Chapter 4

Self-Assessment: From Research Focus to Research Tool

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This chapter is a review of issues that must be addressed when self-assessment is the focus of research or the research method. The strengths and limitations of self-assessment are discussed in relation to recent efforts and future needs in rehabilitative audiology. The chapter is not a comprehensive review of existing self-report measures available to audiologists. Rather, it addresses matters of universal concern in the use of self-report measures with pertinent references to the development and applications of specific audiological self-report instruments. The purpose of the chapter is to illustrate the many ways in which self-report scales can be used to expand our understanding of the effects of hearing impairment.

Following an investigation of factors that prompt individuals to seek audiological care, Swan and Gatehouse (1990) made a critical observation: Hearing-impaired persons pursue assistance because of hearing disabilities and handicaps that do not necessarily correspond to their hearing impairments. The irony, of course, is that audiologists have traditionally managed clients on the basis of the audiogram, an assessment of hearing impairment. Rehabilitative audiologists, whose

responsibility it is to facilitate the reduction of hearing disability and handicap,[1] recognize the importance of self-report instruments in ascertaining the nature and degree of disability and handicap, selecting rehabilitation goals and strategies, and assessing the effectiveness of rehabilitation.

Notwithstanding the increased awareness of the importance of assessing hearing disability and handicap and the potential self-assessment holds in this regard, there have been few organized attempts to integrate self-assessment into service delivery in any systematic fashion. Service delivery models continue to be based on the assumption that appropriately fitted hearing aids (re: the audiogram) will resolve hearing disability and handicap. There is, however, considerable evidence of residual hearing problems even among individuals who wear hearing aids on a regular basis (e.g., Alberti, Pichora-Fuller, Corbin, & Riko, 1984; Eriksson-Mangold, Ringdahl, Björklund, & Wåhlin, 1990; Smedley & Schow, 1990; Thomas, 1984). Ross (1987) contends that the biggest future challenges in rehabilitative audiology are social and psychological rather than technological. In his review of the literature, Ross found no evidence of systematic, comprehensive efforts to assess the full implications of hearing impairment that would promote the development of effective rehabilitation strategies. He also found no evidence of organized follow-up that would permit identification of successful or ineffective intervention. There is a critical need for relevant, programmatic research to support the development and implementation of audiological services that constitute bona fide rehabilitation efforts. The first step in that direction may need to be a new conceptualization of problems experienced by clients with hearing impairment.

SELF-REPORT AS A MEASUREMENT METHOD

Clients' problems can be identified and evaluated in a number of different ways. Directness of measurement, a distinguishing feature of assessment techniques, refers to the immediacy and authenticity of response measurement (Barrios, 1988). Measurements of responses at the time and place they occur, such as physiological recordings, are direct measurements. Behavioral monitoring is fairly direct if behavior is recorded. If judgments of behavior are made and reported retrospectively, however, the measurement is indirect. Self-reports, retrospective verbal responses to verbal descriptions of behavior, are indirect measurement techniques; the behavior being assessed is occurring neither here or now.

Physiological and behavioral measurements are standard procedures in audiology. Audiologists are trained extensively in the administration and interpretation of physiological and behavioral tests of auditory function and clinical research

[1]Discussion of hearing disability and hearing handicap herein are based on the World Health Organization's depiction of the four domains of auditory dysfunction (disorder > impairment > disability > handicap) which differentiate site of lesion, specific auditory symptoms, effects on abilities or performance, and psychosocial consequences (Erdman, 1993; Stephens & Hétu, 1991; Thomas, 1984; WHO, 1980).

has relied heavily on these measurements. Multiple studies have demonstrated, however, that such measurements are not strongly correlated with self-report measures of hearing difficulties (Brainerd & Frankel, 1985; Demorest & Walden, 1984; Erdman & Demorest, 1990; Hallberg & Carlsson, 1991; Hawes & Niswander, 1985; Hétu, Lalonde, & Getty, 1987; High, Fairbanks, & Glorig, 1964; Kielinen & Nerbonne, 1990; Marcus-Bernstein, 1986; McCartney, Maurer, & Sorenson, 1976; Newman, Weinstein, Jacobson, & Hug, 1990; Rowland, Dirks, Dubno, & Bell, 1985; Schow & Nerbonne, 1980; Speaks, Jerger, & Trammel, 1970; Swan & Gatehouse, 1990; Weinstein & Ventry, 1983).

One need not conclude that self-report measures yield second-rate assessments of auditory dysfunction. In fact, self-reports simply constitute different measures; the method of measurement differs as does the content of the measurement. Audiometric tests assess maximum potential or best performance of the central or peripheral hearing mechanism. Self-report instruments, on the other hand, assess typical performance in behavioral utilization of hearing ability. In audiometric testing, instructions and test conditions are geared towards achieving a measure of the individual's maximum hearing ability. When completing self-report measures, however, clients are instructed to identify situations that are typically difficult, how they usually perform, or how often a particular hearing problem occurs. The results from these varied test procedures yield different information about the effects of auditory dysfunction. Behavioral audiometry, tests of middle ear function, and electrophysiological procedures yield diagnoses of hearing disorders and hearing impairment. Self-report instruments assess the impact hearing impairment has on individuals' hearing abilities and communication performance, as well as behavioral and psychosocial adjustment to those hearing problems. Hence, self-report instruments more accurately assess aspects of hearing disability and handicap. The confounding effects of method and content of measurement should be kept in mind when interpreting correlations between audiometric and self-report data and when selecting validation criteria for measurement instruments. In short, audiometric tests are direct measurement procedures involving physiologic or behavioral recordings or observations, they are designed to measure maximum ability or optimal performance, and they provide a basis for an assessment of hearing impairment. Self-report instruments are indirect measurement procedures, they are designed to assess typical performance, and they provide a basis for determining hearing disability and hearing handicap.

The significant, albeit not very strong, correlations between assessments of hearing impairment and assessments of hearing disability and handicap (i.e., between audiometric and self-report measures) suggest the following: (a) Hearing disability and the handicaps that ensue are, indeed, related to hearing impairment. (b) The relationship, however, does not permit the prediction of hearing disability and handicap from measures of hearing impairment. (c) The variability in disability and handicap for a given hearing impairment suggests that other factors determine the extent to which hearing impairment does or does not be-

come a disabling/handicapping condition. (d) Assessment of hearing impairment is an inadequate means of assessing clients' rehabilitative needs.

To further audiology's evolution as a rehabilitation profession, the range of research must be expanded so as to create a scientific basis for understanding the psychosocial impact of hearing loss. Specifically, research is needed in the areas of outcome measures, program evaluation, clinicians' role, attitudes toward those with hearing problems, compliance, clinician-client interaction, client-intervention interaction, and other "process" variables. It is time to move beyond correlating audiometric variables with handicap assessments and to explore adjustment to hearing loss as a function of the individual and his or her environment. This ecological approach, based on Bandura's (1978) concepts of reciprocal determinism, is consistent with multidisciplinary views that type and degree of disability are not associated with adjustment to disability or with type and degree of personality traits (Cook, 1992; Shontz, 1977; Wright, 1983). Emerging evidence suggests that adjustment to hearing impairment is not unlike adjustment to other disabilities insofar as the process is idiosyncratic in nature (Erdman, 1993; Thomas, 1984). Hence, the focus of research must go beyond the audiogram; it is time to focus on the hearing impaired person.

It can be argued that nomothetic approaches to the study of behavior (in which the existence of general laws of behavior and personality is presumed) undermine the importance of individual differences. There is controversy, for example, as to the appropriateness of employing nomothetically derived assessment tools for idiographic purposes. Because the psychometric properties of standardized tests are, by definition, derived from group data, Cone (1988) argues that such instruments are not sensitive to individual change. If true, this would certainly limit the utility of self-assessment for clinical and research purposes related to the study of individual differences. Others, however, cite increasing awareness of the role normative data can play in the management and understanding of the individual (Barrios, 1988; Hartmann, Roper, & Bradford, 1979; Jensen & Haynes, 1986). Although some concerns relative to using nomothetic data for idiographic purposes are valid, comparative use of normative data, with groups and individuals, is appropriate and meaningful. This issue is discussed further later in the chapter.

Why use self-report measures in research? Aren't there more reliable or objective means of assessment? Sometimes, yes. There are, however, distinct advantages to using self-assessment measures. For both research and clinical purposes, self-assessment instruments are easy and inexpensive to administer and can be used with a wide range of populations and for a wide variety of purposes. They are noninvasive and nonthreatening; hence, the compliance (i.e., completion) rate is high. This flexibility and efficiency account for the general popularity of self-assessment among clinicians and researchers alike.

