelings of anxiety, "right now, at this moment." The trait instructions asked subjects to report how they generally feel by indicating the *frequency* of occurrence of their anxiety-related feelings or symptoms. The same 20 items were administered with both state and trait instructions.

When given with trait instructions, each STAI item that correlated significantly with the students' scores on three well-known T-Anxiety scales was retained for further study. The three criterion measures were: The Taylor (1953) MAS and Cattell and Scheier's ASQ (1963), the two most widely used anxiety measures at the time test construction was begun, and the Welsh (1956) "Factor A" Anxiety Scale, which was derived from a factor analysis of the 566 MMPI items. The internal consistency and stability of each STAI item was evaluated when given with either trait or state instructions. In addition, the construct validity of each S-Anxiety item given with state instructions was evaluated under high and low stress conditions.

On the basis of extensive item-validity research with more than 2,000 students comprising 10 independent samples, a final set of 20 items was selected for Form A, the preliminary version of the STAI. Although the STAI (Form A) was designed to be administered with different instructions to measure both S-Anxiety and T-Anxiety (Spielberger et al., 1970), research with the inventory revealed that altering the instructions could not overcome the strong psycholinguistic state or trait connotations of key words in some items. For example, "I feel upset" was a highly sensitive measure of S-Anxiety; scores on this item increased markedly under stressful conditions and were lower under relaxed conditions, compared with a neutral condition. However, when given with trait instructions, correlations of this item with other T-Anxiety items were relatively low and unstable over time. Conversely, "I worry too much" was stable over time and correlated highly with other T-Anxiety items. However, scores on this item did not increase reliably in response to stressful circumstances, nor did scores on this item decrease under relaxed conditions, as was required for the construct validity of an S-Anxiety item.

Because of the difficulties encountered in measuring state and trait anxiety with the same items, we modified our test-construction strategy and selected separate sets of items for the STAI S-Anxiety and T-Anxiety Scales. The 20 items with the best concurrent validity (i.e., highest correlations with the MAS, ASQ, and Welsh Anxiety Scale) and most stability over time were selected for the STAI (Form X) T-Anxiety Scale. The 20 items with the highest internal consistency and best construct validity as measures of state anxiety were selected for the STAI (Form X) S-Anxiety Scale. Only five items met the validity criteria for both scales.

The 30 remaining items were sufficiently different in content to be regarded as unique measures of either state or trait anxiety.

Representative STAI T-Anxiety items, reflecting either the presence or the absence of trait anxiety, are listed next:

Anxiety Present: I worry too much over something that really doesn't matter; I get in a state of tension or turmoil as I think over recent concerns and interests.

Anxiety Absent: I am content; I am a steady person.

In responding to these items, subjects rate themselves on the following 4-point frequency scale: (a) almost never, (b) sometimes, (c) often, and (d) almost always.

The main goal in constructing the STAI (Form X) S-Anxiety Scale was to measure a continuum of increasing intensity on which low scores indicated feeling calm and serene, intermediate scores were associated with moderate levels of tension and worry, and high scores reflected intense fear, approaching terror and panic. In responding to the S-Anxiety items, subjects rate the intensity of their feelings of anxiety on the following 4-point scale: (a) not at all, (b) somewhat, (c) moderately so, and (d) very much so. Representative S-Anxiety present and absent items are listed next:

Anxiety Present: I am tense; I am worried.

Anxiety Absent: I feel calm; I feel secure.

Insights gained in a decade of research stimulated a major revision in the STAI (Form X) (Spielberger, 1983). The main goal in revising the scale was to develop purer measures of state and trait anxiety to provide a firmer basis for differentiating between patients suffering from anxiety and depressive disorders in clinical diagnosis. Careful scrutiny of the content of the STAI items with the best psychometric properties resulted in a clearer conception of the constructs of state and trait anxiety, which then guided the formulation of potential replacement items. Selection of replacement items was based on item analyses and factor analyses of responses to the original and replacement items; 30% of the original items were replaced.

In the construction and standardization of the STAI (Form Y), more than 5,000 additional subjects were tested. The item replacement procedures are described in detail in the revised test manual (Spielberger, 1983). Factor analyses of the STAI (Form Y) items (Spielberger, Vagg, Barker, Donham, & Westberry, 1980; Vagg, Spielberger, & O'Hearn, 1980) identified clear-cut trait and state anxiety factors, which generally were consistent with the results of previous factor studies of Form X (Barker, Barker, & Wadsworth, 1977; Gaudry & Poole, 1975; Gaudry, Spielberger, & Vagg, 1975; Kendall, Finch, Auerbach, Hooke, & Mikulka, 1976; Spielberger et al., 1980). Distinctive state and trait anxiety-absent and anxiety-present factors emerged in the four-factor solutions for Form Y, which were similar to those reported in previous factor studies of Form X. However, Form Y had better simple structure, and the factors were more differentiated and more stable than in Form X, reflecting a better balance between anxiety-present and anxiety-absent items (Spielberger et al., 1980).

RELIABILITY, STABILITY, AND INTERNAL CONSISTENCY OF THE STAI

Detailed reliability data for the STAI (Form Y) are reported in the test manual (Spielberger, 1983). The test-retest stability coefficients for the Form Y T-Anxiety Scale are reasonably high for college students, ranging from .73 to .86, but somewhat lower for high school

students, ranging from .65 to .75; the median stability coefficients for a number of different samples of college and high school students were .77 and .70, respectively. In contrast, the stability coefficients for the S-Anxiety Scale were relatively low, with a median of only .33. However, this lack of stability was expected, because a valid measure of state anxiety should reflect the influence of unique situational factors that exist at the time of testing.

Because anxiety states are expected to vary in intensity as a function of perceived stress, measures of internal consistency such as alpha coefficients provide a more meaningful index of the reliability of state measures than test-retest correlations. Alpha coefficients for the STAI (Form Y) S-Anxiety Scale, computed by Formula KR-20 as modified by Cronbach (1951), are uniformly high. The S-Anxiety alphas were above .90 for large, independent samples of students, working adults, and military recruits, with a median coefficient of .93. The alpha coefficients for the STAI (Form Y) T-Anxiety Scale were also uniformly high for these groups, with a median coefficient of .90. In addition, the S-Anxiety and T-Anxiety alpha coefficients for younger, middle-aged, and older working adults remained high over the entire age range.

Because the distribution of scores on the STAI S-Anxiety Scale when given under neutral conditions is skewed positively, alpha reliability coefficients are generally slightly higher when this scale is given under conditions of psychological stress. For example, the alpha reliability was .92 for the S-Anxiety Scale when it was administered to college males immediately after a difficult intelligence test, and .94 when it was given immediately after a distressing film. For the same subjects, the alpha reliability was .89 when the scale was given following a brief period of relaxation training. Further evidence of the high degree of internal consistency of the STAI scales is provided by the item-remainder correlations, which are .50 or higher for more than half of the items on both scales; all of the T-Anxiety items and 19 of the 20 S-Anxiety items had item-remainder correlations of .30 or higher for both genders in all of the normative samples.

In summary, the internal consistency of the STAI (Form Y) S-Anxiety and T-Anxiety Scales is quite high as measured by alpha coefficients and item-remainder correlations. Test-retest stability is also relatively high for the STAI T-Anxiety Scale, but low for the S-Anxiety Scale, as would be expected for a measure designed to assess transitory changes in anxiety as an emotional state in more or less stressful situations.

CONTENT, CONCURRENT, AND CONSTRUCT VALIDITY OF THE STAI

Individual STAI items were required to meet stringent validity criteria at each stage of the test development process (Spielberger, 1983; Spielberger & Gorsuch, 1966; Spielberger et al., 1970). As previously noted, each item was selected initially on the basis of significant correlations with both the Taylor (1953) MAS and Cattell and Scheier's (1963) ASQ, the two most widely used measures of trait anxiety at the time the STAI was being developed (Spielberger et al., 1970). But the MAS contains a number of items that reflect depression rather than anxiety (e.g., "I cry easily," "I feel useless at times," "At times I think I am no good at all"). In the revised STAI (Form Y), items with depressive content had weaker psychometric properties and therefore were eliminated (Spielberger, 1983). Several ASQ items are more closely related to anger than anxiety (e.g., "Often I get angry with people too quickly"); items with anger content were not included in the original STAI item pool.

The relatively high correlations of scores on the STAI T-Anxiety Scale with the ASQ and the MAS, ranging from .73 to .85, indicate a high degree of concurrent validity. Because the correlations among the three scales approach the scale reliabilities, the three inventories essentially can be considered equivalent measures of trait anxiety. However, a major advantage of the STAI T-Anxiety Scale is that it provides a measure of anxiety that is much less contaminated with depression and anger. A second advantage is that the STAI T-Anxiety Scale is comprised of only 20 items, compared with the 43-item ASQ and the 50-item MAS, and thus requires only about half as much time to administer.

Evidence of the construct validity of the T-Anxiety Scale is reflected in the mean scores of various neuropsychiatric patient (NP) groups compared with normal subjects. The STAI significantly discriminates between normal individuals and psychiatric patients, for whom anxiety is a major symptom (Spielberger, 1983). Except for character disorders, all NP groups have substantially higher T-Anxiety scores than normal subjects. 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 identify nonpsychiatric patients with emotional problems. The lower T-Anxiety scores of patients with character disorders, for whom the absence of anxiety is an important defining condition, provides further evidence of the discriminant validity of the STAI.

To demonstrate construct validity, the scores for each S-Anxiety item had to increase significantly in stressful situations and decline in relaxing situations when compared with a neutral situation. Evidence of the construct validity of the STAI S-Anxiety Scale can be noted in the finding that the S-Anxiety scores of college students are significantly higher under examination conditions and lower after relaxation training than when the students were tested in a regular class period (Spielberger, 1983).

Further evidence of the construct validity of the S-Anxiety Scale may be observed in military recruits tested shortly after they began a highly stressful training program. The S-Anxiety scores of the recruits were much higher than those of high school and college students of about the same age who were tested under relatively nonstressful classroom conditions. The mean S-Anxiety scores for the recruits also were much higher than their own T-Anxiety scores, suggesting that the recruits were experiencing a high state of emotional turmoil when they were tested. In contrast, the mean S-Anxiety and T-Anxiety scores for high school and college students tested under relatively nonstressful conditions were approximately the same.

