

Trends in Anxiety Assessment

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Trends in anxiety assessment were established by examining the methods reported in anxiety-related papers published in three prominent behavior therapy journals from 1970 to 2002. Assessment methods were categorized using Lang's three-system concept of anxiety (P. J. Lang, 1968) as an organizational framework. Analysis of the research methods suggests two primary patterns. First, multisystem assessment declined in the last several years by comparison with previous years whereas the assessment of a single response system (typically self-report) has increased. Second, among anxiety-related papers reporting multimodal assessment, physiological assessment returned to 1970s-era frequency in recent years after an upsurge in the mid-1980s and early 1990s. Some possible interpretations and implications of these trends are discussed.

KEY WORDS: anxiety; fear; assessment; publication trends.

The anxiety⁴ construct occupies a relatively prominent place in every psychological theory of personality and psychopathology (McReynolds, 1976). Anxiety assessment traditionally has lacked uniformity and has been guided largely by the theoretical perspective of the researcher (Bernstein, Borkovec, & Coles, 1986). The view that has become most popular in the behavior therapy community is the three-system approach espoused by Lang (1968). In this view, anxiety is conceptualized as a complex and multifaceted phenomenon with relatively independent subjective, behavioral, and physiological response systems. None of the referents is considered to be primary to the anxiety response complex and no individual response system is presumed to have controlling influence over the others. Therefore, each response system is viewed as potentially important for gauging anxiety responses.

Notably, this perspective has become so imbedded in the behavioral *zeitgeist* that discussion of it often occurs without citation to the appropriate sources (Miller & Kozak, 1993).

The *subjective* system comprises verbal reports of anxiety and/or anxiety phenomena (e.g., cognitions, sensations) via related questionnaires, during clinical interviews, and during exposure to real or imagined anxiety cues. The *behavioral* system comprises overt indices of anxiety such as approach/avoidance behaviors, observable behavioral signs of anxiety/discomfort (e.g., facial expressions), and performance or behavioral deficits. The *physiological* system comprises autonomic nervous system output such as heart rate, skin conductance, respiration, blood pressure, and muscle tension (see Bernstein, Borkovec, & Coles, 1986 and McGlynn & Rose, 1998, for thorough reviews of anxiety assessment methods).

The adoption of the three-system concept had at least two prominent effects on anxiety assessment by behavioral researchers (Miller & Kozak, 1993). First, it placed the importance of gathering data regarding the physiology of anxiety on equal footing with that of gathering subjective and behavioral data. Elevated sympathetic activity, which has been included as part of the process of "anxious apprehension" (Barlow, 2002) is observed commonly in anxious individuals from clinical and nonclinical populations. The physiological component may be particularly prominent in individuals whose focal fears were acquired

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⁴Given the broad focus of this paper, "anxiety" is used here as a general term of reference for purposes of convenience. However, there are important conceptual and empirical distinctions between "anxiety" and "fear." The reader is referred elsewhere (Barlow, 2002; Craske, 1999) for cogent explications of these concepts.

via direct classical conditioning rather than by observation or by misinformation (Rachman, 1977). Second, the three-system concept provided a framework with which to understand differences in anxiety responding across response systems and across individuals. Within any single individual, anxiety response systems may be relatively different at any one time (discordance) and may change at different rates over time (desynchrony) during exposure to anxiety cues (Rachman & Hodgson, 1974). Moreover, a growing literature has indicated significant differences in response patterns across the three response systems in normal (e.g., McGlynn, Karg, & Lawyer, 2003) and clinical (Jerremalm, Jansson, & Öst, 1986; Öst, Jerremalm, & Jansson, 1984; Öst, Johansson, & Jerremalm, 1982) samples when confronting anxiety-provoking situations.

The purpose of the present research was to document historical trends in anxiety assessment by cataloguing assessment methods in anxiety-related research published in three prominent behavior therapy journals using Lang's three-system concept (Lang, 1968) as a guiding structure. This method of examining publication trends is useful for two reasons. First, evaluation of the methods used by researchers provides a sound index of researchers' behaviors vis-à-vis anxiety assessment. Second, evaluating research trends using consensually endorsed definitions and organizational frameworks provides an objective and replicable procedure for similar future comparisons.