Self-report does, of course, yield introspective data. (Those accustomed to objective measurements of observable phenomena are apt to shudder visibly at the mere thought of subjective appraisals of the nebulous world of cognition and

emotions!) But, how else might one assess an individual's perception of problems? How else might one ascertain why an individual is seeking treatment? Or, how an individual perceives the benefits of intervention? Or why he or she discontinues treatment? In fact, individuals seek and terminate treatment because of beliefs, feelings, and perceptions (i.e., subjective experiences of cognition and affect), for which there simply are no other means of assessment. Self-assessment instruments generate descriptions of behavior, characteristics, thoughts, attitudes, interests, opinions, and/or feelings that, as Cronbach (1970) points out, respondents are in a "uniquely excellent position to observe" (p. 493).

In addition to the subjective realm, self-report can also be used effectively to assess behaviors that are motoric and physiologic in nature (Barlow, Hayes, & Nelson, 1984). For example, self-report can be used to assess the severity and frequency of tinnitus (e.g., Kuk, Tyler, Russell, & Jordan, 1990; Sweetow & Levy, 1990) and dizziness (Jacobson & Newman, 1990), or to gauge patterns of hearing aid use (Brooks, 1990). Although physiologic and motor behavior can be assessed by more direct means, clients' perceptions of these behaviors are nonetheless highly relevant because their perceptions play a key role in deciding to seek or terminate treatment. When self-report instruments address problems clients have experienced, they have good face validity. Face validity promotes a cooperative attitude in respondents because the task is perceived as relevant and is therefore valuable from a public relations standpoint. Although nonessential from a technical perspective, recent findings support the inclusion of qualitative and quantitative data on face validity in test manuals (Nevo, 1985). Finally, the sheer simplicity of self-report measures also facilitates scoring, interpretation, and all aspects of data management.

Although the terms self-report and self-assessment are often used interchangeably, they can have different connotations. Self-report need not involve the evaluative or measurement function implicit in self-assessment; self-report may simply refer to the method of data collection. Clients' diary or journal entries, responses to open-ended questions, and interview data can all be viewed as obtained via self-report. The term self-assessment is more specific inasmuch as an evaluative intent is implicit; the function or purpose of data collection is also communicated. Self-report measures may cover broad areas such as personality, overall adjustment, and communication handicap, or they may be designed to assess rather specific areas such as anxiety, depression, and hearing aid benefit. A variety of terms are used to label these instruments (e.g., scale, inventory, profile, etc.) and although these terms are also used interchangeably in generic discussions, they do identify distinctly different measures. Inventories have a broad scope and assess a range of variables. Inventory scores are derived from responses to items in specific "scales," each of which is focused on a particular variable. A profile is a graphic representation of an individual's scale scores in relation to standardized norms. This approach permits a comparative evaluation. Short, focused instruments that yield one score can also correctly be labeled scales.

To minimize consternation related to good-bad scores or right-wrong responses, use of the term "test" is generally discouraged in titles of self-report instruments (American Psychological Association, 1966). Nonetheless, psychometrically sound self-report measures do conform to relevant definitions of tests. In evaluation, or assessment, the level or magnitude of some attribute or characteristic is appraised. Tests, standardized procedures for sampling behavior and describing it with categories or scores, constitute one part of assessment (Aiken, 1989; Anastasi, 1988; Cronbach, 1970; Gregory, 1992).

Questionnaires are the most common format for self-assessment instruments. Other formats include: (a) rating-scales, such as those employed in systematic desensitization (Wolpe, 1982); (b) checklists, such as the Adjective Check List (Gough & Heilbrun, 1983); and (c) Q-sorts or card sorts, originally developed by Stephenson (1952) and used extensively for clinical and research purposes in personality assessment and Rogerian client-centered therapy (Block, 1961; Butler & Haigh, 1954; Rogers & Dymond, 1954). Ordinarily, rating-scales, checklists, and card sorts do not provide comprehensive assessments, but they are focused, efficient to administer, and well-suited to monitoring change. These formats have not yet been implemented for widespread use in audiology.

THE NEED FOR ADDITIONAL SELF-ASSESSMENT INSTRUMENTS

Given the broad spectrum of research needs in rehabilitative audiology and the potential self-assessment holds for exploring many of these areas, it is appropriate to consider the adequacy of our current armamentarium of such instruments. A proliferation of self-assessment scales, as evidenced in recent reviews (Alpiner & Schow, 1993; Schow & Gatehouse, 1990; Skinner, 1988), has, to date, provided audiologists with a variety of instruments for use with a wide-range of hearing-impaired clients with varied assessment needs. Researchers, understandably, often prefer to develop instruments based on their own concepts and theories. As a result, the social and behavioral sciences literature (audiology included) is replete with newly devised measurement tools that appear in a handful of studies and never appear again. There are several reasons researchers should consider the use of existing instruments whenever possible. For one, construction of psychometrically sound measures delays the start of the intended research significantly. In the interest of progress, it is pointless to expend time and effort "reinventing the wheel." Secondly, the value of comparable data and of replication studies speaks strongly for using existing measures, particularly those with known psychometric characteristics. The importance of convergent findings to substantiate the appropriateness and efficacy of intervention strategies (e.g., cochlear implantation) cannot be overstated.

The proliferation of self-assessment instruments in audiology is evidence of the expanding scope of intervention and interest in audiology. As in other social, behavioral, and health sciences (Barrios, 1988; Caldwell-Colbert & Robinson,

1984), assessment needs have paralleled and complemented developments in intervention theory and techniques. A perusal of existing self-report instruments in audiology immediately suggests that there are areas in which the number and scope of instruments is more adequate than others. As an example, Skinner (1988) lists over twenty instruments, at least a dozen of which are designed to assess the communication performance of individuals with hearing impairment. Fewer instruments, however, assess aspects of psychosocial functioning. Hence, researchers who intend to investigate communication performance per se have a wealth of measurement tools from which to choose. Many existing instruments could, of course, benefit from refinements or continued psychometric scrutiny; research along such lines could yield valuable contributions to the literature. Indeed, new research efforts could replicate prior findings, provide normative data for different populations, or generate factor scores to increase the potential specificity of existing instruments. Nevertheless, it is now reasonable to move beyond developing self-report measures which specifically assess aspects of communication performance and on to research in which instruments of this type are the research tool.

The existence of relevant measurement tools does not, of course, ensure that they are suitable for one's research needs. For example, evidence that attitudes of individuals with unimpaired hearing may impact negatively on the rehabilitation prospects of those who are hearing impaired (Hétu, Riverin, Getty, Lalande, & St-Cyr, 1990) suggests a need for public awareness programs to modify such attitudes. With this in mind, Beaudry and Hétu (1990) conducted a literature review to identify measurement scales which could first be used to learn more about the public's attitudes towards those with hearing impairment. Although their search identified eight relevant measurement instruments, it also revealed significant problems with them including a paucity of psychometric data, overall neglect of behavioral and cognitive aspects of attitudes, a lack of data pertaining to type or severity of hearing impairment, and restricted sampling. Justifiably, they concluded that development of a new instrument was indicated for their research purposes. The range of research needs in rehabilitative audiology described earlier clearly points to other areas in which we do not have appropriate assessment tools.

APPROACHES TO CONSTRUCTION OF SELF-ASSESSMENT MEASURES

When the appropriateness of self-report for a specific research need has been established and the adequacy of existing measures has been ruled out, it becomes necessary to consider what goes into construction of self-report instruments. Test construction strategies include: rational-theoretical approaches; factor-analytic approaches; and empirical, criterion-keyed approaches (see Aiken, 1989; Anastasi, 1988; Burisch, 1984, 1986; Cohen, Swerdlik, & Smith, 1992; Goldberg, 1972; Lanyon & Goodstein, 1982).

Rational-Theoretical Approaches

Rational-theoretical approaches to test construction, also referred to as deductive approaches, are content-based development strategies. Items are selected for their face validity, so the rationale for including an item is fairly evident from its content. Item selection may be guided by clinical judgment, logic, intuition, prior research findings, or theoretical relevance. As an example of the latter, the Myers-Briggs Type Indicator (Myers & McCaulley, 1985), widely used for clinical, educational, and vocational purposes, is based on Jungian analytic theory.