More than 10,000 adolescents and adults were tested in constructing and validating the STAI. Norms for high school and college students; working adults; military personnel; prison inmates; and psychiatric, medical, and surgical patients were reported in the revised STAI (Form Y) Test Manual (Spielberger, 1983). The State-Trait Anxiety Inventory for Children (STAIC) measures anxiety in young children (Spielberger, 1973) and also may be used with adolescents. With extensive norms for fourth-, fifth-, and sixth-grade students, the STAIC has been used in numerous studies of normal children as well as with children who have emotional or physical problems.

Since first introduced a quarter century ago (Spielberger & Gorsuch, 1966), the STAI and the STAIC have been used in more than 6,000 studies. Adapted for cross-cultural research in 43 different languages and dialects (Spielberger, 1989), the STAI has been used extensively in psychological research in many areas, including: experimental investigations and clinical studies of stress-related psychiatric, psychosomatic, and medical disorders; investigations of general psychological processes, such as attention, memory, learning, and academic achievement; research on situation-specific anxiety phenomena, such as test anxiety, anxiety in

sports, and speech anxiety; studies of depression, schizophrenia, sociopathy, and substance abuse; and as an outcome measure in research on the effectiveness of biofeedback, psychotherapy, and various forms of behavioral and cognitive treatment.

Anger, Hostility, and Aggression

The maladaptive effects of anger in psychopathology traditionally are emphasized as important contributors to the etiology of the psychoneuroses, depression, and schizophrenia. Much has been written about the negative impact of anger and hostility on physical health and psychological well-being, but the definitions of these constructs are ambiguous and sometimes contradictory. Moreover, the terms *anger*, *hostility*, and *aggression* often are used interchangeably in the research literature, and this conceptual confusion is reflected in a diversity of measurement operations of questionable validity (Biaggio, Supplee, & Curtis, 1981).

Given the substantial overlap in prevailing conceptual definitions of anger, hostility, and aggression, and the variety of operational procedures used to assess these constructs, we have referred to them, collectively, as the AHA! Syndrome (Spielberger et al., 1985). Spielberger, Jacobs, Russell, and Crane (1983) proposed the following working definitions of these constructs:

The concept of 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. . . . While anger and hostility refer to feelings and attitudes, the concept of aggression generally implies destructive or punitive behavior directed towards other persons or objects. (p. 16)

Anger is clearly at the core of the AHA! Syndrome, but different aspects of this emotion typically are emphasized in various definitions of hostility and aggression. Moreover, ambiguities and inconsistencies in the definitions of these constructs are reflected in the procedures that have been developed to assess them. The earliest efforts to assess anger and hostility were based on clinical interviews, behavioral observations, and projective techniques, such as the Rorschach Inkblots and the Thematic Apperception Test. The physiological and behavioral correlates of anger and hostility, and various manifestations of aggression, have also been investigated in numerous studies. In contrast, the phenomenological experience of anger (i.e., angry feelings) has been largely neglected in psychological research. Moreover, most psychometric measures of anger and hostility confound angry feelings with the mode and direction of the expression of anger.

MEASURES OF HOSTILITY AND ANGER

Beginning in the 1950s, a number of self-report psychometric scales were developed to measure hostility (Buss & Durkee, 1957; Caine, Foulds, & Hope, 1967; Cook & Medley, 1954; Schultz, 1954; Siegel, 1956). A rational-empirical strategy was employed in developing the Buss-Durkee (1957) Hostility Inventory (BDHI), which generally is regarded as the most carefully constructed psychometric measure of hostility. Conceptualizing hostility as a multidimensional concept, Buss (1961) constructed items to assess seven facets of this construct, each of which is defined by a BDHI subscale. The dimensions of the BDHI were

investigated in two studies in which the responses to individual BDHI items were factored. Although seven dimensions of hostility are assessed by BDHI subscales, Bendig (1962) identified only two major underlying factors, which he labeled overt and covert hostility. Russell (1981) identified three meaningful BDHI factors, which he described as: (a) neuroticism, (b) general hostility, and (c) expression of anger.

The need to distinguish between anger and hostility was recognized in the early 1970s with the appearance in the psychological literature of three anger measures: 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 (e.g., "People pushing into line"). Similar in conception and format to the RI, Novaco's (1975) AI consists of 90 statements that describe anger-provoking incidents ("Being called a liar," "Someone spits at you"). In responding to the RI and the AI, subjects rate the degree to which each situation or incident would anger or provoke them. The ASR was designed by Zelin, Adler, and Myerson (1972) to assess both "awareness of anger" and different modes of anger expression. In validating this scale, the ASR scores of psychiatric patients were found to correlate significantly with psychiatrists' ratings of anger.

Because the ASR and the RI each have been used in only one or two published studies over the past 30 years, the construct validity of these scales has yet to be established firmly. Although the AI has been used more often in research than the other anger measures, Biaggio et al. (1981) found no significant correlations of this scale with either self-ratings or observer ratings of anger and hostility. Moreover, over a brief two-week interval, Biaggio et al. reported that the test-retest stability of the AI was only .17.

A common problem with existing measures of anger and hostility is that, in varying degrees, these scales confound the experience and expression of anger with situational determinants of angry reactions. Furthermore, none of these measures explicitly takes the state-trait distinction into account. The ASR Awareness subscale comes closest to examining the extent to which subjects experience angry feelings, but this instrument does not assess the intensity of these feelings at a particular time. A number of BDHI items specifically inquire about the frequency that anger is experienced or expressed (e.g., "I *sometimes* show my anger"; "Almost every week, I see someone I dislike"; "I *never* get mad enough to throw things," italics added). Although these items implicitly assess individual differences in a personality trait, most BDHI items evaluate hostile attitudes (e.g., resentment, negativism, suspicion), rather than angry feelings.

It seems apparent that the phenomena assessed by the RI, ASR, AI, and BDHI are heterogeneous and complex. 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 three anger scales described earlier. On the basis of her findings, Biaggio (1980) concluded that evidence of the validity of these measures was both fragmentary and limited. A coherent theoretical framework that distinguishes between anger, hostility, and aggression as psychological concepts, and that takes the state-trait distinction into account, is essential for constructing and validating psychometric measures of anger and hostility.

THE STATE-TRAIT ANGER SCALE (STAS)

The concept of anger, as previously noted, refers to phenomena that are both more fundamental and less complex than hostility and aggression. 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 constructed to measure anger as an emotional state and individual differences in anger proneness as a personality trait.

Prior to constructing the STAS, working definitions of state and trait anger were formulated. State anger (S-Anger) was defined as a psychobiological state or condition consisting of subjective feelings of anger that vary in intensity, from mild irritation or annoyance to intense fury and rage, with concomitant activation or arousal of the autonomic nervous system. It was assumed further that S-Anger would fluctuate over time as a function of perceived affronts, injustice, or frustration. Trait anger (T-Anger) was defined in terms of individual differences in the frequency that S-Anger was experienced over time. Assuming that persons high in T-Anger perceive a wider range of situations as anger provoking (e.g., annoying, irritating, frustrating) than those low in T-Anger, high T-Anger individuals are likely to experience more frequent and intense elevations in S-Anger whenever annoying or frustrating conditions are encountered.

On the basis of these working definitions, a pool of items was assembled to assess the intensity of angry feelings (S-Anger) and individual differences in anger proneness (T-Anger). The following are examples of S-Anger items: "I am furious"; "I feel irritated"; "I feel like I'm about to explode." Subjects report the intensity of their angry feelings by rating themselves on the following 4-point scale: "not at all," "somewhat," "moderately so," "very much so." Examples of T-Anger items are: "I have a fiery temper," "I fly off the handle," "It makes me furious when I am criticized in front of others." In responding to the T-Anger items, subjects indicate how they generally feel by rating themselves on the following frequency scale: "almost never," "sometimes," "often," "almost always."

RELIABILITY AND INTERNAL CONSISTENCY OF THE STAS

Fifteen S-Anger and 15 T-Anger items were selected for the preliminary form of the STAS. Alpha coefficients for the 15-item STAS S-Anger Scale were .93 for both males and females, indicating a high degree of internal consistency. The alpha coefficients for the STAS T-Anger Scale were .87 for both genders, providing equally strong evidence of the internal consistency of this scale. The item-remainder correlations for the individual S-Anger and T-Anger items also were uniformly high (median $r = .68$). Given the high internal consistency of the preliminary STAS scales, it was possible to reduce the length of these scales without weakening their psychometric properties.

In revising the STAS, it was considered desirable to develop internally consistent measures of anger that were relatively independent of anxiety. Therefore, in selecting the final set of items, the S-Anger and T-Anger items with the highest item-remainder correlations for each scale and the lowest correlations with measures of anxiety were identified. With only two exceptions, the item-remainder correlations for the 15 S-Anger items were .50 or higher. Two S-Anger items with the lowest item-remainder coefficients ("I am annoyed," "I am resentful") and three items with the highest correlations with the STAI S-Anxiety Scale ("I feel irritated," "I feel frustrated," "I feel aggravated") were eliminated, reducing the number of S-Anger items from 15 to 10.

To reduce the number of T-Anger items from 15 to 10, item-remainder coefficients and correlations of each item with measures of anxiety were examined (Barker, 1979; Westberry, 1980). Two items with low item-remainder correlations ("People who think they are always right irritate me," "I get annoyed when I am singled out for correction"), and three items for which the correlations with the STAI T-Anxiety Scale were relatively high ("I feel irritated,"

"It makes my blood boil when I am pressured," "I feel angry") were eliminated. It is interesting to note that two of the T-Anger items that were eliminated (i.e., "I feel irritated," "I feel angry") had content validity as measures of anger. However, the correlations of these items with T-Anxiety were almost as high as their item-remainder coefficients, suggesting that feelings of anger and irritation are frequently associated with symptoms of anxiety.

Correlations between the 10- and 15-item forms of the S-Anger and T-Anger Scales, ranging from .95 to .99 for Navy recruits and college students, indicate that the 10-item scales provide essentially the same information as the longer forms (Spielberger, 1988). Because those items with the highest correlations with anxiety were eliminated, the correlations of the 10-item S-Anger and T-Anger Scales with anxiety were substantially lower than was the case for the 15-item anger scales.

Given the fact that the STAS S-Anger and T-Anger items were generated primarily on a rational basis, the internal consistency of these scales is impressive. In addition to providing evidence of the utility of the working definitions that guided the item-selection process, the high degree of internal consistency for both the STAS S-Anger and T-Anger Scales, as reflected in item-remainder correlations and alpha coefficients, indicates that most people are sensitive to their experience of angry feelings and highly consistent in reporting the intensity and the frequency of experiencing these feelings.