METHOD

A computer database literature search using PsycInfo[®] was conducted with a focus on three prominent behavior therapy journals: *Behavior Therapy*, *The Journal of Behavior Therapy and Experimental Psychiatry*, and *Behaviour Research and Therapy*. These journals were selected because of their long-standing histories, their uniformly high standings in the field of behavior therapy, because they publish articles on anxiety disorders, and because they have existed from 1970 to the present. Search words entered into the database for initial article selections were: *phobia*, *phobias*, *phobic*, *fear*, and *anxiety*. Papers published in even-dated years beginning with 1970 and ending in 2002 were identified and included for analysis. Evaluating only those papers published in even-dated years provided a balance of the need for sufficient sampling of related research to make accurate judgments about publication trends with that of addressing the logistical constraints of evaluating a large number of papers in detail.

Decisions about the categorization of individual assessment measures into the three response systems were

made by two raters (the authors) prior to data collection and were guided by the categorization outlined by McGlynn and Rose (1998). Each paper was scored by analyzing the method section and categorizing it in terms of the following domains: appropriateness for analysis, type of paper (group design, single-subject design, case study, review/editorial), anxiety system assessed (subjective, behavioral, physiological), and combinations of systems assessed. Papers with a group design and the manipulation of an independent variable were pooled with the single-subject design papers to make up an "experimental" category of published papers. Papers that contained more than one experiment were counted only once and data were used from the experiment that assessed the greatest number of response systems.

The initial keyword search yielded 720 papers for analysis. To establish a reliability estimate for categorization, seventy-five papers (approximately 10%) were selected randomly and subjected to blind review by the raters. The two raters agreed on 93.75% of the domain classifications of these papers, indicating sufficient reliability. The raters discussed the relatively few inconsistencies (a primary inconsistency was in the categorization of some measures as behavioral or self-report, e.g., in the case of self-reports of behavioral events) in categorization and reached consensus regarding subsequent classifications. The remaining papers were then divided evenly between the two raters for independent analysis.

After the methods of the papers were categorized, 27 were excluded because they primarily addressed topics other than anxiety (e.g., schizophrenia, cancer pain) and 74 were excluded because they were categorized as reviews or editorials. Therefore, the methods sections of 619 papers were analyzed for anxiety assessment trends across the 32-year time period.

RESULTS

Data Analysis

The data were analyzed using a combination of chi square analyses (for trends across time) and visual inspection (for patterns within time-periods). Statistical analyses were conducted with SPSS 10.0 statistical analysis software. All data analyses for trends across time were initially analyzed across each of the nine time-periods. When analyses indicated significant differences, the nine data points were collapsed evenly into three distinct time periods, each containing three data points. Collapsing the time-periods this way allows for clearer and more substantive statements regarding trends across time that would be less

vulnerable to any “outlier” effects of any single two-year time-period. Decade 1 refers to the years spanning 1970–1980; Decade 2 refers to the years spanning 1982–1992; and Decade 3 refers to the years spanning 1994–2002. In all cases, statistically significant differences in the initial analysis were met with parallel differences when the three Decades were analyzed. Therefore, only the analyses concerning the three distinct Decades are reported here.

Analysis of Number of Response Systems Assessed

Figure 1 illustrates the proportion of papers that assessed one, two, and three response systems across the three-decade time period. A separate trend line indicates the use of multiple (i.e., either two or three) response systems. Analyses of individual trend lines indicate that significantly more papers in the Decade 3 (62.6%) reported assessing a single response system than would be expected given the frequency in Decade 1 (48%) and Decade 2 (49.5%), $\chi^2(2, 619) = 10.918, p = .004$. Two-system assessment has remained stable over the 30-year time-period, $\chi^2(2, 619) = 0.994, p = ns$. Analyses indicated also that significantly fewer papers reported assessing three response systems in Decade 3 (5.4%) given the frequency reported in Decades 1 (15.4%) and 2 (15.3%), $\chi^2(2, 619) = 13.579, p = .001$. Analyses indicated also that papers reported use of multiple anxiety measures less frequently in Decade 3 (37.4%) than would be expected given the frequency in Decade 1 (52.0%) and Decade 2 (50.5%), $\chi^2(2, 619) = 10.918, p = .004$.