The distinguishing feature of the deductive approach is that the constructs to be measured and the items to assess them are specified a priori. Early stages in the development of the Hearing Handicap Inventory for the Elderly (HHIE) (Ventry & Weinstein, 1982) exemplified this deductive allocation of items to specific sets or subsections. A team of five audiologists (relying on clinical experience, reviews of relevant literature, and existing measurement scales) formulated items to assess variables which – they concluded in advance – influence hearing disability and handicap: situational and emotional variables and hearing sensitivity. Burisch (1984, 1986) supports the deductive approach to test construction because, in his view, such instruments typically are the easiest and most economical to construct, the most efficient to administer, have the best communicability, and are the least redundant. A potential concern with deductive approaches is that developers' preconceptions of the target area can be limited and subjective; consequently, relevant areas may be overlooked.

Factor-Analytic Approaches

Factor analytic approaches, which may also be labeled inductive, itemmetric, internal, or internal consistency methods, are based on the premise that the data should be allowed to speak for themselves. As in deductive approaches, inductive development methods also begin with the creation of a pool of items. They differ from deductive approaches in that, rather than deciding scale composition a priori, test developers employ statistical analyses to discern the nature and number of variables assessed, and to identify the items contributing to the assessment of each.

The purported advantage to allowing data to dictate what variables are being measured is the elimination of arbitrary or subjective preconceptions. Nonetheless, subjective decisions about how the analysis should proceed are made throughout the factor analytic process. Furthermore, a factor's meaning is not given, nor is it necessarily clear. Hence, the identification or interpretation of the factor may, in and of itself, prove to be arbitrary unless, or until, empirical evidence confirms it. Cattell's (1965) somewhat extreme view of his identified factors as real or true (albeit nameless) unitary structures in normal personality has prompted others to maintain a modicum of skepticism with respect to the purported powers of factor analysis (Anastasi, 1988; Burisch, 1984, 1986; Lanyon

& Goodstein, 1982). Anastasi (1988), for example, maintains that Cattell "regards factor analysis not as a data-reduction technique, but as a method for discovering underlying causal traits" (p. 542). Burisch (1984), who admittedly has faith in the "paper, pencil, and a bottle of wine" approach to test construction, proclaims no faith in the existence of a natural structure of personality or in the inductivists' ability to uncover it if it does exist. Others have impugned the arbitrary nature of factor-analytic approaches, as in Revelle's (1983) factors are fiction treatise. Nonetheless, balanced perspectives on the utility of factor analysis merit consideration because of the unique contributions factor analysis has to make in testing clinical hypotheses. Briggs and Cheek (1986) stress the potential of factor analysis given its ability to group correlated variables, reduce sets of redundant variables, and identify what it is that a set of variables has in common. They contend factor analysis should not be viewed as an end in itself, but that it is useful in refining and clarifying measures, and in testing the validity of measures and constructs. Because factor analysis is a useful means of examining components of behaviors or problems, it can increase understanding of the variables under investigation and can be useful in increasing an instrument's specificity.

An investigation of the feasibility of using self-report measures of hearing aid benefit to validate hearing aid selection procedures (Walden, Demorest, & Hepler, 1984) revealed a four-factor structure for the 64 items of the Hearing Aid Performance Inventory (HAPI). The factors suggest different benefits from amplification in noisy, quiet, auditory only, and non-speech signal conditions. Clearly, more specific insights into hearing aid benefit can be gleaned from separate factor scores than could be from a generalized measure with a single score. Factor analysis of the Communication Profile for the Hearing Impaired (CPHI) scales revealed a five-factor structure that facilitates clinical interpretation of patterns of scale scores (Demorest & Erdman, 1989a). In this instance, rather than yielding a more detailed analysis, factor scores aid in synthesizing multiple scale scores to identify patterns of adjustment to hearing impairment.

Criterion-Keyed Approaches

A third category of approaches to test development consists of the criterion-keyed strategies, also referred to as external, atheoretical, empirical, or group-contrast approaches. The distinguishing feature of these approaches is that items are selected strictly on the basis of their ability to differentiate between, or among, groups. In other words, the items are allowed to speak for themselves. In this approach a large pool of heterogeneous items (this is critical inasmuch as the vast majority will be eliminated) is administered to a select group of individuals who epitomize the variable in question and to a large relevant control group. Items that fail to distinguish the criterion group from the control group are discarded; items that do are automatically retained. Items may have little or no face validity. In fact, item content per se may have no relevance. Only the response an item elicits, interpreted relative to an empirically confirmed

correlate, is significant. This can result in the inclusion of items that are seemingly unrelated to the criteria they predict. Poor face validity can increase the likelihood that examinees will question the instrument's relevance or appropriateness, or even the examiner's competence. On the other hand, the fact that an item's significance is not evident from the content impedes a person's ability to fake "good" or "bad" responses.

One of the better known criterion-keyed instruments is the Minnesota Multiphasic Personality Inventory (MMPI), which was originally designed to categorize psychiatric patients for diagnostic purposes. Another well-established instrument is the Strong Vocational Interest Blank. Used extensively in guidance and vocational counseling, it identifies the occupations of those whose interests are most like the examinee's. Although criterion-keyed strategies have not been employed to date in the development of self-report measures in rehabilitative audiology, they would seem to merit consideration in the development of screening instruments.

These varied approaches to test development should not be viewed as mutually exclusive; they can, and often do, overlap. Most test developers attempt to exploit the strengths, and avoid the pitfalls, inherent in each of the approaches. Comparisons of the various strategies (Burisch, 1984, 1986; Goldberg, 1972; Hase & Goldberg, 1967) suggest, overall, that instruments developed by these methods are fairly equal in terms of validity and predictive effectiveness. Although Burisch (1984, 1986) did find deductive scales to be the easiest to construct, the most economical to administer, the least redundant, and the most straightforward, he also admits they are easiest for respondents to fake. Nevertheless, when viewed as a sequential process in which determining reliability and validity is integral, test development is more than likely to include deductive, inductive, and empirical phases. No matter what levels of thought and activity go into the original item selection and arrangement, sound judgment dictates some ex post facto assessment of the effectiveness of the instrument. As even Burisch (1984) concedes "only a purist of deductivism would maintain that a decent item analysis based on sufficient data, could do any harm" (p. 215).

THE MOST CRITICAL VARIABLE: THE TEST ITEM

Consensus does exist when it comes to the importance of test items. Any instrument, regardless of the construction approach used in its development, is only as good as the items that comprise it. For purposes of content validity, it is essential that test items adequately reflect the content domain of the constructs being measured. Behaviorists have devised an approach to item generation termed situational analysis (Goldfried & D'Zurilla, 1969; Jensen & Haynes, 1986) in which situations and problems of interest are obtained from those in relevant populations, and from peers, significant others, and related professionals. A similar approach was used to amass an item pool for the CPHI (Demorest & Erdman, 1987).

Reliability and validity issues ultimately rest on the characteristics of individual test items. Angleitner, John, and Löhr (1986) stress that self-report test items should be easy to understand, unambiguous, concrete, self-referent, and neutral. Uncommon words, complex sentence structure, confusion among clauses, and grammatical errors can affect items' comprehensibility. Clearly, when an item is misunderstood, the response to it is invalid. Ambiguous items may have more than one interpretation. Responses may be affected in two ways: subjects may fail to recognize that an item is ambiguous and simply respond to a misinterpreted meaning, or they may recognize the ambiguity and not know which way to respond. Angleitner et al. (1986) suggest that concrete item content may yield greater response stability than abstract content because subjects have greater leeway in interpreting abstract concepts. They also maintain that self-referent items enable subjects to respond on the basis of their own perceptions and experiences. They define self-reference in items as the extent to which the respondent is mentioned, does or experiences something, or is emotionally involved. Finally, items should be neutral in terms of social values or subjects can be expected to select the most socially desirable response. When an otherwise excellent item does not seem to "work" in a test format, careful scrutiny of the item with the above criteria in mind may be useful.

RESPONSE SETS AND BIASES

The confounding effects of response biases and response sets must be taken into consideration throughout construction and interpretation of self-assessment instruments. Among the response variables that can affect self-assessment scores are: social desirability, acquiescence, deviation, extremism, overcautiousness, oppositionalism, and faking good or bad.