Jacobs, Latham, and Brown (1988) examined the stability of the STAS for a large group of undergraduate students. The test-retest reliability coefficients for the STAS T-Anger Scale over a 2-week interval were .70 and .77, respectively, for males and females. In contrast, the stability coefficients for the STAS S-Anger Scale of .27 for males and .21 for females were much lower, as would be expected for a measure of transitory anger.

Because factor analyses of the STAS S-Anger items indicated only a single underlying factor for both males and females, the S-Anger Scale appears to measure a unitary emotional state that varies in intensity. In contrast, the results of the factor analyses of the T-Anger items identified two correlated factors, which were labeled Angry Temperament (T-Anger/T) and Angry Reaction (T-Anger/R). The T-Anger/T items describe the individual differences in the disposition to express anger, without specifying any provoking circumstance (e.g., "I am a hotheaded person"). The T-Anger/R items describe angry reactions in situations that involve frustration and/or negative evaluations (e.g., "It makes me furious when I am criticized in front of others").

That the two T-Anger scales assess different facets of anger is clearly reflected in the results of a study by Crane (1981). She found that 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/R scores of the hypertensives. No difference was found in the T-Anger/T scores of the hypertensive and control patients. Crane also reported that hypertensives had significantly higher T-Anxiety scores than control patients, and that their scores on the S-Anger and S-Anxiety scales after performing on a mildly frustrating task were higher than the corresponding scores for the controls.

CONCURRENT, DISCRIMINANT, PREDICTIVE, AND CONSTRUCT VALIDITY OF THE STAS

To evaluate concurrent validity, the STAS, the Buss-Durkee Hostility Inventory (BDHI; 1957), and the Hostility (HO; Cook & Medley, 1954) and Overt Hostility (Hv; Schultz, 1954) Scales of the Minnesota Multiphasic Personality Inventory (MMPI) were administered

to undergraduate college students and Navy recruits. Moderately high positive correlations of the STAS T-Anger Scale with the three hostility measures were found for males and females in both samples, providing evidence of a substantial relationship between T-Anger and hostility. Moderate positive correlations of the STAS T-Anger Scale also were found with the Neuroticism Scale of the Eysenck Personality Questionnaire (EPQ; Eysenck & Eysenck, 1975) and the T-Anxiety Scale of the State-Trait Personality Inventory (STPI; Spielberger, 1979b) for a large sample of college students. These findings are consistent with the clinical observation that neurotic individuals frequently experience angry feelings that they cannot readily express (Spielberger, 1988).

Small positive correlations between the STAS T-Anger Scale and the EPQ Psychoticism Scale suggested that individuals with high scores on the latter experience anger somewhat more frequently than individuals with low Psychoticism scores. Small negative correlations of T-Anger with the EPQ Lie Scale suggest that anger scores may be reduced slightly by test-taking attitudes that lead some people to inhibit reports of negative characteristics such as anger. However, these correlations also might be interpreted as indicating that individuals who experience anger more frequently make less use of repression and denial as defenses against emotional arousal. The finding of essentially zero correlations of the T-Anger Scale with the EPQ Extraversion and STPI Curiosity Scales indicates that T-Anger is unrelated to these personality dimensions.

Although STAS T-Anger scores correlated substantially with a number of hostility measures, the research literature indicates that there are important differences in the meaning of anger and hostility as personality constructs. The nature of the relationship between anger and hostility was explored in factor analyses of the 10 T-Anger items, in which the BDHI Total and subscale scores and scores on the MMPI HO and Hv Scales were included. To evaluate the discriminant validity of the anger and hostility measures, the STPI T-Anxiety and T-Curiosity item and scale scores also were included in these analyses (Spielberger, 1980; Westberry, 1980).

The resulting three- and four-factor solutions were similar for both males and females. In the three-factor solutions, the very strong first factor clearly measured an anger/hostility dimension; the second and third factors were anxiety and curiosity. The STAS T-Anger and Buss-Durkee Total scores had the highest loadings on the anger/hostility factor. All 10 T-Anger items, the HO and Hv Scale scores, and all of the BDHI subscales except Guilt also had salient loadings on this factor. Interestingly, the BDHI Guilt, Suspicion, and Resentment subscales had higher loadings on the anxiety factor than on the anger/hostility factor.

In the four-factor solutions, separate anger and hostility factors emerged for both males and females; anxiety and curiosity factors similar to those obtained in the three-factor solutions also were found. The T-Anger Scale and all but one of the T-Anger items had their highest loadings on the anger factor. The hostility factor was defined by high loadings for scores on the Buss-Durkee Total and HO Scales, and by salient loadings for all of the Buss-Durkee subscales except Guilt. Several BDHI subscales also had salient secondary loadings on the anger factor. Interestingly, the HO Scale and the BDHI Suspicion and Resentment subscales had higher secondary loadings on the anxiety factor than on the anger factor. Thus, the results of the factor analyses indicate that measures of anger and hostility assess different, but related constructs, and that measures of anger and hostility correlate substantially with anxiety.

In a series of studies at Colorado State University, Deffenbacher (1992) used the STAS T-Anger Scale to assess multiple aspects of anger. The researcher found that individuals with high T-Anger scores reported that they experienced greater intensity and frequency of day-to-day anger across a wide range of provocative situations than persons low in T-Anger. The

high T-Anger individuals also reported anger-related physiological symptoms twice to four times more often than low anger subjects. When provoked, the high T-Anger individuals were characterized by stronger general tendencies to both express and suppress anger, and by less constructive and more dysfunctional coping, as manifested in physical and verbal antagonism.

In a study in which trait anger and self-concept were assessed, Stark and Deffenbacher (1986) found a moderately strong inverse relationship between these measures. The high T-Anger students did not like themselves as much as the low T-Anger subjects, nor did they feel as worthwhile or confident. Negative events such as failure also appeared to have a more devastating (catastrophizing) impact on high T-Anger individuals (Story & Deffenbacher, 1985), who reported that they experienced high levels of anxiety more frequently than students with low T-Anger scores.

As anger research has progressed, the critical importance of differentiating between the experience and expression of anger has become increasingly apparent (Spielberger et al., 1985). It is essential to distinguish, both conceptually and empirically, between the experience of anger as an emotional state (S-Anger) and individual differences in anger proneness as a personality trait (T-Anger), and to identify and measure the characteristic ways in which people express their anger. In the following section, theory and research on anger expression are reviewed briefly, and the development of scales to assess the expression and control of anger is described in some detail.

The Expression and Control of Anger

The conceptual and operational distinction between "anger-in" and "anger-out" as major modes of anger expression long has been recognized in psychophysiological research. The effects of these modes of anger expression on the cardiovascular system were a major focus almost 40 years ago in the classic studies of Funkenstein and his coworkers (Funkenstein, King, & Drolette, 1954). These researchers exposed healthy college students to anger inducing laboratory conditions and measured their pulse rate and blood pressure. Students who became angry during the experiment and directed their anger toward the investigator or the laboratory situation were classified as anger-out; those who suppressed their anger and/or directed it at themselves were classified as anger-in. Typically, the increase in pulse rate for students classified as anger-in was three times greater than for the anger-out group.

Following the procedures used by Funkenstein et al. (1954), individuals generally are classified as anger-in in studies on anger expression if they suppress their anger or direct it inward—toward the ego or self (Averill, 1982; Tavris, 1982). Those who express their anger in aggressive behavior, directing it toward other persons or objects in the environment, are classified as anger-out. When held in or suppressed, anger may be subjectively experienced as an emotional state, S-Anger, which varies in intensity and fluctuates over time as a function of the provoking circumstances. Defining anger-in in this manner differs from the psychoanalytic conception of anger turned inward toward the ego or self (Alexander, 1939, 1948). In the psychoanalytic conception, the feelings of anger often result in guilt and depression (Alexander & French, 1948), whereas the thoughts and memories relating to the anger-provoking situation may be repressed and, thus, not directly experienced.

Anger directed outward generally involves both the experience of S-Anger and its manifestation in some form of aggressive behavior. Anger out may be expressed in physical acts such as slamming doors, destroying objects, and assaulting other persons, or in verbal

behavior in the form of 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 frustration, or expressed indirectly toward persons or objects associated with or symbolic of the provoking agent.

Harburg and his associates have reported impressive relationships between anger expression, elevated blood pressure (BP), and hypertension, demonstrating that anger-in and anger-out have different effects on the cardiovascular system (Harburg, Blakelock, & Roeper, 1979; Harburg et al., 1973; Harburg & Hauenstein, 1980; Harburg, Schull, Erfurt, & Schork, 1970). These investigators classified individuals as "anger-in" or "anger-out" on the basis of their self-ratings of how they would express anger if treated unfairly by a supervisor, a landlord, or a police officer. Gentry (1972) and his colleagues (Gentry, Chesney, Gary, Hall, & Harburg, 1982; Gentry, Chesney, Hall, & Harburg, 1981) have corroborated subsequently and extended Harburg's findings.

The procedure used by Harburg and Gentry to classify individuals as anger-in who did not report feeling angry in anger-provoking situations raises important conceptual issues. This procedure equates individuals who do not experience anger with those who experience and suppress their angry feelings. Different personality dynamics have been attributed by Rosenzweig (1976, 1978) to "impunitive" persons, who do not experience anger in anger-provoking situations; and "intrapunitive" persons, who turn anger in when provoked, often blaming themselves for the anger directed toward them by others.

THE ANGER EXPRESSION (AX) SCALE

Differentiating between the experience of angry feelings and how these feelings are expressed can be accomplished by measuring both the intensity of S-Anger as an emotional state and individual differences in the frequency that S-Anger is expressed in behavior (anger-out), suppressed (anger-in), or otherwise controlled. Because anger expression is defined implicitly by Funkenstein et al. (1954), Harburg et al. (1973), and Gentry et al. (1982) as a single dimension, varying from extreme suppression or inhibition of anger to the expression of anger in assaultive or destructive behavior, Spielberger et al. (1985) attempted to construct a unidimensional, bipolar scale to assess this dimension.

As a first step in constructing the Anger Expression (AX) Scale, working definitions of anger-in and anger-out were formulated on the basis of a review of the relevant research literature. Anger-in was defined in terms of how often an individual experiences, but holds in (suppresses), angry feelings, rather than on the basis of the more ambiguous psychoanalytic construct of anger turned against the ego. Anger-out was defined in terms of the frequency that an individual expresses angry feelings in verbally or physically aggressive behavior.