When examined within the time-periods, relatively more papers reported measuring a single response system

than two response systems across all three Decades, whereas three-system assessment was relatively infrequent across all three Decades. When the proportions of papers reporting the measurement of a single response system were compared with those reporting multiple (two or three) response systems, an interesting pattern emerges. During Decades 1 and 2, similar proportions of papers reported measuring one versus multiple response systems. However, considerable separation between the proportion of papers reported one versus multiple response systems is apparent since 1994 such that fewer papers appear to report multisystem assessment.

Analysis of Assessment Systems Measured

Figure 2 illustrates the proportions of papers that assessed only one subjective, behavioral, or physiological response system among the subset of papers that assessed only one response system across the 32-year time period. The proportion of papers reporting only subjective, only behavioral, or only physiological anxiety measures differed significantly from 1970 to 2002. Among the papers assessing only one response system, significantly more used only self-report indices in Decade 3 (97.8%) than would be expected given the frequency of use in Decade 1 (84.5%) and Decade 2 (90.9%), $\chi^2(2, 333) = 13.277, p = .001$. Similarly, the use of only behavioral measures of anxiety was more frequent in Decade 1 (10.7%) than would be expected given the frequency of use in Decade 2 (5.5%) and Decade 3 (1.4%), $\chi^2(2, 333) = 9.340, p = .009$. When examined within each Decade, it is clear that subjective

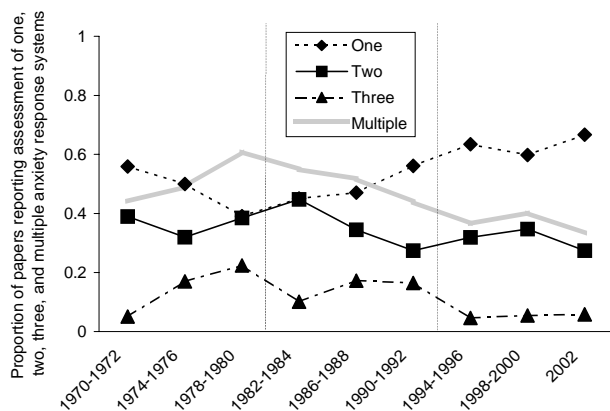


Fig. 1. Proportions of papers reporting the assessment of one, two, three, and multiple anxiety response systems among anxiety-related papers ($n = 619$) published in three behavior therapy journals from 1970 to 2002.

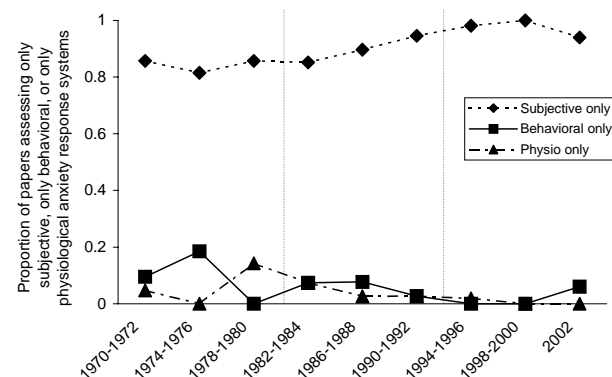


Fig. 2. Proportions of papers reporting the assessment of only subjective, only behavioral, or only physiological response systems among anxiety-related papers ($n = 333$) reporting single-system assessment in three behavior therapy journals from 1970 to 2002.

anxiety measures are preferred when a single system is assessed.

Analysis of Experimental versus Nonexperimental Reports

The analyses conducted thus far lead to two conclusions. One, the frequency with which a single response system is assessed has increased relative to previous years and relative to the frequency of assessing multiple response systems. Two, when only one system is measured, subjective measures clearly dominate over the singular assessment of behavioral or physiological anxiety measures. The possible reasons for this trend are numerous (e.g., relative accessibility and low cost of self-report measures), but one possibility is that the increasingly popular use of subjective measures in anxiety research reflects a trend toward increased use of nonexperimental methodologies. In such cases, multisystem assessment may be neither necessary nor practical (e.g., case studies, psychometric analyses of self-report instruments). As such, trends toward an increased use of nonexperimental methodologies might explain the increased use of only subjective measures in anxiety research.