Social desirability refers to the tendency for respondents to present themselves in a favorable light, either intentionally, or unintentionally. Concern and debate over the implications of this response set are such that social desirability has a veritable literature of its own. Some argue that social desirability is a trait-like personality variable worthy of identification and measurement in and of itself. Others argue that psychological tests amount to nothing more than appraisals of any respondent's ability to demonstrate an awareness of what is socially desirable. Not coincidentally, measures such as the Marlowe-Crowne Social Desirability Scale (Crowne & Marlowe, 1964), the Edwards Social Desirability Scale (Edwards, 1957), and the L (Lie) and K (Correction) scales of the MMPI have been developed to detect this response pattern. To minimize the confounding effects of socially desirable responses, efforts can be made during test construction to select socially neutral items. Forced-choice formats (in which response options consist of paired items equivalent in social value) have also been suggested. The latter introduces technical difficulties associated with rating items' social value, however, and has not been highly effective (Anastasi, 1988). Interestingly, the need for social approval is reportedly associated with acceptance

of those with disabilities (Livneh, 1984). Furthermore, the need for approval, attention, or sympathy influences the client-clinician relationship which, in turn, influences the treatment process (Pettegrew & Turkat, 1986; Squier, 1990). Kuk et al. (1990) administered the Marlowe-Crowne Social Desirability Scale (Crowne & Marlowe, 1964) to rule out influences from social desirability during development of a tinnitus questionnaire. Otherwise, this variable appears to have received little attention in the audiological literature.

Acquiescence refers to the tendency to respond in an agreeable or positive mode. Items for which response options include true-false, agree-disagree, or like-dislike, are particularly vulnerable to the effects of this response set. For this reason, balancing the number of true- and false-keyed items is now standard procedure in scale construction. Equivalent numbers of true-false items can be achieved through selection and/or rewording. "Naysayers" constitute a variation of the traditional acquiescent respondent; rather than consistently agreeing or responding "true," the naysayer consistently disagrees or responds "false."

Subjects who invariably skip any item about which they are uncertain exhibit *overcautiousness*. Overcaution may also result in prolonged deliberation over individual items. This is particularly problematic when time constraints preclude completion of the instrument. In either case, the number of items left unanswered can be expected to influence scores. *Deviation* is a response set that is characterized by unusual or uncommon responses. Other response sets include *extremism,* consistently responding at the extremes of the response scale, and *oppositionalism,* habitually indicating a response which is the opposite of one's actual answer.

Faking, in all probability, is the threat to response validity with which audiologists are the most familiar. Tests for nonorganicity, or malingering, have long been standard features of the audiometric test battery. Most audiologists have encountered clients who fake good (have hearing impairment but try to test normal), who fake bad (have normal hearing but test abnormal), and who fake a little (have some degree of hearing impairment to which they add a nonorganic overlay during testing). Not infrequently, demand characteristics of the test situation influence such response patterns. For example, documented hearing impairment can result in denied entry to the armed forces, law enforcement agencies, aviation, and other occupational tracks. Conversely, individuals hoping to avoid military service or to obtain an early discharge may suddenly manifest a marked decrease in hearing. Perhaps the most challenging are those who have incurred some degree of hearing impairment but who exaggerate the problem for compensation or reimbursement purposes. Attempts to fake, negate, or exaggerate hearing difficulties could pose serious threats to the validity of self-report measures, particularly those used for screening and classification purposes. Prudence would dictate inclusion of some validity check in self-report instruments used to determine compensation benefits or eligibility for services.

The CPHI includes two scales (Problem Awareness and Denial) that are designed to identify individuals whose hearing difficulties are not apparent to them,

or who are unwilling to admit to them (Demorest & Erdman, 1986a, 1986b; Erdman & Demorest, 1990). The items in both scales are written in such a way that even those with normal hearing should tend to agree (e.g., "Sometimes I have trouble understanding what's being said when someone speaks to me from another room" and "I sometimes get annoyed when I have trouble hearing"). Clinical experience with the CPHI suggests that the scales are sensitive to a lack of insight into the nature and extent of hearing problems (inferred from low Problem Awareness scores) and to an assortment of responses characteristic of denial (inferred from a low Denial score). Interestingly however, it also appears that a tendency to exaggerate the extent of hearing difficulties and reactions to them can be inferred from high scores on the two scales. Clinical evidence that the Problem Awareness and Denial scales are performing as the developers hoped they would suggests that items like these can be used to corroborate the validity of responses to self-report measures of hearing problems. This is but one potential research avenue to explore in enhancing response validity for self-report measures of hearing difficulties.

PSYCHOMETRIC PROPERTIES AND NORMATIVE DATA

When an investigation involves self-assessment, either as the research focus or the research tool, variables that affect the reliability and validity of these instruments must be considered. Self-assessment procedures have enjoyed widespread use in other fields. As a result, a wealth of information exists that is directly applicable in the development and use of self-report scales in audiology. Those engaging in development of or research with self-assessment instruments are strongly encouraged to peruse related literature in measurement, psychology, rehabilitation, and education. Information concerning psychometric characteristics of self-report instruments can also be found in the audiological literature. Several articles provide general information (e.g., Demorest & Walden, 1984; Schow & Gatehouse, 1990). Many others are related to the development and evaluation of specific self-report measures.

Of the audiological self-report measures published, the HHIE and the CPHI appear to have been subjected to the most intense psychometric scrutiny thus far. In combination, these studies provide insight into the scope of activities that, ideally, should be included in developing a psychometrically sound self-assessment tool. Psychometric characteristics of the original HHIE (Ventry & Weinstein, 1982) and retest reliability findings (Newman & Weinstein, 1989; Weinstein, Spitzer, & Ventry, 1986) have been reported as have results obtained for versions modified for use with adults (HHIA) (Newman, Weinstein, Jacobson, & Hug, 1990, 1991), and for screening purposes (HHIE-S and HHIA-S) (Lichtenstein, Bess, & Logan, 1988; Mulrow, Tuley, & Aguilar, 1990; Newman et al., 1991; Ventry & Weinstein, 1983). Demorest and Erdman conducted item analyses (1986b), a retest stability study (1988), a canonical analysis (1989b), and a factor analysis (1989a) of the CPHI following its development (Demorest

& Erdman, 1987). Also of interest are articles describing the development and psychometric characteristics of the Hearing Performance Inventory (HPI) and its revised form (Demorest & Walden, 1984; Giolas, Owens, Lamb, & Schubert, 1979; Lamb, Owens, & Schubert, 1983).

The reliability of a measurement instrument sets limits on the extent to which scores can be generalized; validity gives meaning to those scores. As a measure of temporal consistency, reliability is usually assessed by correlating scores obtained through repeated administrations (retest reliability). As a measure of consistency across items, scores from one half of the items are correlated with scores for the other half, or, scores from alternate forms of the instrument are correlated. Instruments that do not provide consistent, or reliable measurements, cannot provide valid measurements. Whereas reliability can be determined in a fairly straightforward manner, test validation is an ongoing process that evolves as research findings accumulate. Tests are valid to the extent that the inferences which can be made from their scores are appropriate, meaningful, and useful. Types of validity (e.g., content, concurrent, construct, convergent, criterion, discriminant, ecological, external, nomological, population, predictive, temporal, etc.) are related to the types of evidence that give scores meaning. The various methods for investigating relationships between test scores and independent measures of target constructs are now viewed as a triad of validation procedures: content-related, criterion-related, and construct-related (AERA, APA, & NCME, 1985). In short, content validity refers to the extent to which items adequately represent the domain to be assessed. Criterion-related validity (under which concurrent and predictive validity are subsumed) refers to the relationship between the test and an independent measure of the same test construct. Anastasi (1986) views construct validity as a never-ending, comprehensive approach in which other recognized validation procedures (i.e., content validation and criterion-related validation) are stages. Construct validity is the extent to which a test measures a specific construct or trait, which itself, can only be defined in light of data generated by the validation process (Anastasi, 1988). Because there is a critical need to define the constructs underlying adjustment to hearing impairment, construct validation is an important direction for research with self-report measures in rehabilitative audiology.

It is useful to conceptualize an instrument's reliability and validity in terms of its intended function. Screening instruments, for example, are designed to differentiate between those who do or do not meet a specific selection criterion. No further differentiation is intended beyond determining an initial disposition. This may focus on need for services or eligibility for services. Unreliable or invalid measurements will result in misclassifications.