In contrast to the procedure used by Funkenstein and Harburg (i.e., assigning subjects to dichotomous anger-in or anger-out categories), the AX Scale was designed to measure a continuum of individual differences in how often anger was held in or expressed. The rating-scale format for the AX Scale was the same as that used with the STAS T-Anger Scale (Spielberger, 1980), but the instructions differed markedly from those used to assess T-Anger. Rather than asking subjects to indicate how they generally feel, they were instructed to report "... how often you generally react or behave in the manner described when you feel angry or furious." In responding, subjects rated themselves on the following 4-point frequency scale: (1) almost never, (2) sometimes, (3) often, and (4) almost always.

Consistent with our working definitions of anger-in and anger-out, the content of the items for the 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). Examples of AX Scale items are ("When angry or furious"):

AX/In: I keep things in; I boil inside, but I don't show it.

AX/Out: I lose my temper; I strike out at whatever infuriates me.

In a study of the relationship between anger expression and blood pressure, Johnson (1984) administered a 33-item preliminary version of the AX Scale to 1,114 high school students; three items with poor psychometric properties and judged to be ambiguous were subsequently discarded. To verify that the AX Scale items were measuring a unitary psychological construct, the students' responses to the individual items were evaluated in separate factor analyses for males and females. Although we originally intended to develop a unidimensional, bipolar measure of anger expression, the results of the factor analyses suggested that the AX items were tapping two independent dimensions. On the basis of the content of the items with high loadings, these factors were labeled Anger/In and Anger/Out. Most of the preliminary AX Scale items had strong loadings on one of these factors and negligible loadings on the other.

Given the strength and clarity of the Anger/In and Anger/Out factors, the striking similarity (invariance) of these factors for males and females, and the large samples on which the factor analyses were based, the test-construction strategy for developing the AX Scale was modified to identify homogeneous subsets of items for measuring anger-in and anger-out. Of the 30 items on which the identification of the Anger/In and Anger/Out factors was originally based, 8 had relatively small loadings (below .35) on both factors. After eliminating these items, item-remainder correlations were computed for males and females for the remaining items; two items with relatively low item-remainders for the females were eliminated, reducing the total number of items to 20.

The selection of subsets of AX Scale items for measuring anger-in and anger-out was based on further factor analyses and subscale item-remainder correlations (Spielberger et al., 1985). Eight items with uniformly high loadings for both genders on the Anger/In factor and negligible loadings on the Anger/Out factor were selected for the AX/In subscale. The median loadings of these items on the Anger/In and Anger/Out factors were .665 and -.045, respectively. Similarly, eight items with uniformly high loadings for both genders on the Anger/Out factor and negligible loadings on Anger/In were selected for the AX/Out subscale. The median loading of the AX/Out items was .59 on the Anger/Out factor, and -.01 on the Anger/In factor.

The internal consistency of the 8-item AX/In and AX/Out subscales was evaluated by computing alpha coefficients and item-remainder correlations. All but one of the item-remainder correlations for the AX/In and AX/Out subscales were .37 or greater. The alphas ranged from .73 to .84, and were somewhat higher for the AX/In subscale. Jacobs, Latham, and Brown (1988) examined the test-retest reliability of the AX Scale and found coefficients that ranged from .64 to .86. Johnson (1984) and Pollans (1983) found essentially zero correlations between the AX/In and AX/Out subscales for both males and females in large samples of high school and college students; similar findings also have been reported for other populations (Knight, Chisholm, Paulin, & Waal-Manning, 1988; Spielberger, 1988). Thus, the AX/In and AX/Out subscales are empirically independent, as well as factorially orthogonal. Clearly, these subscales assess two independent anger-expression dimensions.

MEASUREMENT OF ANGER CONTROL

A number of items intended to measure the middle range of the anger-in/anger-out continuum were included in the original AX Scale item pool. Three of these items ("Control my temper"; "Keep my cool"; "Calm down faster") were retained in the final set of 20 AX Scale items, because the item-remainder correlations for these items were strong; all three items had substantial loadings on both the Anger/In and Anger/Out factors. In research with the AX Scale, emerging evidence that these items coalesced to form the nucleus of an anger control factor (Pollans, 1983) stimulated further work on developing an AX Anger Control (AX/Con) subscale.

The first step in constructing the AX/Con subscale was to assemble a pool of items with appropriate content. Using the three anger control items from the 20-item AX Scale as a guide, a number of additional anger control items were written. Dictionary and thesaurus definitions of *control* and idioms pertaining specifically to the control of anger were consulted in writing these items. The new AX/Con items were administered along with the 20 original AX Scale items to a large sample of undergraduate university students. In separate factor analyses of the AX/Con items for males and females, a large anger control (Anger/Con) factor and several very small factors were found for both genders. The items with the strongest loadings on the Anger/Con factor for both males and females were added to the three original AX/Con items to form an 8-item AX/Con subscale.

To confirm the independence of the Anger/Con factor, and to evaluate its relation to the Anger/In and Anger/Out factors, the 24 AX Scale items, which included the 8-item AX/Con, AX/Out, and AX/In subscales, were administered to another large sample of university students (Spielberger, Krasner, & Solomon, 1988). In the factor analyses of the AX Scale items, an Anger/Con factor was the strongest to emerge for both males and females; all eight AX/Con items had salient loadings on this factor. Well-defined Anger/In and Anger/Out factors, on which all eight AX/In and AX/Out items had salient loadings on the appropriate factor, also were found. For both genders, the AX/Con subscale correlated negatively with AX/Out ($r = -.59$ and $-.58$ for males and females, respectively). Correlations of the AX/In subscale with the AX/Out subscale were essentially zero for both genders. The independence of the AX/In and AX/Out subscales, and moderately high negative correlations of the AX/Con and AX/Out subscales, have been demonstrated consistently (Pollans, 1983; Spielberger, 1988; Spielberger et al., 1985).

Evidence of the concurrent and discriminant validity of the AX subscales is reflected in the correlations of these scales with other anger and personality measures (Spielberger, 1988). Moderately high correlations of AX/Out scores with T-Anger and T-Anger/T scores, and smaller correlations of both AX/Out and AX/In scores with T-Anger/R scores suggest that individuals who have angry temperaments are more likely to express their anger outwardly than suppress it, whereas those individuals who frequently experience anger when they are frustrated or treated unfairly are equally likely to suppress or outwardly express their anger. Small, but highly significant correlations of the AX/In and AX/Out subscales with the STPI T-Anxiety Scale suggest that individuals who suppress or express anger more often are also likely to experience anxiety more frequently than individuals with low anger expression scores. Correlations of all three anger expression measures with the STPI T-Curiosity subscale were essentially zero, providing evidence of discriminant validity.

A major reason for constructing the AX Scale was to develop an instrument that would facilitate the investigation of how various components of anger contribute to the etiology of hypertension and coronary heart disease. As previously noted, Harburg et al. (1973, 1979) and Gentry et al. (1981, 1982) reported that individuals who tend to suppress anger have

higher systolic and diastolic blood pressure, and Williams et al. (1980) found that patients with high scores on the MMPI HO Scale were more likely to develop coronary artery disease. Similarly, Dembroski, MacDougall, Williams, and Haney (1985) found that high ratings of potential for hostility and anger-in were associated positively with angiographically documented severity of coronary atherosclerosis.

Johnson (1984) administered the AX Scale to 1,114 high school students in an investigation of the relationship between anger expression and blood pressure (BP). Measures of systolic (SBP) and diastolic (DBP) blood pressure were obtained during the same class period in which these students responded to the psychological tests. The correlations of AX/In scores with SBP and DBP were positive, curvilinear, and highly significant for both genders. There was no relation between suppressed anger and BP over 60% to 80% of the range of AX/In scores, but students with very high AX/In scores had much higher BP. Because the correlations of AX/Out scores with the BP measures were quite small, the overall pattern of correlations indicates that higher blood pressure is associated with holding anger in.

Johnson (1984) also examined the influence of a number of variables that have been found to be related to BP in previous research. Height, weight, dietary factors (salt intake), racial differences, and family history of hypertension and cardiovascular disorders correlated significantly with BP, but even after partialing out the influence of these variables, the AX/In scores still were associated positively and significantly with elevated SBP and DBP. Indeed, in separate multiple regression analyses for males and females, AX/In scores were found to be better predictors of blood pressure than any other measure (i.e., the AX/In scores were first to enter step-wise multiple discriminant equations for both genders).

THE STATE-TRAIT ANGER EXPRESSION INVENTORY

The STAS and the AX Scale recently were combined to form the State-Trait Anger Expression Inventory (STAXI), which provides relatively brief, objectively scored measures of the experience, expression, and control of anger (Spielberger, 1988). The STAXI consists of 44 items, which form five primary scales and two subscales. The components of anger that are assessed by each STAXI scale are described in Table 13.1.

Fuqua et al. (1991) recently administered the STAXI to a large sample of college students and factor analyzed their responses to the 44 individual items. The results of this analysis led these investigators to conclude: "... that seven factors provided the best fit of the data to the instrument and its theoretical foundations" (1991, p. 442). Four of the factors extracted by Fuqua et al. corresponded almost exactly to four of the five primary STAXI scales; the items from the STAXI T-Anger Scale loaded on two separate factors that corresponded exactly to the T-Anger Temperament and Reaction subscales.

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/T, and T-Anger/R. Almost all of the items in the corresponding STAXI scales had salient loadings on the appropriate factor and negligible loadings on the other factors. Thus, six of the seven factors identified by Fuqua et al. (1991) corresponded with the components of anger measured by the STAXI scales. These findings provide strong confirmation from the factor structure of the STAXI that the subscales of the inventory measure meaningful, relatively independent components of the experience, expression, and control of anger.

The seventh factor identified by Fuqua et al. (1991) was defined by secondary, but salient loadings for 3 of the 10 STAXI S-Anger items (Feel like . . . breaking things, . . . banging

TABLE 13.1
Definitions of the Components of Anger Assessed by the Subscales of the State-Trait Anger
Expression Inventory¹

<i>Scale</i>	<i>Anger Component Measured by Each STAXI Scale</i>
S-Anger 10 items	An emotional state marked by subjective feelings that vary in intensity, from mild annoyance or irritation to intense fury and rage, accompanied by activation of the autonomic nervous system. The intensity of S-Anger varies as a function of perceived injustice, being attacked or treated unfairly by others, or frustration resulting from barriers to goal-directed behavior.
T-Anger 10 items	Individual differences in anger proneness, that is, the tendency to perceive a wide range of situations as annoying or frustrating, and to respond with elevations in S-Anger. High T-Anger individual's experience S-Anger more often and with greater intensity than persons low in T-Anger. T-Anger/T (4 items): Individual differences in a general disposition to experience anger with little or no specific provocation. T-Anger/R (4 items): Individual differences in the disposition to feel angry when criticized or treated unfairly.
AX/In: 8 items	Individual differences in the frequency that angry feelings are experienced, but held in or suppressed.
AX/Out: 8 items	Individual differences in the frequency that feelings of anger are expressed in aggressive behavior directed toward other people or objects in the environment.
AX/Con: 8 items	Individual differences in the frequency that an individual attempts to control the outward expression of angry feelings.
AX/Ex: 24 items	This measure provides a general index of the frequency that anger is experienced and expressed, irrespective of the direction of expression.