To assess this possibility, a proportion was calculated (using the aforementioned criteria) to represent the percentage of anxiety-related papers published in these journals that used experimental methodologies. A decrease in the use of experimental methods that corresponds with a proportional increase in assessment using only subjective measures would suggest that the observed trends in anxiety assessment were influenced by methodological constraints. However, no differences were noted across any time-period assessed, $\chi^2(8, 619) = 7.956, p = ns$. The use of experimental versus nonexperimental methods reported in these journals has not changed dramatically over the last 32 years and, therefore, cannot account for increased use of singular self-report measures.

Analysis of Combinations of Response-System Assessment

Analysis of the data in Fig. 1 indicates that the assessment of two response systems has been relatively stable over time, but it does not provide information about which two response systems have been assessed historically. Figure 3 illustrates data germane to the combination of response systems assessed when two response systems were measured. Over time, fewer papers reported the combined use of subjective and behavioral measures in Decade 2

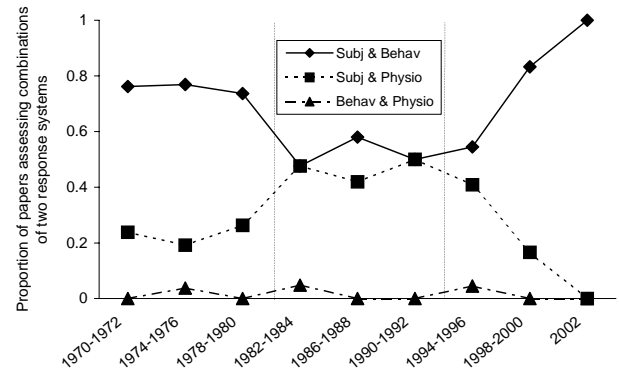


Fig. 3. Proportions of papers reporting the combined assessment of subjective, behavioral, and physiological response systems among anxiety-related papers ($n = 213$) reporting two-system assessment in three behavior therapy journals from 1970 to 2002.

(51.3%) than would be expected given the frequency reported in Decade 1 (76.6%) and Decade 3 (74.6%), $\chi^2(2, 213) = 13.163, p = .001$. In a mirror-like fashion, significantly more papers reported measuring subjective and physiological aspects of anxiety in Decade 2 (46.2%) than would be expected given the frequency reported in Decade 1 (21.9%) and Decade 3 (23.9%), $\chi^2(2, 213) = 12.398, p = .002$. The reported use of behavioral and physiological anxiety measures did not differ across the 32-year time period.

Examined visually within each Decade, a clear pattern emerges. Papers that reported using two response measures in Decade 1 were characterized by the dominant use of subjective and behavioral measures by comparison with subjective and physiological measures. By contrast, Decade 2 was characterized by relatively similar use of combined subjective/behavioral and subjective/physiological anxiety measures in these papers. In Decade 3, however, the majority of anxiety-related papers reporting two measures again used subjective and behavioral measures, whereas the proportional use of physiological measures with subjective measures was notably less and quite similar to patterns viewed in Decade 1.

DISCUSSION

This historical review of anxiety assessment methods in papers published in prominent behavior therapy journals revealed several interesting patterns. Analysis of these publication trends suggests that the “heyday” of multisystem anxiety assessment began in the mid- to late-1970s and ended prior to 1990. The early emphasis on multisystem anxiety assessment may be traced to Rachman

and Hodgson's oft-cited research review (Rachman & Hodgson, 1974) that highlighted desynchrony and discordance among anxiety-response measures and to an emphasis on the heterogeneity of anxiety symptom presentations (Wolpe, 1977). Attention to the implications of such assertions certainly would have entailed the measurement of multiple response systems. However, explanations for the overall decrease in multisystem assessment in more recent years are less obvious. This trend cannot be explained by co-occurring trends in the publication of nonexperimental research that might explain an increased use of only self-report anxiety measures.