Individual, test, and setting variables can all affect the reliability of measurements. Inasmuch as reliability delineates the extent to which measurements can be generalized (over time or across samples) replication studies are crucial. Erdman et al. (1990) reported pilot data from a collaborative study to evaluate the feasibility of developing CPHI norms for a more heterogeneous population

of hearing-impaired adults. Their findings revealed strikingly similar patterns of scores, with predictable differences in specific means, for populations as divergent as profoundly impaired cochlear implant candidates and active-duty servicemembers with noise-induced hearing impairment (see Figure 1 in Chapter 15, on page 305). Because such data provide valuable information about the similarities and differences among disparate hearing-impaired populations, research in this area holds great promise for enhancing our understanding of the variables that contribute to hearing disability and handicap.

Establishing specific subgroup norms is essential because individual's scores are most appropriately interpreted in relation to norms for a representative standardization sample. Montano and Malinoff (1990), for example, obtained mean CPHI scores for a group of individuals with unilateral hearing impairment. The mean scores (subgroup norms) can be used to compare the effects of unilateral and bilateral hearing impairment. These norms also permit one to compare how a particular client with unilateral impairment is doing compared to others with the same condition. This norm-referenced approach to interpreting test scores, particularly when coupled with content-referenced interpretation, exemplifies the actual flexibility and potential in interfacing individual and group data. Norm-referenced comparisons allow one to identify clients' problems, to establish rehabilitation goals, to select homogeneous treatment groups, to determine appropriate intervention strategies, and to evaluate treatment effects (Barrios, 1988; Hartmann et al., 1979; Jensen & Haynes, 1986). Norms can be developed with demographic (e.g., age, gender, occupational or marital status) or audiologic (e.g., severity of loss, etiology, time of onset, hearing aid use) variables as the deciding criteria. Norms developed on local clinical populations facilitate accountability and are invaluable for program evaluation purposes.

The use of scoring aids ranging from templates, calculators, and optical scanners, to computerized scoring packages and databases, has simplified the generation of norms significantly (Demorest, 1987; Demorest & Erdman, 1984; Palmer, 1992). Clinicians can examine the characteristics of their clinical populations by simply querying the databases; one's clinical curiosity alone dictates the scope of questions posed. If demographic and audiometric data are also maintained in such databases, the opportunity for substantive investigations becomes almost unlimited. Although descriptive and retrospective studies yielding normative data are not terribly glamorous, they facilitate the generation of hypotheses and provide the necessary foundation for a scientific exploration of adjustment to hearing impairment.

FUTURE RESEARCH: SPECIFIC NEEDS AND GENERAL DIRECTIONS

The development of self-report measures for use in rehabilitative audiology has provided us with the necessary tools to embark on many varied research endeavors. In the immediate future, there remains a need to refine existing

instruments and to develop new ones. Work is already progressing in these directions. With respect to existing self-report instruments there is a critical need for replication studies to provide descriptive statistics and normative data for populations other than those on which instruments were developed. Analyses to increase the sensitivity and specificity of current procedures could enhance their usefulness for clinical and research purposes. Multimethod designs (Nay, 1979) could be employed in validation studies.

There is also a need to examine test variables including instructions, test administration (e.g., interview, paper and pencil, computerized, supervised vs. unsupervised, etc.), and response formats. Specific populations' needs may warrant the modification of existing formats. Such modifications might include foreign translations for use with clients for whom English is a second language, or large-print or recorded test versions for the visually-impaired. Recent work in Sweden (Hallberg, Eriksson-Mangold, & Carlsson, 1992) exemplifies strategies which should be followed to ensure that translations retain the psychometric characteristics of original instruments.

The use of self-report measures with individuals who are profoundly hearing impaired must take into account their preferred communication mode, previous hearing experience, and language skills (Kaplan, Bally, & Brandt, 1991). Kaplan et al. (1991) developed the Communication Self-Assessment Scale for Deaf Adults (CSDA), which they standardized on prelingually deaf adults who were predominantly college students. Owens and Raggio (1988) designed the Performance Inventory for Profound and Severe Loss (PIPSL) following their observation that individuals with severe-to-profound impairments typically omit many items when instruments contain material not relevant to their communication needs or experiences. The CPHI (Erdman et al., 1990; Knutson & Lansing, 1990; Lansing & Seyfried, 1990) and the PIPSL (Spitzer, Kessler, & Bromberg, 1992) have been administered to cochlear implant candidates who, by definition, aspire to communicate aurally. The validity of self-report measures obtained from individuals with profound hearing impairment is contingent upon the appropriateness of the measurement instrument. Although the appropriateness, in large part, may be dictated by preferred communication mode and/or onset of hearing impairment (i.e., pre- or postlingual acquisition), additional research is needed to determine whether or not other variables also merit consideration.

The reports of significant others are invaluable in corroborating self-report data and in evaluating the effects of hearing impairment on family dynamics. Several investigations in which self-report methods were obtained from significant others have been reported (Erdman & Demorest, 1990; McCarthy & Alpiner, 1983; Newman & Weinstein, 1986; Schow & Nerbonne, 1982). Much of this work has been preliminary in nature; additional test development and evaluation is warranted.

In view of the relationship between stigma and disability, the paucity of audiological literature related to attitudes toward individuals with hearing impair-

ment is deplorable. Noteworthy exceptions are the work of Beaudry and Hétu (1990) and Fujikawa and Cunningham (1989). Both studies exemplify the potential utility of self-assessment in this area. In addition to identifying attitudes held by others about individuals with hearing loss, there is a critical need for research focused on the sources of attitudes, and on means of modifying attitudes, particularly in the work force. Those pursuing research in this area should consult Marinelli and Dell Orto (1984), Parker and Szymanski (1992), Wright (1983), and Yuker (1988) for valuable reviews of issues related to attitudes towards those with disabilities.

Self-report instruments have also been developed to assess handicap associated with tinnitus (Kuk et al., 1990; Sweetow & Levy, 1990; Wilson, Henry, Bowen, & Haralambous, 1991) and dizziness (Jacobson & Newman, 1990; Jacobson, Newman, Hunter, & Balzer, 1991). The implementation of cognitive-based intervention programs (Bellis, 1989; Sweetow, 1984, 1986; Sweetow & Levy, 1990; Tyler, Stouffer, & Schum, 1989) demonstrates the expanding clinical role audiologists are assuming in the management of patients with tinnitus and disequilibrium. There is no reason that the development, evaluation, and applications of self-assessment measures in these areas will not warrant the same research considerations that instruments pertaining to more traditional rehabilitation interests do.

Treatment efficacy and program evaluation dictate the need for instruments that can be used to assess change. Outcome research is critical for the development of effective intervention strategies. Consequently, it is of considerable interest to practitioners. Treatment outcome is also becoming increasingly important to consumers and policymakers who influence decisions related to eligibility for services, reimbursement, professional training standards, and licensure requirements (Thomas, Thoreson, Butler, & Parker, 1992). Prior to using an instrument to measure outcome, its retest reliability must be established. An instrument's sensitivity (i.e., its ability to detect change) also determines its suitability as an outcome measure. Moreover, sensitivity to changes in group data, does not ensure that an instrument is sensitive to change in an individual's data. This dilemma restricts the clinical, and research, applications of some self-report measures.

Most of the audiological research involving self-report measures of treatment effects pertains to hearing aid benefit. Among the global handicap measures that have been used to assess benefit from hearing aid use are the HHIE (Malinoff & Weinstein, 1989a, 1989b; Mulrow, Tuley, & Aguilar, 1992; Newman & Weinstein, 1988), the HPI (Dempsey, 1986), and the Hearing Handicap Scale (Tannahill, 1979). Others have employed instruments that assess more direct aspects of hearing aid benefit (Cox & Alexander, 1992; Cox & Gilmore, 1990; Cox, Gilmore, & Alexander, 1991; Cox & Rivera, 1992; Walden et al., 1984). Inasmuch as hearing aid fittings constitute the most common intervention variable in the audiological rehabilitation process, ongoing research in this area is vitally important. An immediate need is to define hearing aid benefit. Brooks (1990)

identifies frequency of use, satisfaction, and performance as elements of hearing aid benefit. Additional research is needed to identify the specific variables that influence frequency of use, that contribute to perceived satisfaction, and that affect aided hearing performance. Such information will be of direct relevance for hearing aid fitting strategies. It is also important to relate direct benefits from amplification (improved performance) to indirect benefits (reduced handicap). Although global measures may be less sensitive to change, when such evidence of change does exist it suggests that treatment effects are broad-based. Consequently, there is a reasonable justification for employing focused, as well as global, outcome measures. Moreover, when comprehensive rehabilitation efforts (e.g., communication strategies, speechreading, counseling, and amplification) have been provided, the multiple scales of global instruments may be more appropriate to cover the range of possible treatment effects.