¹Adapted from the Professional Manual for the *State-Trait Anger Expression Inventory: Revised Research Edition* (Spielberger, 1988, p. 1), with the permission of Psychological Assessment Resources, Inc. (PAR).

on the table, . . . hitting someone). Although these items all had higher loadings on the original S-Anger factor, the findings of Fuqua et al. nevertheless suggest that there may be a second S-Anger factor. The content of the three items with salient loadings on this factor seem to reflect high levels of S-Anger that may provide strong instigation to the expression of anger in aggressive behavior.

van der Ploeg (1988) administered a Dutch adaptation of the 20-item State-Trait Anger Scale (STAS) to male military draftees in The Netherlands. In separate analyses of the 10 S-Anger and 10 T-Anger items that comprise the STAS, two T-Anger and two S-Anger factors were found. van der Ploeg's two T-Anger factors were essentially the same as the STAS T-Anger Temperament and Reaction factors that have been reported consistently in studies of American subjects (Spielberger, 1988); his two S-Anger factors were quite similar to those reported by Fuqua et al. (1991). Thus, there appear to be two meaningful facets of state anger, but further research is required to clarify the nature of these S-Anger components.

GUIDELINES FOR INTERPRETING SCORES ON THE STAXI

The STAXI has proved useful for assessing the experience, expression, and control of anger in normal and abnormal individuals (Deffenbacher, 1992; Moses, 1992), and for evaluating

the role of these anger components in a variety of disorders, including alcoholism, hypertension, coronary heart disease, and cancer (Spielberger, 1988). Comparing STAXI test scores with appropriate scale norms is an important step in test interpretation. Norms for the STAXI scales are reported in the test manual for male and female high school and college students and working adults (Spielberger, 1988). In addition, there are norms for the following special interest groups: general medical and surgical patients, prison inmates, and military recruits.

The distributions of scores on the S-Anger and T-Anger/T Scales are positively skewed, which prevents these scales from effectively discriminating among respondents with low scores. However, low scores on the other STAXI scales may provide useful information that contributes to understanding the personality dynamics of an individual with such scores. Individuals who score below the 25th percentile on the T-Anger, AX/Out, and AX/In Scales generally experience, express, or suppress relatively little anger. However, low scores on these scales when AX/Con scores are very high may indicate excessive use of denial and repression to protect an individual from experiencing unacceptable angry feelings.

General guidelines for interpreting high scores for each of the STAXI scales are provided in Table 13.2. Percentile ranks reported in the STAXI manual corresponding to STAXI scale scores (Spielberger, 1988) indicate how a particular person compares with other individuals who are similar in age and gender. Scores between the 25th and 75th percentiles on individual STAXI scales fall in what may be considered the normal range. Although individuals with scale scores that approach the 75th percentile are more prone to experience, outwardly express, or suppress anger than those with scores below the median, such differences generally are not sufficient to detect persons whose anger problems may predispose them to develop physical or psychological disorders (Spielberger, 1988).

Individuals with anger scores above the 75th percentile are likely to experience and/or express angry feelings to a degree that may interfere with optimal functioning. The anger of these individuals may contribute to difficulties in interpersonal relationships or dispose them to develop psychological or physical disorders. High AX/In scores, especially when associated with low AX/Out scores and high levels of anxiety, have been found to be associated with elevated blood pressure (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 STAS and the AX Scales have been used extensively in research on the relationship between anger and health (Brooks, Walfish, Stenmark, & Canger, 1981; Cavanaugh, Kanonchoff, & Bartels, 1987; Johnson & Broman, 1987; Johnson-Saylor, 1984; Schlosser, 1986; Vitaliano, 1984; Vitaliano et al., 1986). With the development of the improved STAXI measures to assess the experience and expression of anger, suppressed anger has been identified consistently as an important factor in elevated BP and hypertension (Crane, 1981; Deshields, 1986; Gorkin, Appel, Holroyd, Saab, & Stauder, 1986; Hartfield, 1985; Johnson, 1985; Johnson, Spielberger, Worden, & Jacobs, 1987; Kearns, 1985; Schneider, Egan, & Johnson, 1986; Spielberger et al., 1985, 1988; van der Ploeg, van Buuren, & van Brummelen, 1988).

McMillan (1984) used the STAXI scales to assess the anger experienced by patients undergoing treatment for Hodgkins disease and lung cancer. The STAXI scales also have been used to examine relationships between hardiness, well-being, and coping with stress (Schlosser & Sheeley, 1985a, 1985b), and to investigate the role of anger in Type-A behavior (Booth-Kewley & Friedman, 1987; Croyle, Jemmott, & Carpenter, 1988; Goffaux, Wallston, Heim, & Shields, 1987; Herschberger, 1985; Janisse, Edguer & Dyck, 1986; Krasner, 1986; Spielberger et al., 1988).

Kinder and his colleagues (Curtis, Kinder, Kalichman, & Spana, 1988; Kinder, Curtis, & Kalichman, 1986) used the STAXI scales in a series of studies of psychological factors that

TABLE 13.2
Guidelines for Interpreting High STAXI Scores.¹

Scale	Characteristics of Persons With High Scores
S-Anger	Individuals with high scores are experiencing relatively intense angry feelings at the time the test was administered. If S-Anger is elevated relative to T-Anger, the individuals's angry feelings are likely to be determined situationally. Elevations in S-Anger are more likely to reflect chronic anger if T-Anger and AX/In scores are also high.
T-Anger	High T-Anger individuals frequently experience angry feelings, especially when they feel they are treated unfairly by others. Whether persons high in T-Anger suppress, express, or control their anger can be inferred from their scores on the AX-In, AX/Out, and AX/Con Scales.
T-Anger/T	Persons with high T-Anger/T scores are quick tempered and readily express their anger with little provocation. Such individuals are often impulsive and lacking in anger control. High T-Anger/T individuals who have high AX/Con scores may be strongly authoritarian and use anger to intimidate others.
T-Anger/R	Persons with high T-Anger/R scores are highly sensitive to criticism, perceived affronts, and negative evaluation by others. They frequently experience intense feelings of anger under such circumstances.
AX/In	Persons with high AX/In scores frequently experience intense angry feelings, but tend to suppress these feelings rather than express them in either physical or verbal behavior. Persons with high AX/In scores who also have high AX/Out scores may express their anger in some situations, whereas suppressing it in others.
AX/Out	Persons with high AX/Out scores frequently experience anger, which they express in aggressive behavior. Anger-out may be expressed in physical acts, such as assaulting other persons or slamming doors; or verbally, in the form of criticism, sarcasm, insults, threats, and extreme use of profanity.
AX/Con	Persons with high scores on the AX/Con Scale tend to invest a great deal of energy in monitoring and preventing the expression of anger. Although controlling anger is certainly desirable, the overcontrol of anger may result in passivity and withdrawal. Persons with high AS/Con and high T-Anger scores also may experience anxiety and depression.

¹Adapted from Table 4 of the Professional Manual for the *State-Trait Anger Expression Inventory: Revised Research Edition* (Spielberger, 1988, p. 5), with the permission of Psychological Assessment Resources, Inc. (PAR).

contribute to chronic pain, and Stoner (1988) investigated the effects of marijuana use on the experience and expression of anger. The STAXI scales also have been used in research on the effects of situational factors on the experience and expression of anger (Aragona, 1983; Bromet & Leonard, 1987; Buck, 1987; Pape, 1986).

Assessment of Emotions in Treatment Planning

The *DSM-III-R* provides criteria for diagnosing anxiety disorders (American Psychiatric Association, 1987), but no such attention has been given to the classification of problems with anger (Deffenbacher, 1992). Nevertheless, the assessment of both anger and anxiety is essential in planning an effective treatment program, and in evaluating the relative efficacy of different forms of behavioral and pharmacological interventions. Because the management of

anxiety and anger during treatment is among the chief concerns of most psychotherapists and counselors, the valid assessment of these emotions can facilitate the treatment process (Deffenbacher, Demm, & Brandon, 1986; Spielberger et al., 1985). Consequently, obtaining reliable and valid measures of state and trait anxiety, and carefully assessing the experience, expression, and control of anger, are essential in selecting an optimal form of treatment, monitoring the treatment process, and evaluating treatment outcome.

ASSESSING ANXIETY IN TREATMENT PLANNING AND EVALUATION

Symptoms of anxiety typically are found in almost all emotional disorders. From a psychoanalytic perspective, Freud (1936) regarded anxiety as the "fundamental phenomenon and the central problem of neurosis" (p. 85), as was noted previously. According to de la Torre (1979), dealing with transitory anxiety (S-Anxiety) is also 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, such as test anxiety. Diverse manifestations of anxiety in various physical and psychological disorders generally require different forms of treatment, as de la Torre (1979) 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)

The STAI has been used to assess state and trait anxiety in more than 6,000 investigations, including psychological and pharmacological treatment studies of psychiatric, psychosomatic, and medical patients (Spielberger, 1989). The assessment of anxiety as a personality trait (T-Anxiety) is especially important in evaluating treatment outcomes in phobias (Foa & Kozak, 1985), and in panic and generalized anxiety disorders (Barlow, 1985). Careful assessment of anxiety is also essential in applications of systematic desensitization to the treatment of phobic patients, and in clients with conditioned aversion reactions (Suinn & Deffenbacher, 1988).

The STAI also has been used extensively in test anxiety treatment studies. Test anxious individuals manifest high levels of S-Anxiety during examinations, which contributes to impaired test performance (Spielberger, Anton, & Bedell, 1976). It has been demonstrated that systematic desensitization, rational-emotive therapy, cognitive-behavioral interventions, and even relaxation training are all successful in reducing S-Anxiety in testing situations. However, cognitive treatment strategies appear to be more effective for reducing both test anxiety and T-Anxiety levels in test anxious students (Spielberger et al., 1976).