Barlow and Maser's observation (Barlow & Maser, 1984) that "... there is an increasing development of behavioral and physiological measures and decreasing reliance on self-report . . . to determine the core components of the [anxiety] response" (p. 345-346) appears to correspond with the data reported here for that time-period. These patterns, however, have not continued into more recent years. One conclusion that may be drawn is that experimental findings in anxiety research are based increasingly on data regarding only subjective reports of anxiety. The use of self-report data in psychological research has a long and controversial history. Self-reports of anxiety can provide important data about both objective (e.g., frequency of a behavior) and subjective (e.g., how anxious one "feels") aspects of anxiety (Bellack & Hersen, 1977). However, many behavioral researchers hesitate to rely solely on self-report methods given the historically relevant position (e.g., Watson, 1913) that subjective reports of anxiety phenomena are inferior to more objective and externally valid behavioral measures.

The data presented here provide an interesting perspective of trends in the assessment of the physiological anxiety responses. One possible source of the increased use of physiological measures of anxiety (in conjunction with subjective measures) in the early 1980s is Lang's well-received information processing perspective of fear responding (Lang, 1977). From this perspective, the physiological response is viewed to be acutely important for understanding the anxiety reduction process during exposure to anxiety-provoking imagery. Another possible source for the initial increase in physiological assessment may be changes in technology. Although physiological assessment has been part-and-parcel of behavior therapy for some time (e.g., Agras, Leitenberg, & Barlow, 1968), technological advances may have made physiological assessment increasingly available to researchers as an assessment alternative.

However, the relatively strong decrease of physiological assessment in recent years is striking. Like the use of self-reports, physiological assessment has not received

uniform acceptance in the behavior therapy community. Researchers' concerns have mainly been practical in nature, focusing on the reliability of physiological measurement (Arena, Blanchard, Andrasik, Cotch, & Myers, 1983; Holden & Barlow, 1986) and/or concerns that physiological correlates of anxiety phenomena (e.g., panic attacks, traumatic memories, phobic responses) are not uniform (Orr & Roth, 2000). These concerns may be well placed and reasonable, but physiological assessment may provide useful data beyond those obtained by subjective or behavioral methods. Several reports indicate that physiological data can aid in the diagnostic classification of posttraumatic stress disorder (Keane et al., 1998; Orr & Kaloupek, 1997; Prins, Kaloupek, & Keane, 1995) and in the subtype classification of panic (Schmidt, Forsyth, Santiago, & Trakowski, 2002). In addition, assessing the physiological components of anxiety may provide important decision-making information regarding treatment components that will be most efficacious for reducing target symptoms associated with anxiety disorders (e.g., Öst et al., 1982, 1984). It is difficult to predict if the pattern of relative infrequency of physiological assessment of anxiety seen here will continue. Similar analyses of future research trends will be useful to determine if this is the case. Nonetheless, wariness about physiological assessment and a historical preference for objective assessment may explain the popular return of the combined use of subjective and behavioral measures when two anxiety response systems are assessed (Fig. 3).

There are several limitations to this particular study that preclude unqualified interpretations about the trends noted. Although the use of experimental methodologies may not be able to explain changes in assessment patterns over time, there are other methodological issues that are equally important to consider. For example, the papers considered in these analyses included a variety of methodological approaches (e.g., treatment outcome, survey research) and subject matter (e.g., most of the anxiety disorders and various anxiety-related phenomena). The amalgamation of publications with such broad foci might have masked substantively different trends that would be apparent had a more selective focus been employed. Moreover, not every anxiety research study warrants the assessment of subjective, behavioral, and physiological response systems. The selection of assessment measures must be guided by the experimental question at hand and practical considerations of the research. However, the purpose of this analysis was to provide a broad characterization of anxiety assessment, and no effort was made to characterize specific literatures. Future research might consider similar analyses of publications with foci on certain anxiety disorders (e.g., panic, phobic disorders), methodologies

(experimental psychopathology, treatment outcome), or populations (e.g., clinical, human-analogue).

In spite of the potential limitations of this research, these data have provided a broad picture of trends in anxiety assessment in behaviorally oriented research publications. Hopefully, the data reported here will prompt some discussion and methodological considerations for future research. Until then, behavioral researchers and clinicians might take note of a particularly noteworthy aspect of the data reported here. Despite the progress of behavior therapy in the last three decades and the widespread adoption of Lang's three-system conceptualization of anxiety (Lang, 1968), anxiety assessment in 2002 differs little from that in 1970.

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