To date, self-report measures have not been used quite as extensively to investigate effects of intervention beyond amplification. In part, this is due to the complexities involved in the relationship between treatment and outcome. The problems inherent in measuring change are many, not the least of which is determining the actual agent of change. In addition to variables associated with treatment, client and clinician variables are also implicated. Moreover, simple difference scores are notorious for having low reliability (Linn & Slinde, 1977) which limits the extent to which one can draw conclusions from the difference in an individual's pre- and post-test scores. In analyses of group data, differential changes can be investigated by comparing correlations of pre- and post-tests to test-retest correlations. Absence of differential changes in the presence of mean changes suggests a constant treatment effect whereas differential changes are indicative of individual differences. If the pre- and post-test correlations are smaller than those obtained for the test-retest condition, differential changes can be inferred. Correlates of change warrant investigation when the quest is to identify prognostic indicators.

Future research efforts should be focused on the agent or mechanism of change (i.e., process variables) in addition to actual outcome. Comparative outcome research, currently the norm in many rehabilitation fields, consists of investigations designed to match intervention strategies with specific types of clients. Stated differently, an important function of assessing the rehabilitative needs of individuals with hearing impairment is to identify appropriate intervention strategies. Indeed, a major challenge for rehabilitative audiologists is the development and implementation of effective treatment strategies. Because self-report measures are an effective means of assessing affective, cognitive, and behavioral components of hearing handicap, they are ideal instruments for research of this nature. If clients seek treatment secondary to perceived handicap, it is entirely appropriate to gauge the success of intervention by assessing change in perceived handicap. Inasmuch as self-report measures are the only means of assessing clients' perceptions, self-report is an appropriate and essential means of measuring outcome.

As the constructs underlying handicap associated with hearing impairment become clearer through ongoing test validation, appropriate intervention goals become clearer. As the goals of intervention become clearer, appropriate intervention strategies become clearer. As appropriate intervention strategies are implemented, outcome measures can ensure professional accountability. This unfolding process constitutes a dynamic basis for audiology's evolution as a truly rehabilitative profession.

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REFERENCES

Aiken, L.R. (1989). *Assessment of personality*. Boston: Allyn and Bacon.

Alberti, P.W., Pichora-Fuller, M.K., Corbin, H., & Riko, K. (1984). Aural rehabilitation in a teaching hospital: Evaluation and results. *Annals of Otology, Rhinology, and Laryngology, 93*(6), 589-594.

Alpiner, J.G., & Schow, R.L. (1993). Rehabilitative evaluation of hearing-impaired adults. In J.G. Alpiner & P.A. McCarthy (Eds.), *Rehabilitative audiology: Children and adults* (2nd ed.) (pp. 237-283). Baltimore: Williams and Wilkins.

American Educational Research Association, American Psychological Association, & National Council on Measurement in Education. (1985). *Standards for educational and psychological testing*. Washington, DC: American Psychological Association.

American Psychological Association. (1966). *Standards for educational and psychological tests and manuals*. Washington, DC: American Psychological Association.

Anastasi, A. (1986). Evolving concepts of test validation. *Annual Review of Psychology, 37*, 1-15.

Anastasi, A. (1988). *Psychological testing* (6th ed.). New York: MacMillan.

Angleitner, A., John, O.P., & Löhr, F.-J. (1986). It's *what* you ask and *how* you ask it: An itemmetric analysis of personality questionnaires. In A. Angleitner & J.S. Wiggins (Eds.), *Personality assessment via questionnaires* (pp. 109-123). New York: Springer-Verlag.

Bandura, A. (1978). The self system in reciprocal determinism. *American Psychologist, 33*, 344-358.

Barlow, D.H., Hayes, S.C., & Nelson, R.O. (1984). *The scientist practitioner: Research and accountability in clinical and educational settings*. New York: Pergamon Press.

Barrios, B.A. (1988). On the changing nature of behavioral assessment. In A.S. Bellack & M. Hersen (Eds.), *Behavioral assessment: A practical handbook* (3rd ed.) (pp. 3-41). New York: Pergamon Press.

Beaudry, J., & Hétu, R. (1990). Measurement of attitudes of those with unimpaired hearing towards the hearing impaired: A critical examination of the available scales. *Journal of Speech Language Pathology and Audiology/ROA, 14*(2), 23-32.

Bellis, T.J. (1989). A vestibular rehabilitation program for the disequilibratory patient. *Journal of the Academy of Rehabilitative Audiology, 22*, 82-88.

Block, J. (1961). *The Q-sort method in personality assessment and psychiatric research*. Springfield, IL: Charles C. Thomas.

Brainerd, S.H., & Frankel, B.G. (1985). The relationship between audiometric and self-report measures of hearing handicap. *Ear and Hearing, 6*(2), 89-92.

Briggs, S.R., & Cheek, J.M. (1986). The role of factor analysis in the development and evaluation of personality scales. *Journal of Personality, 54*(1), 107-148.

Brooks, D.N. (1990). Measures for the assessment of hearing aid provision and rehabilitation. *British Journal of Audiology, 24*, 229-233.

Burisch, M. (1984). Approaches to personality inventory construction. *American Psychologist, 39,* 214-227.

Burisch, M. (1986). Methods of personality inventory development – A comparative analysis. In A. Angleitner & J.S. Wiggins (Eds.), *Personality assessment via questionnaires* (pp. 109-123). New York: Springer-Verlag.

Butler, J.M., & Haigh, G.V. (1954). Changes in the relation between self-concept and ideal concepts consequent upon client-centered counseling. In C.R. Rogers & R.F. Dymond (Eds.), *Psychotherapy and personality change* (pp. 55-75). Chicago: University of Chicago Press.

Caldwell-Colbert, A.T., & Robinson, W.L. (1984). Utilization and predicted trends of behavioral inventories. *Journal of Behavioral Assessment, 6*(3), 189-196.

Cattell, R.B. (1965). *The scientific analysis of personality.* Baltimore: Penguin.

Cohen, R.J., Swerdlik, M.E., & Smith, D.K. (1992). *Psychological testing and assessment* (2nd ed.). Mountain View, CA: Mayfield Publishing.

Cone, J.D. (1988). Psychometric considerations and the multiple models of behavior assessment. In A.S. Bellack & M. Hersen (Eds.), *Behavioral assessment: A practical handbook* (3rd ed.) (pp. 42-66). New York: Pergamon Press.

Cook, D. (1992). Psychosocial impact of disability. In R.M. Parker & E.M. Szymanski (Eds.), *Rehabilitation counseling: Basics and beyond* (pp. 249-272). Austin, TX: Pro-ed.

Cox, R.M., & Alexander, G.C. (1992). Maturation of hearing aid benefit: Objective and subjective measurements. *Ear and Hearing, 13*(3), 131-141.

Cox, R.M., & Gilmore, C. (1990). Development of the Profile of Hearing Aid Performance (PHAP). *Journal of Speech and Hearing Research, 33*(2), 343-357.

Cox, R.M., Gilmore, C., & Alexander, G.C. (1991). Comparison of two questionnaires for patient-assessed hearing aid benefit. *Journal of the American Academy of Audiology, 2*(3), 134-145.

Cox, R.M., & Rivera, I.M. (1992). Predictability and reliability of hearing aid benefit measured using the PHAB. *Journal of the American Academy of Audiology, 3,* 242-254.

Cronbach, L.J. (1970). *Essentials of psychological testing* (3rd ed.). New York: Harper & Row.

Crowne, D.P., & Marlowe, D. (1964). *The approval motive: Studies in evaluative dependence.* New York: Wiley.

Demorest, M.E. (1987). *User's guide to the CPHI database system.* Washington, DC: CPHI Services.

Demorest, M.E., & Erdman, S.A. (1984). A database management system for the Communication Profile for the Hearing Impaired. *Journal of the Academy of Rehabilitative Audiology, 17,* 87-96.

Demorest, M.E., & Erdman, S.A. (1986a, June). *The problem of denial: An approach to assessment using the Communication Profile for the Hearing Impaired.* Presented at the Summer Institute of the Academy of Rehabilitative Audiology, Lake Geneva, WI.

Demorest, M.E., & Erdman, S.A. (1986b). Scale composition and item analysis of the Communication Profile for the Hearing Impaired. *Journal of Speech and Hearing Research, 29*(4), 515-535.