ASSESSING ANGER IN TREATMENT PLANNING AND EVALUATION

Deffenbacher (1992) reported research findings from a series of studies that have important implications for clinical assessment and treatment. In these studies, high T-Anger subjects experienced heightened S-Anger and physiological arousal in ongoing situations on a daily basis, which could be targeted for behavioral treatment such as relaxation training and coping skills programs (Deffenbacher et al., 1986; Deffenbacher & Stark, 1990; Hazaleus & Deffen-

bacher, 1986). By helping clients learn to lower anger by engaging in self-initiated relaxation exercises, successful treatment would free them to use more effective problem-solving and social skills that were previously disrupted by unpleasant and distracting physiological arousal associated with heightened states of anger.

Deffenbacher's (1992) consistent finding that high T-Anger individuals experience anger across a wide range of ongoing daily situations has important implications for clinical treatment. His research suggested that emotional states of anger can be conceptualized as a complex cognitive-physiological phenomenon embedded in a specific situational context. Effective treatment requires that all aspects of this phenomenon be assessed carefully, along with the behaviors triggered by or associated with anger. Deffenbacher recommended that a number of different measurement strategies be used in assessing anger, such as interviewing, role plays, and self-monitoring so that the range of real and potential sources of anger may be mapped. He further suggested that, in the later stages of therapy, it may be appropriate to use self-monitoring measures of S-Anger, along with role-play simulations to provide opportunities for assessment, rehearsal, and transfer of skills and insights.

The observed tendency for high T-Anger individuals to suppress anger and/or express it in less-controlled, socially desirable ways requires careful clinical assessment in treatment programs. As previously noted, Deffenbacher (1992) found that high T-Anger individuals reported strong tendencies toward verbal and physical antagonism and less constructive behavior, which suggested that these individuals are generally more abrupt, abrasive, and intimidating. The verbal and nonverbal cues associated with such behavior may elicit anger in others, leading them to withdraw or counterattack—the latter response is likely to stimulate further anger and aggression in the high T-Anger individual. Effective treatment will require raising the high T-Anger person's awareness of this vicious cycle, and then training him or her to control the tendency to counterattack.

Assessment of when, where, and why clients employ different anger expression strategies not only will contribute to clarifying the nature of anger and its expression, but also will help identify adaptive strategies that can be used effectively in angering situations. High T-Anger individuals seem to interpret many situations as insulting and frustrating (Beck, 1976) and maladaptive anger is related to serious personality problems, including difficulties in interpersonal relationships and many health-related disorders (Hazaleus & Deffenbacher, 1985; Hogg & Deffenbacher, 1986; Story & Deffenbacher, 1985; Zwemer & Deffenbacher, 1984). Therefore, effective strategies for controlling anger are urgently needed in treatment planning (Deffenbacher, 1992).

Effective treatment of anger-related problems requires detailed knowledge concerning an individual's experience of both state and trait anger and modes of anger expression (Sharkin, 1988). Careful assessment of the experience, expression, and control of anger is not only essential for understanding problems that are rooted in anger, but assessment is also a necessary first step in treatment planning. Because of the multidimensionality of anger, multifaceted interventions are likely to be required to produce beneficial treatment outcomes (Deffenbacher, 1991; Novaco, 1979).

According to Deffenbacher (1992), therapeutic strategies for dealing with anger and anxiety should include psychodynamic, self-explorative, behavioral, and cognitive interventions to help patients perceive the world as less threatening. If successful, such interventions will help patients feel less vulnerable, thereby reducing personal frustration and decreasing the intensity and frequency of angry reactions. Research evidence indicates that relaxation exercises, social skills training, and cognitive-behavioral interventions have proved effective in decreasing levels of anxiety and anger (Deffenbacher et al., 1986; Deffenbacher, Story, Stark, Hogg, & Brandon, 1987).

Research with the STAI and, more recently, with the STAXI and its subscales provides encouraging evidence of the utility of these inventories in treatment planning, and in the evaluation of treatment process and outcome. In a recent comprehensive evaluation and critique, Moses (1992) concluded that the STAXI is a "specific, sensitive, psychometric instrument," and that:

If future applications of the STAXI are as experimentally rigorous as the development of this measure, there is great potential for its use to significantly further our understanding of important stress-based and stress-influenced syndromes and to help in identifying effective means by which such disorders may be reversed and prevented. (1992, p. 524)

Summary

Recent advances in the conceptualization of anxiety and anger have stimulated the development of improved instruments for the measurement of these emotions. Early theories of anxiety; the concepts of state and trait anxiety; and conceptual ambiguity and confusion in current theoretical interpretations of anger, hostility, and aggression were examined. A number of techniques and procedures that have been developed to assess anxiety were discussed, and the construction and validation of a psychometric inventory designed to assess state and trait anxiety was reviewed. The research literature on the expression of anger was examined, and the procedures employed in developing and validating a new psychometric instrument for measuring the experience, expression, and control of anger were described in detail. The chapter concludes with a discussion of issues concerning the utilization of measures of anxiety and anger in treatment planning, and in the evaluation of therapeutic interventions with individuals experiencing anger-related problems.

References

- Alexander, F. G. (1939). Emotional factors in essential hypertension: Presentation of a tentative hypothesis. *Psychosomatic Medicine*, 1, 175-179.
- Alexander, F. G. (1948). Emotional factors in hypertension. In F. Alexander & T. M. French (Eds.), *Studies in psychosomatic medicine: An approach to the cause and treatment of vegetative disturbances* (pp. 289-97). New York: Ronald.
- Alexander, F. G., & French, T. M. (Eds.). (1948). *Studies in psychosomatic medicine: An approach to the cause and treatment of vegetative disturbances*. New York: Ronald.
- American Psychiatric Association. (1987). *Diagnostic and statistical manual (DSM-III-R)* (3rd ed., rev.). Washington, DC: American Psychiatric Association.
- Aragona, J. C. (1983). Physical child abuse: An interactional analysis (Doctoral dissertation, University of South Florida, Tampa, 1983). *Dissertation Abstracts International*, 44, 1225B.
- Arnold, M. B. (1960). *Emotion and personality: Volume I. Psychological aspects*. New York: Columbia University Press.
- Atkinson, J. (1964). *An introduction to motivation*. Princeton: Van Nostrand-Reinhold.
- Averill, J. R. (1982). *Anger and aggression: An essay on emotion*. New York: Springer-Verlag.
- Barker, B. M., Barker, H. R., & Wadsworth, A. P., Jr. (1977). Factor analysis of the items of the State-Trait Anxiety Inventory. *Journal of Clinical Psychology*, 33, 450-455.
- Barker, L. R. (1979). *Personality variables as determinants of performance problems of re-*

- cruits in the U.S. armed forces. Unpublished master's thesis, University of South Florida, Tampa.
- Barlow, D. H. (1985). The dimensions of anxiety disorders. In A. H. Tuma & J. D. Maser (Eds.), *Anxiety and the anxiety disorders* (pp. 479-500). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Beck, A. (1976). *Cognitive therapy and the emotional disorders*. New York: International Universities Press.
- Bendig, A. W. (1962). Factor analytic scales of covert and overt hostility. *Journal of Consulting Psychology*, 26, 200.
- Biaggio, M. K. (1980). Assessment of anger arousal. *Journal of Personality Assessment*, 44, 289-298.
- Biaggio, M. K., & Maiuro, R. D. (1985). Recent advances in anger assessment. In C. D. Spielberger & J. N. Butcher (Eds.), *Advances in personality assessment* (Vol. 5, pp. 71-111). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Biaggio, M. K., Supplee, K., & Curtis, N. (1981). Reliability and validity of four anger scales. *Journal of Personality Assessment*, 45, 639-648.
- Booth-Kewley, S., & Friedman, H. S. (1987). Psychological predictors of heart disease: A quantitative review. *Psychological Bulletin*, 101, 343-362.
- Borkovec, T. D., Weerts, T. C., & Bernstein, D. A. (1977). Assessment of anxiety. In A. R. Ciminero, K. S. Calhoun, & H. E. Adams (Eds.), *Handbook of behavioral assessment* (pp. 367-428). New York: Wiley.
- Bromet, E., & Leonard, K. (1987). *Psychological effects of lead exposure*. Unpublished manuscript, University of Pittsburgh, Western Psychiatric Institute and Clinic.
- Brooks, M. L., Walfish, S., Stenmark, D. E., & Canger, J. M. (1981). Personality variables in alcohol abuse in college students. *Journal of Drug Education*, 11, 185-189.
- Buck, D. K. (1987). *The impact of parental divorce on levels of anger and anxiety in young adults in comparison to young adults whose parents are not divorced*. Unpublished master's thesis, Ohio University, Athens.
- Buss, A. H. (1961). *The psychology of aggression*. New York: Wiley.
- Buss, A. H., & Durkee, A. (1957). An inventory for assessing different kinds of hostility. *Journal of Consulting Psychology*, 21, 343-349.
- Caine, T. M., Foulds, G. A., & Hope, K. (1967). *Manual of the hostility and direction of hostility questionnaire (HDHQ)*. London: University of London Press.
- Campbell, D. T. (1963). Social attitudes and other acquired behavioral dispositions. In S. Koch (Ed.), *Psychology: A study of a science* (Vol. 6, pp. 94-172). New York: McGraw-Hill.
- Cattell, R. B. (1966). Patterns of change: Measurement in relation to state-dimension, trait change, lability, and process concepts. In R. B. Cattell (Ed.) *Handbook of multivariate experimental psychology* (pp. 355-408). Chicago: Rand McNally.
- Cattell, R. B., & Scheier, I. H. (1958). The nature of anxiety: A review of thirteen multivariate analyses comprising 814 variables. *Psychological Reports*, 4, 351.
- Cattell, R. B., & Scheier, I. H. (1961). *The meaning and measurement of neuroticism and anxiety* (pp. 57, 182). New York: Ronald.
- Cattell, R. B., & Scheier, I. H. (1963). *Handbook for the IPAT Anxiety Scale* (2nd ed.). Champaign, IL: Institute for Personality and Ability Testing.
- Cavanaugh, D. J., Kanonchoff, A. D., & Bartels, R. L. (1987). *Menstrual irregularities in athletic women may be predictable based on pre-training menses*. Unpublished manuscript, Ohio State University, Department of Work Psychology, Columbus.
- Cook, W. W., & Medley, D. M. (1954). Proposed hostility and pharisaic-virtue scales for the MMPI. *The Journal of Applied Psychology*, 38, 414-418.
- Crane, R. S. (1981). The role of anger, hostility, and aggression in essential hypertension (Doctoral dissertation, University of South Florida, Tampa, FL, 1981). *Dissertation Abstracts International*, 42, 2982B.
- Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, 16, 297-335.
- Croyle, R. T., Jemmott, J. B. III, & Carpenter, B. D. (1988). Relations between four individual difference measures associated with cardiovascular dysfunction and anger coping style. *Psychological Reports*, 63, 779-786.
- Curtis, G., Kinder, B., Kalichman, S., & Spana, R. (1988). Affective differences among sub-