Demorest, M.E., & Erdman, S.A. (1987). Development of the Communication Profile for the Hearing Impaired. *Journal of Speech and Hearing Disorders, 52*(2), 129-143.

Demorest, M.E., & Erdman, S.A. (1988). Retest stability of the Communication Profile for the Hearing Impaired. *Ear and Hearing, 9*(5), 237-242.

Demorest, M.E., & Erdman, S.A. (1989a). Factor structure of the Communication Profile for the Hearing Impaired. *Journal of Speech and Hearing Disorders, 54*(4), 541-549.

Demorest, M.E., & Erdman, S.A. (1989b). Relationships among behavioral, environmental, and affective communication variables: A canonical analysis of the CPHI. *Journal of Speech and Hearing Disorders, 54*(2), 180-188.

Demorest, M.E., & Walden, B.E. (1984). Psychometric principles in the selection, interpretation, and evaluation of communication self-assessment inventories. *Journal of Speech and Hearing Disorders, 49,* 226-240.

Dempsey, J.J. (1986). The Hearing Performance Inventory as a tool in fitting hearing aids. *Journal of the Academy of Rehabilitative Audiology, 19,* 116-125.

Edwards, A.L. (1957). *The social desirability variable in personality assessment and research.* New York: Appleton-Century-Crofts.

Erdman, S.A. (1993). Counseling hearing impaired adults. In J.G. Alpiner & P.A. McCarthy (Eds.), *Rehabilitative audiology: Children and adults* (2nd ed.) (pp. 374-413). Baltimore: Williams and Wilkins.

Erdman, S.A., & Demorest, M.E. (1990). *CPHI manual: A guide to clinical use.* Simpsonville, MD: CPHI Services.

Erdman, S.A., Demorest, M.E., Wark, D.J., Lansing, C.R., Henoch, M.A., Corn, L., & Binzer, S.M. (1990). Factors affecting adjustment to hearing loss [Abstract]. *Asha, 32*(10), 171.

Eriksson-Mangold, M., Ringdahl, A., Björklund, A.-K., & Wåhlin, B. (1990). The active fitting (AF) programme of hearing aids: A psychological perspective. *British Journal of Audiology, 24,* 277-285.

Fujikawa, S., & Cunningham, J.K. (1989). Practices and attitudes related to hearing: A survey of executives. *Ear and Hearing, 10*(6), 357-360.

Giolas, T.G., Owens, E., Lamb, S., & Schubert, E. (1979). Hearing Performance Inventory. *Journal of Speech and Hearing Disorders, 44*(2), 169-195.

Goldberg, L.R. (1972). Parameters of personality inventory construction and utilization: A comparison of prediction strategies and tactics. *Multivariate Behavioral Research Monograph* (No. 72-2).

Goldfried, M.R., & D'Zurilla, T.J. (1969). A behavioral-analytic model for assessing competence. In C.D. Spielberger (Ed.), *Current topics in clinical and community psychology* (Vol. 1, pp. 151-196). New York: Academic Press.

Gough, H.G., & Heilbrun, A.B. (1983). *The adjective check list manual.* Palo Alto, CA: Consulting Psychologists Press.

Gregory, R.J. (1992). *Psychological testing: History, principles and applications.* Boston: Allyn and Bacon.

Hallberg, L.R.-M., & Carlsson, S.G. (1991). Hearing impairment, coping and perceived hearing handicap in middle-aged subjects with acquired hearing loss. *British Journal of Audiology, 25,* 323-330.

Hallberg, L.R.-M., Eriksson-Mangold, M., & Carlsson, S.G. (1992). Psychometric evaluation of a Swedish version of the Communication Strategies Scale of the Communication Profile for the Hearing Impaired. *Journal of Speech and Hearing Research, 35*(3), 666-674.

Hartmann, D.P., Roper, B.L., & Bradford, D.C. (1979). Some relationships between behavioral and traditional assessment. *Journal of Behavioral Assessment, 1,* 3-21.

Hase, H.D., & Goldberg, L.R. (1967). Comparative validity of different strategies of constructing personality inventory scales. *Psychological Bulletin, 67,* 231-248.

Hawes, N.A., & Niswander, P.S. (1985). Comparison of the Revised Hearing Performance Inventory with audiometric measures. *Ear and Hearing, 6*(2), 93-97.

Hétu, R., Lalonde, M., & Getty, L. (1987). Psychosocial disadvantages associated with occupational hearing loss as experienced in the family. *Audiology, 26,* 141-152.

Hétu, R., Riverin, L., Getty, L., Lalande, N.M., & St-Cyr, C. (1990). The reluctance to acknowledge hearing difficulties among hearing-impaired workers. *British Journal of Audiology, 24,* 265-276.

High, W.S., Fairbanks, G., & Glorig, A. (1964). Scale for self-assessment of hearing handicap. *Journal of Speech and Hearing Disorders, 29,* 215-230.

Jacobson, G.P., & Newman, C.W. (1990). The development of the Dizziness Handicap Inventory. *Archives of Otolaryngology and Head Neck Surgery, 116,* 424-427.

Jacobson, G.P., Newman, C.W., Hunter, L., & Balzer, G.K. (1991). Balance function test correlates of the Dizziness Handicap Inventory. *Journal of the American Academy of Audiology, 2,* 253-260.

Jensen, B.J., & Haynes, S.N. (1986). Self-report questionnaires and inventories. In A.R. Ciminero, K.S. Calhoun, & H.E. Adams (Eds.), *Handbook of behavioral assessment* (2nd ed.) (pp. 150-175). New York: Wiley.

Kaplan, H., Bally, S.J., & Brandt, F. (1991). Communication Self-Assessment Scale Inventory for Deaf Adults. *Journal of the American Academy of Audiology, 2,* 164-182.

Kielinen, L.L., & Nerbonne, M.A. (1990). Further investigation of the relationship between hearing handicap and audiometric measures of hearing impairment. *Journal of the Academy of Rehabilitative Audiology, 23,* 89-94.

Knutson, J.F., & Lansing, C.R. (1990). The relationship between communication problems and psychological difficulties in persons with profound acquired hearing loss. *Journal of Speech and Hearing Disorders, 55,* 656-664.

Kuk, F.K., Tyler, R.S., Russell, D., & Jordan, H. (1990). The psychometric properties of a Tinnitus Handicap Questionnaire. *Ear and Hearing, 11* (6), 434-445.

Lamb, S.H., Owens, E., & Schubert, E.D. (1983). The revised form of the Hearing Performance Inventory. *Ear and Hearing, 4* (3), 152-157.

Lansing, C.R., & Seyfried, D.N. (1990). Longitudinal changes in personal adjustment to hearing loss in adult cochlear implant users. *Journal of the Academy of Rehabilitative Audiology, 23,* 63-77.

Lanyon, R.I., & Goodstein, L.D. (1982). *Personality assessment.* New York: Wiley.

Lichtenstein, M.J., Bess, F.H., & Logan, S.A. (1988). Diagnostic performance of the Hearing Handicap Inventory for the Elderly (Screening version) against differing definition of hearing loss. *Ear and Hearing, 9* (4), 208-211.

Linn, R.L., & Slinde, J.A. (1977). The determination of the significance of change between pre- and posttesting periods. *Review of Educational Research, 47* (1), 121-150.

Livneh, H. (1984). On the origins of negative attitudes toward people with disabilities. In R.P. Marinelli & A.E. Dell Orto (Eds.), *The psychological and social impact of physical disability* (2nd ed.) (pp. 167-184). New York: Springer.

Malinoff, R.L., & Weinstein, B.E. (1989a). Changes in self-assessment of hearing handicap over the first year of hearing aid use by older adults. *Journal of the Academy of Rehabilitative Audiology, 22,* 54-60.

Malinoff, R.L., & Weinstein, B.E. (1989b). Measurement of hearing aid benefit in the elderly. *Ear and Hearing, 10* (6), 354-360.

Marcus-Bernstein, C. (1986). Audiologic and nonaudiologic correlates of hearing handicap in black elderly. *Journal of Speech and Hearing Research, 29,* 301-312.

Marinelli, R.P., & Dell Orto, A.E. (Eds.). (1984). *The psychological & social impact of physical disability* (2nd ed.). New York: Springer.

McCarthy, P.A., & Alpiner, J.G. (1983). An assessment scale of hearing handicap for use in family counseling. *Journal of the Academy of Rehabilitative Audiology, 16,* 256-270.