- groups of chronic pain patients. *Anxiety Research: An International Journal*, 1, 65-73.
- Darwin, C. (1965). *The expression of emotions in man and animals*. Chicago: University of Chicago Press. (Original work published in 1872).
- Deffenbacher, J. L. (1991, July). *Cognitive-behavioral approaches to general anger reduction*. Proceedings of the International Congress on Stress, Anxiety, and the Emotional Disorders, Braga, Portugal.
- Deffenbacher, J. L. (1992). Trait anger: Theory, findings, and implications. In C. D. Spielberger & J. N. Butcher (Eds.), *Advances in personality assessment* (Vol. 9, pp. 177-201). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Deffenbacher, J. L., Demm, P. M., & Brandon, A. D. (1986). High general anger: Correlates and treatment. *Behavioral Research and Therapy*, 24, 480-489.
- Deffenbacher, J. L., & Stark, R. S. (1990). *Relaxation and cognitive-relaxation treatments of general anger*. Manuscript submitted for publication, Department of Psychology, Colorado State University, Fort Collins.
- Deffenbacher, J. L., Story, D. A., Stark, R. S., Hogg, J. A., & Brandon, A. D. (1987). Cognitive-relaxation and social skills interventions in the treatment of general anger. *Journal of Counseling Psychology*, 34, 171-176.
- de la Torre, J. (1979). Anxiety states and short-term psychotherapy. In W. E. Fann, I. Karacan, A. D. Polorny, & R. L. Williams (Eds.), *Phenomenology and treatment of anxiety* (pp. 377-388). Jamaica, NY: Spectrum.
- Dembroski, T. M., MacDougall, J. M., Williams, R. B., & Haney, T. L. (1985). Components of Type A, hostility, and anger-in: Relationship to angiographic findings. *Psychosomatic Medicine*, 47, 219-233.
- Deshields, T. L. (1986). Anger and assertiveness in essential hypertension. *Dissertations Abstracts International*, 46, 3212B. (University Microfilms No. 85-24, 330.)
- Duffy, F. (1941). An explanation of "emotional" phenomena without the use of the concept "emotion." *Journal of General Psychology*, 25, 283-293.
- Evans, D. R., & Stangeland, M. (1971). Development of the reaction inventory to measure anger. *Psychological Reports*, 29, 412-414.
- Eysenck, H. J., & Eysenck, S. B. G. (1975). *Manual of the Eysenck Personality Questionnaire*. London: Hodder and Stroughton.
- Foa, E. B., & Kozak, M. J. (1985). Treatment of anxiety disorders: Implications for psychopathology. In A. H. Tuma & J. D. Maser (Eds.), *Anxiety and the anxiety disorders* (pp. 421-452). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Freud, S. (1924). *Collected papers* (Vol. 1). London: Hogarth.
- Freud, S. (1936). *The problem of anxiety*. New York: W. W. Norton.
- Funkenstein, D. H., King, S. H., & Drolette, M. E. (1954). The direction of anger during a laboratory stress-inducing situation. *Psychosomatic Medicine*, 16, 404-413.
- Fuqua, D. R., Leonard, E., Masters, M. A., Smith, R. J., Campbell, J. L., & Fischer, P. C. (1991). A structural analysis of the State-Trait Anger Expression Inventory (STAXI). *Educational and Psychological Measurement*, 51, 439-446.
- Gaudry, E., & Poole, C. (1975). A further validation of the state-trait distinction in anxiety research. *Australian Journal of Psychology*, 27, 119-125.
- Gaudry, E., Spielberger, C. D., & Vagg, P. R. (1975). Validation of the state-trait distinction in anxiety research. *Multivariate Behavior Research*, 10, 331-341.
- Gentry, W. D. (1972). Biracial aggression: 1. Effect of verbal attack and sex of victim. *The Journal of Social Psychology*, 88, 75-82.
- Gentry, W. D., Chesney, A. P., Gary, H. G., Hall, R. P., & Harburg, E. (1982). Habitual anger-coping styles: I. Effect on mean blood pressure and risk for essential hypertension. *Psychosomatic Medicine*, 44, 195-202.
- Gentry, W. D., Chesney, A. P., Hall, R. P., & Harburg, E. (1981). Effect of habitual anger-coping pattern on blood pressure in black/white, high/low stress area respondents. *Psychosomatic Medicine*, 43, 88.
- Goffaux, J., Wallston, B. S., Heim, C. R., & Shields, S. L. (1987, March). *Type A behaviors, hostility, anger and exercise adherence*. Paper presented at the 8th Annual Session of the Society of Behavioral Medicine, Washington, DC.
- Gorkin, L., Appel, M., Holroyd, K. A., Saab, P. G., & Stauder, L. (1986). *Anger management style and family history status as risk factors for essential hypertension*. Un-

- published manuscript, Ohio University, Athens.
- Hamilton, M. (1959). The assessment of anxiety states by rating. *British Journal of Medical Psychology*, 32, 50.
- Harburg, E., Blakelock, E. H., & Roeper, P. J. (1979). Resentful and reflective coping with arbitrary authority and blood pressure: Detroit. *Psychosomatic Medicine*, 3, 189-202.
- Harburg, E., Erfurt, J. C., Hauenstein, L. S., Chape, C., Schull, W. J., & Schork, M. A. (1973). Socio-ecological stress, suppressed hostility, skin color, and black-white male blood pressure: Detroit. *Psychosomatic Medicine*, 35, 276-296.
- Harburg, E., & Hauenstein, L. (1980). Parity and blood pressure among four race-stress groups of females in Detroit. *American Journal of Epidemiology*, 111, 356-366.
- Harburg, E., Schull, W. J., Erfurt, J. C., & Schork, M. A. (1970). A family set method for estimating heredity and stress-I. *Journal of Chronic Disease*, 23, 69-81.
- Hartfield, M. T. (1985). Appraisals of anger situations and subsequent coping response in hypertensive and normotensive adults: A comparison (Doctoral dissertation, University of California, 1985). *Dissertation Abstracts International*, 46, 4452B.
- Hazaleus, S. L., & Deffenbacher, J. L. (1985). Irrational beliefs and anger arousal. *Journal of College Student Personnel*, 26, 47-52.
- Hazaleus, S. L., & Deffenbacher, J. L. (1986). Relaxation and cognitive treatments of anger. *Journal of Consulting and Clinical Psychology*, 54, 222-226.
- Herschberger, P. (1985). *Type A behavior in non-intensive and intensive care nurses*. Unpublished master's thesis, University of South Florida, Tampa.
- Hodges, W. F. (1976). The psychophysiology of anxiety. In M. Zuckerman & C. D. Spielberger (Eds.), *Emotions and anxiety: New concepts, methods, and applications* (pp. 175-194). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Hogg, J. A., & Deffenbacher, J. L. (1986). Irrational beliefs, depression and anger in college students. *Journal of College Student Personnel*, 27, 349-353.
- Jacobs, G. A., Latham, L. E., & Brown, M. S. (1988). Test-retest reliability of the State-Trait Personality Inventory and the Anger Expression Scale. *Anxiety Research*, 1, 263-265.
- Janisse, M. P., Edgner, N., & Dyck, D. G. (1986). Type A behavior, anger expression, and reactions to anger imagery. *Motivation and Emotion*, 10, 371-385.
- Johnson, E. H. (1984). *Anger and anxiety as determinants of elevated blood pressure in adolescents*: Unpublished doctoral dissertation, University of South Florida, Tampa.
- Johnson, E. H., & Broman, C. L. (1987). The relationship of anger expression to health problems among Black Americans in a national survey. *Journal of Behavioral Medicine*, 10, 103-169.
- Johnson, E. H., Spielberger, C., Worden, T., & Jacobs, G. (1987). Emotional and familial determinants of elevated blood pressure in black and white adolescent males. *Journal of Psychosomatic Research*, 31, 287-300.
- Johnson-Saylor, M. T. (1984). *Relationships among anger expression, hostility, hardiness, social support, and health risk*. Unpublished doctoral dissertation, University of Michigan, Ann Arbor.
- Kearns, W. D. (1985). *A laboratory study of the relationship of mode of anger expression to blood pressure*. Unpublished master's thesis, University of South Florida, Tampa.
- Kendall, P. C., Finch, A. J., Jr., Auerbach, S. M., Hooke, J. F., & Mikulka, P. J. (1976). The State-Trait Anxiety Inventory: A systematic evaluation. *Journal of Consulting and Clinical Psychology*, 44, 406-412.
- Kinder, B., Curtis, G., & Kalichman, S. (1986). Anxiety and anger as predictors of MMPI elevations in chronic pain patients. *Journal of Personality Assessment*, 50, 651-661.
- Knight, R. G., & Chisholm, B. J., Paulin, J. M., & Waal-Manning, H. J. (1988). The Spielberger Anger Expression Scale: Some psychometric data. *Journal of Clinical Psychology*, 27, 279-281.
- Krasner, S. S. (1986). *Anger, anger control, and the coronary prone behavior pattern*. Unpublished master's thesis, University of South Florida, Tampa.
- Lader, M. (1975). Psychophysiological parameters and methods. In L. Levi (Ed.), *Emotions: Their parameters and measurement* (pp. 341-367). New York: Raven.
- Lazarus, R. S., Deese, J., & Osler, S. F. (1952). The effects of psychological stress upon per-