McCartney, J., Maurer, I., & Sorenson, F. (1976). A comparison of the Hearing Handicap Scale and the Hearing Measurement Scale with standard audiometric measures on the geriatric population. *Journal of Auditory Research, 16,* 51-58.

Montano, J., & Malinoff, R.L. (1990). Effects of a unilateral hearing loss on adults [Abstract]. *Asha, 32* (10), 182.

Mulrow, C.D., Tuley, M.R., & Aguilar, C. (1990). Discriminating and responsiveness abilities of two hearing handicap scales. *Ear and Hearing, 11* (30), 176-180.

Mulrow, C.D., Tuley, M.R., & Aguilar, C. (1992). Sustained benefits of hearing aids. *Journal of Speech and Hearing Research, 35* (6), 1402-1405.

Myers, I.B., & McCaulley, M.H. (1985). *Manual: A guide to the development and use of the Myers-Briggs Type Indicator.* Palo Alto, CA: Consulting Psychologists Press.

Nay, W.R. (1979). *Multimethod clinical assessment.* New York: Gardner Press.

Nevo, B. (1985). Face validity revisited. *Journal of Educational Measurement, 22,* 287-293.

Newman, C.W., & Weinstein, B.E. (1986). Judgments of perceived hearing handicap by hearing-impaired elderly men and their spouses. *Journal of the Academy of Rehabilitative Audiology, 19,* 109-115.

Newman, C.W., & Weinstein, B.E. (1988). The Hearing Handicap Inventory for the Elderly as a measure of hearing aid benefit. *Ear and Hearing, 9* (2), 81-85.

Newman, C.W., & Weinstein, B.E. (1989). Test-retest reliability of the Hearing Handicap Inventory for the Elderly using two administrative approaches. *Ear and Hearing, 10*(3), 190-191.

Newman, C.W., Weinstein, B.E., Jacobson, G.P., & Hug, G.A. (1990). The Hearing Handicap Inventory for Adults: Psychometric adequacy and audiometric correlates. *Ear and Hearing, 11*(6), 430-433.

Newman, C.W., Weinstein, B.E., Jacobson, G.P., & Hug, G.A. (1991). Test-retest reliability of the Hearing Handicap Inventory for Adults. *Ear and Hearing, 12*(5), 355-357.

Owens, E., & Raggio, M. (1988). Performance Inventory for Profound and Severe Loss (PIPSL). *Journal of Speech and Hearing Disorders, 53*(1), 42-56.

Palmer, C.V. (1992). Computer administration of hearing performance inventories. *American Journal of Audiology, 1*(4), 13-14.

Parker, R.M., & Szymanski, E.M. (Eds.). (1992). *Rehabilitation counseling: Basics and beyond* (2nd ed.). Austin, TX: Pro-ed.

Pettegrew, L.S., & Turkat, I.D. (1986). How patients communicate about their illness. *Human Communication Research, 12*(3), 376-394.

Revelle, W. (1983). Factors are fictions, and other comments on individuality theory. *Journal of Personality, 51,* 707-713.

Rogers, C.R., & Dymond, R.F. (Eds.). (1954). *Psychotherapy and personality change.* Chicago: University of Chicago Press.

Ross, M. (1987). Aural rehabilitation revisited. *Journal of the Academy of Rehabilitative Audiology, 20,* 13-23.

Rowland, J.P., Dirks, D.D., Dubno, J.R., & Bell, T.S. (1985). Comparison of speech recognition-in-noise and subjective communication assessment. *Ear and Hearing, 6*(6), 291-296.

Schow, R.L., & Gatehouse, S. (1990). Fundamental issues in self-assessment of hearing. *Ear and Hearing, 11*(5), 6S-16S.

Schow, R.L., & Nerbonne, M.A. (1980). Hearing Handicap and Denver Scales: Applications, categories, interpretation. *Journal of the Academy of Rehabilitative Audiology, 13,* 66-77.

Schow, R.L., & Nerbonne, M.A. (1982). Communication screening profile: Use with elderly clients. *Ear and Hearing, 3*(3), 135-147.

Shontz, F.C. (1977). Physical disability and personality: Theory and recent research. In R.P. Marinelli & A.E. Dell Orto (Eds.), *The psychological and social impact of physical disability* (pp. 105-140). New York: Springer.

Skinner, M.W. (1988). *Hearing aid evaluation.* Englewood Cliffs, NJ: Prentice-Hall.

Smedley, T.C., & Schow, R.L. (1990). Frustrations with hearing aid use: Candid observations from the elderly. *Hearing Journal, 43*(6), 21-27.

Speaks, C.S., Jerger, J., & Trammell, J. (1970). Measurement of hearing handicap. *Journal of Speech and Hearing Research, 13*(4), 768-776.

Spitzer, J.B., Kessler, M.A., & Bromberg, B. (1992). Longitudinal findings in quality of life and perception of handicap following cochlear implantation. *Seminars in Hearing, 13*(3), 260-270.

Squier, R.W. (1990). A model of empathic understanding and adherence to treatment regimens in practitioner-patient relationships. *Social Science and Medicine, 30*(3), 325-339.

Stephens, D., & Hétu, R. (1991). Impairment, disability and handicap in audiology: Towards a consensus. *Audiology, 30*(4), 185-200.

Stephenson, W. (1952). Some observations on the Q-technique. *Psychological Bulletin, 49,* 483-498.

Swan, I.R.C., & Gatehouse, S. (1990). Factors influencing consultation for management of hearing disability. *British Journal of Audiology, 24,* 155-160.

Sweetow, R.W. (1984). Cognitive-behavioral modification in tinnitus management. *Hearing Instruments, 35*(9), 14-18, 52.

Sweetow, R.W. (1986). Cognitive aspects of tinnitus patient management. *Ear and Hearing, 7*(6), 390-399.

Sweetow, R.W., & Levy, M.C. (1990). Tinnitus severity scaling for diagnostic/therapeutic usage. *Hearing Instruments, 41* (2), 20-21, 46.

Tannahill, J.C. (1979). The Hearing Handicap Scale as a measure of hearing aid benefit. *Journal of Speech and Hearing Disorders, 44,* 91-99.

Thomas, A.J. (1984). *Acquired hearing loss: Psychological and psychosocial implications.* London: Academic Press.

Thomas, K., Thoreson, R., Butler, A., & Parker, R.M. (1992). Theoretical foundations of rehabilitation counseling. In R.M. Parker & E.M. Szymanski (Eds.), *Rehabilitation counseling: Basics and beyond* (pp. 207-247). Austin, TX: Pro-ed.

Tyler, R.S., Stouffer, J.L., & Schum, R. (1989). Audiological rehabilitation of the tinnitus client. *Journal of the Academy of Rehabilitative Audiology, 22,* 30-42.

Ventry, I.M., & Weinstein, B.E. (1982). The Hearing Handicap Inventory for the Elderly: A new tool. *Ear and Hearing, 3* (3), 128-134.

Ventry, I.M., & Weinstein, B.E. (1983). Identification of elderly people with hearing problems. *Asha, 25* (7), 37-42.

Walden, B.E., Demorest, M.E., & Hepler, E.L. (1984). Self-report approach to assessing benefit derived from amplification. *Journal of Speech and Hearing Research, 27,* 49-56.

Weinstein, B.E., Spitzer, J.B., & Ventry, I.M. (1986). Test-retest reliability of the Hearing Handicap Inventory for the Elderly. *Ear and Hearing, 7,* 295-299.

Weinstein, B.E., & Ventry, I.M. (1983). Audiometric correlates of the Hearing Handicap Inventory for the Elderly. *Journal of Speech and Hearing Disorders, 48,* 379-384.

Wilson, P.H., Henry, J., Bowen, M., & Haralambous, G. (1991). Tinnitus Reaction Questionnaire: Psychometric properties of a measure of distress associated with tinnitus. *Journal of Speech and Hearing Research, 34* (1), 197-201.

Wolpe, J. (1982). *The practice of behavior therapy* (3rd ed.). New York: Pergamon Press.

World Health Organization (WHO). (1980). *International classification of impairments, disabilities and handicaps: A manual of classification relating to the consequences of disease.* Geneva: World Health Organization.

Wright, B.E. (1983). *Physical disability: A psychosocial approach.* New York: Harper and Row.

Yuker, H.E. (Ed.). (1988). *Attitudes toward persons with disabilities.* New York: Springer.