- formance. *Psychological Bulletin*, 49, 293-317.
- Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. New York: Springer.
- Lazarus, R. S., & Opton, E. M., Jr. (1966). The study of psychological stress. In C. D. Spielberger (Ed.), *Anxiety and behavior* (pp. 225-262). New York: Academic Press.
- Levitt, E. E. (1980). *The psychology of anxiety* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Martin, I. (1973). Somatic reactivity: Methodology. In H. J. Eysenck (Ed.), *Handbook of abnormal psychology* (2nd ed., pp. 417-456). San Diego, CA: Knapp.
- McMillian, S. C. (1984). *A comparison of levels of anxiety and anger experienced by 2 groups of cancer patients during therapy for Hodgkin's disease and small cell lung cancer*. Unpublished master's thesis, University of South Florida, Tampa.
- McReynolds, P. (1968). The assessment of anxiety: A survey of available techniques. In P. McReynolds (Ed.), *Advances in psychological assessment* (Vol. 1, pp. 244-264). Palo Alto, CA: Science and Behavior Books.
- Moses, J. A. (1992). *State-Trait Anger Expression Inventory, research edition*. In D. J. Keyser & R. C. Sweetland (Eds.), *Test critiques* (Vol. 9, pp. 510-525). Austin, TX: PRO-ED.
- Novaco, R. W. (1975). *Anger control: The development and evaluation of an experimental treatment*. Lexington, MA: Lexington Books/D. C. Heath.
- Novaco, R. W. (1979). The cognitive regulation of anger and stress. In P. C. Kendall & S. D. Hollon (Eds.), *Cognitive behavioral interventions, theory, research, and procedures* (pp. 241-285). New York: Academic Press.
- Pape, N. E. (1986). Emotional reactions and anger coping strategies of anger suppressors and expression (Doctoral dissertation, University of South Florida, Tampa, 1986). *Dissertation Abstracts International*, 47, 2627B.
- Plutchik, R. (1962). *The emotions*. New York: Random House.
- Pollans, C. H. (1983). *The psychometric properties and factor structure of the Anger Expression (AX) Scale*. Unpublished master's thesis, University of South Florida, Tampa.
- Rosenzweig, S. (1976). Aggressive behavior and the Rosenzweig picture frustration study. *Journal of Clinical Psychology*, 32, 885-891.
- Rosenzweig, S. (1978). *The Rosenzweig Picture-Frustration (P-F) Study basic manual and adult form supplement*. St. Louise, MO: Rana.
- Russell, S. F. (1981). *The factor structure of the Buss-Durkee hostility inventory*. Unpublished master's thesis, University of South Florida, Tampa.
- Schlosser, M. B. (1986, August). *Anger, crying, and health among females*. Paper presented at the 94th annual convention of the American Psychological Association, Washington, DC.
- Schlosser, M. B., & Sheeley, L. A. (1985a, August). *The hardy personality: Females coping with stress*. Paper presented at the 93rd annual convention of the American Psychological Association, Los Angeles, CA.
- Schlosser, M. B., & Sheeley, L. A. (1985b, August). *Subjective well-being and the stress process*. Paper presented at the 93rd annual convention of the American Psychological Association, Los Angeles, CA.
- Schneider, R. H., Egan, B., & Johnson, E. H. (1986). Anger and anxiety in borderline hypertension. *Psychosomatic Medicine*, 48, 242-248.
- Schultz, S. D. (1954). A differentiation of several forms of hostility by scales empirically constructed from significant items on the MMPI. *Dissertation Abstracts*, 17, 717-720.
- Sharkin, B. S. (1988). Treatment of client anger in counseling. *Journal of Counseling and Development*, 66, 361-365.
- Siegel, S. (1956). The relationship of hostility to authoritarianism. *Journal of Abnormal and Social Psychology*, 52, 368-373.
- Spielberger, C. D. (1966). Theory and research on anxiety. In C. D. Spielberger (Ed.), *Anxiety and behavior* (pp. 3-20). New York: Academic Press.
- Spielberger, C. D. (1972a). Anxiety as an emotional state. In C. D. Spielberger (Ed.), *Anxiety: Current trends in theory and research* (Vol. 1, pp. 24-49). New York: Academic Press.
- Spielberger, C. D. (1972b). Current trends in theory and research on anxiety. In C. D. Spielberger (Ed.), *Anxiety: Current trends in theory and research* (Vol. 1, pp. 3-19). New York: Academic Press.
- Spielberger, C. D. (1973). *Manual for the State-Trait Anxiety Inventory for Children*. Palo Alto, CA: Consulting Psychologists Press.
- Spielberger, C. D. (1976). Stress and anxiety

- and cardiovascular disease. *Journal of the South Carolina Medical Association* X (Suppl. 15), 72, 15-22.
- Spielberger, C. D. (1977). Anxiety: Theory and research. In B. B. Wolman (Ed.), *International encyclopedia of neurology, psychiatry, psychoanalysis, and psychology* (pp. 81-84). New York: Human Sciences Press.
- Spielberger, C. D. (1979a). *Understanding stress and anxiety*. London: Harper & Row.
- Spielberger, C. D. (1979b). *Preliminary manual for the State-Trait Personality Inventory (STPI)*. Unpublished manuscript, University of South Florida, Tampa.
- Spielberger, C. D. (1980). *Preliminary manual for the State-Trait Anger Scale (STAS)*. Tampa, FL: University of South Florida, Human Resources Institute.
- Spielberger, C. D. (1983). *Manual for the State-Trait Anxiety Inventory: STAI (Form Y)*. Palo Alto, CA: Consulting Psychologists Press.
- Spielberger, C. D. (1988). *Manual for the State-Trait Anger Expression Inventory (STAXI)*. Odessa, FL: Psychological Assessment Resources.
- Spielberger, C. D. (1989). *State-Trait Anxiety Inventory: A comprehensive bibliography* (2nd ed.). Palo Alto, CA: Consulting Psychologists Press.
- Spielberger, C. D., Anton, W. D., & Bedell, J. (1976). The nature and treatment of test anxiety. In M. Zuckerman & C. D. Spielberger (Eds.), *Emotions and anxiety: New concepts, methods and applications* (pp. 317-345). New York: Lawrence Erlbaum Associates.
- Spielberger, C. D., & Gorsuch, R. L. (1966). The development of the State-Trait Anxiety Inventory. In C. D. Spielberger & R. L. Gorsuch, *Mediating processes in verbal conditioning*. Final report to the National Institutes of Health, U.S. Public Health Service on Grants MH-7229, MH-7446, and HD-947.
- Spielberger, C. D., Gorsuch, R. L., & Lushene, R. D. (1970). *STAI: Manual for the State-Trait Anxiety Inventory*. Palo Alto, CA: Consulting Psychologists Press.
- Spielberger, C. D., Jacobs, G., Russell, S., & Crane, R. (1983). Assessment of anger: The State-Trait Anger Scale. In J. N. Butcher & C. D. Spielberger (Eds.), *Advances in personality assessment* (Vol. 2, pp. 159-187). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Spielberger, C. D., Johnson, E. H., Russell, S. F., Crane, R. J., Jacobs, G. A., & Worden, T. J. (1985). The experience and expression of anger: Construction and validation of an anger expression scale. In M. A. Chesney & R. H. Rosenman (Eds.), *Anger and hostility in cardiovascular and behavioral disorders* (pp. 5-30). New York: Hemisphere.
- Spielberger, C. D., Krasner, S. S., & Solomon, E. P. (1988). The experience, expression and control of anger. In M. P. Janisse (Ed.), *Health psychology: Individual differences and stress* (pp. 89-108). New York: Springer-Verlag.
- Spielberger, C. D., Vagg, P. R., Barker, L. R., Donham, G. W., & Westberry, L. G. (1980). The factor structure of the State-Trait Anxiety Inventory. In I. G. Sarason & C. D. Spielberger (Eds.), *Stress and anxiety* (Vol. 7, pp. 95-109). Washington, DC: Hemisphere.
- Stark, R. S., & Deffenbacher, J. L. (1986, April). *General anger and self-concept*. Paper presented at Rocky Mountain Psychological Association, Denver, Colorado.
- Stoner, S. B. (1988). Undergraduate marijuana use and anger. *Journal of Psychology*, 122, 343-347.
- Story, D., & Deffenbacher, J. L. (1985, April). *General anger and personality*. Paper presented at Rocky Mountain Psychological Association, Tucson, Arizona.
- Suinn, R. M., & Deffenbacher, J. C. (1988). Anxiety management training. *The Counseling Psychologist*, 16, 31-49.
- Tavris, C. (1982). *Anger, the misunderstood emotion*. New York: Simon & Schuster.
- Taylor, J. A. (1953). A personality scale of manifest anxiety. *Journal of Abnormal Social Psychology*, 48, 285.
- Titchener, E. B. (1897). *An outline of psychology*. New York: Macmillan.
- Vagg, P. R., Spielberger, C. D., & O'Hearn, T. P., Jr. (1980). Is the State-Trait Anxiety Inventory multidimensional? *Personality and Individual Differences*, 1, 202-214.
- van der Ploeg, H. M. (1988). The factor structure of the State-Trait Anger Scale. *Psychological Reports*, 63, 978.
- van der Ploeg, H. M., van Buuren, E. T., & van Brummelen, P. (1988). The role of anger in hypertension. *Psychotherapy and Psychosomatics*, 43, 186-193.
- Vitaliano, P. P. (1984). *Identification and intervention with students at high risk for distress*

- in medical school. Unpublished doctoral dissertation, University of Washington, Seattle.
- Vitaliano, P. P., Maiuro, R. D., Russo, J., Mitchell, E. S., Carr, J. E., & van Citters, R. L. (1986). A biopsychosocial model to explain personal sources of medical student distress. *Proceedings of the 26th Annual Conference on Research in Medical Education*, 26, 228-234.
- Welsh, G. S. (1956). Factor dimensions A and R. In G. S. Welsh & W. G. Dahlstrom (Eds.), *Basic Readings on the MMPI in psychology and medicine* (pp. 264-281). Minneapolis: University of Minnesota Press.
- Westberry, L. G. (1980). *Concurrent validation of the Trait-Anger Scale and its correlation with other personality measures*. Unpublished master's thesis, University of South Florida, Tampa.
- Williams, R. B., Haney, T. L., Lee, K. L., Kong, Y., Blumenthal, J., & Whalen, R. E. (1980). Type A behavior, hostility, and coronary atherosclerosis. *Psychosomatic Medicine*, 42, 539-549.
- Wundt, W. (1896). *Outlines of psychology*. New York: Dustav E. Stechert.
- Young, P. T. (1943). *Emotion in man and animal*. New York: Wiley.
- Zelin, M. L., Adler, G., & Myerson, P. G. (1972). Anger self-report: An objective questionnaire for the measurement of aggression. *Journal of Consulting and Clinical Psychology*, 39, 340.
- Zuckerman, M. (1960). Development of an Affect Adjective Check List for the measurement of anxiety. *Journal of Consulting Psychology*, 26, 291.
- Zuckerman, M., & Biase, D. V. (1962). Replication and further data on the Affect Adjective Check List measures of anxiety. *Journal of Consulting Psychology*, 26, 291.
- Zuckerman, M., & Lubin, B. (1965). *Manual for the Multiple Affect Adjective Checklist*. San Diego, CA: Educational and Industrial Testing Service.
- Zwemer, W. A., & Deffenbacher, J. L. (1984). Irrational beliefs, anger and anxiety. *Journal of Counseling Psychology*, 31, 391-393.