

## Reliability of the Self-Assessment of Communication-Adolescent (SAC-A)

**Kelli Wright, Au.D.**

Northeast Ohio Au.D. Consortium  
Akron, Ohio

**Kris English, Ph.D.**

University of Akron  
Akron, Ohio

**Judy Elkayam, Au.D.**

Low Incidence Cooperative Agreement  
Mt. Prospect, Illinois

**Self-assessments give audiologists the opportunity to discuss comprehensive rehabilitation issues, including perceived impact of hearing loss on communication and social-emotional well-being. Until recently, few self-assessments existed for use with adolescents who are deaf or hard-of-hearing. In 2003, Elkayam and English modified a pre-existing questionnaire to create the Self Assessment of Communication-Adolescent (SAC-A), a 12-item survey with three subcategories: Hearing & Understanding, Feelings about Communication, and Other People. For a questionnaire to be clinically useful, it must be both psychometrically valid and reliable. Face validity for the SAC-A is high, as rated by a panel of pediatric audiology experts. The purpose of the present study was to evaluate reliability of the SAC-A. Twenty students between the ages of 11 and 19 years with educationally-significant hearing loss completed the SAC-A on two occasions. Pearson product-moment correlation for test-retest reliability was adequate (.76) for the total SAC-A. Internal consistency reliability, as measured by Cronbach's alpha, was determined to be acceptable (.85) for the first test session. Because correlations for test-retest and internal consistency were both satisfactory, the SAC-A can be considered a psychometrically reliable measure when used as a discussion tool for hearing disability and handicap in adolescents. Continued research is needed to determine if the SAC-A may be used as a measure of treatment efficacy for this population.**

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### Introduction

By nature of professional training, audiologists are uniquely qualified to provide counseling regarding hearing loss (Clark & English, 2004). This responsibility is twofold. Both informational and personal adjustment counseling are necessary for comprehensive care. Informational counseling focuses on facts and content, while personal adjustment counseling encompasses psychological, social, and emotional challenges. Personal adjustment topics are sensitive, and many audiologists feel inadequate addressing them (Clark & English, 2004).

Self-assessments which examine issues of disability, handicap, or both can be used to initiate personal adjustment conversations. Questionnaires used as counseling tools provide a relatively nonintrusive means of stimulating conversation (Elkayam & English, 2003). In this format, patients are able to express worries and difficulties safely (Kopun & Stelmachowicz, 1998; Mendel, 1997). By addressing the emotional aspects of hearing loss, personal adjustment counseling can enhance patient quality of life and adjustment to hearing impairment (Clark, 1994; Mendel, 1997).

At present, almost all hearing disability/handicap self-

assessments are designed for adults, e.g., Hearing Handicap Inventory-Adults (HHIA; Newman, Weinstein, Jacobson, & Hug, 1990), the Self Assessment of Communication (SAC; Schow & Nerbonne, 1982), and the Abbreviated Profile of Hearing Aid Benefit (APHAB; Cox & Alexander, 1995). Surveys regarding children's hearing disability/handicap also exist; however, they were either designed primarily for younger children (e.g., The Listening Inventory for Education [L.I.F.E.; Anderson & Smaldino, 1998]; Children's Peer Relationship Scale [English, 2002]) or they collect information from adults rather than from the child (e.g., Children's Auditory Performance Scale [CHAPS; Smoski, Brunt, & Tannahill, 1998]; Screening Instrument for Targeting Educational Risk [S.I.F.T.E.R.; Anderson & Matkin, 1989]).

Because adolescents experience life with hearing impairment differently from adults and children, they too could benefit from a unique disability/handicap questionnaire. To address this need, Elkayam and English (2003) designed the Self-Assessment of Communication-Adolescent (SAC-A). This short 12-item questionnaire evaluates three subcategories: Hearing & Understanding, Feelings about Communication, and Other People. Personal adjustment counseling can be facilitated through discussing a teen's responses to the SAC-A.

### ***Hearing Disability and Handicap in Adolescence***

For teenagers, the communicative challenges of hearing loss and resultant emotional and social sequelae can be especially challenging (Crowell, Hanenburg & Gilbertson, 2009). Peer rejection and low self-esteem are pervasive issues for students with hearing loss (Cappelli, Daniels, Duriex-Smith, McGrath, & Neuss, 1995). In fact, poor self-concept among hearing impaired youth seems independent of the degree of hearing impairment. Bess, Dodd-Murphy, and Parker (1998) analyzed the academic and social-emotional functioning of 1200 children with mild hearing loss. Despite their mild hearing thresholds, these children exhibited more self-esteem troubles than their peers.

Social interactions can be limited for teens with hearing impairment due to delay in communication skills and ability to understand others' feelings and perceptions (Clark & English, 2004). In general, youth with hearing loss describe themselves as having more difficulty making friends (Loeb & Sarigiani, 1986) and integrating into a social mainstream (Israelite, Ower, & Goldstein, 2002). Many do not have opportunities to interact with others like themselves, which can lead to feelings of inadequacy and detachment (Fusick, 2008). Social isolation can be even more intense for mainstreamed children with profound hearing loss who use American Sign Language (ASL; Mathos, 2005). Development of self-identity (Israelite et al., 2002; Ladd, Munson, & Miller, 1984; Stinson & Liu, 1999) and overall happiness (Kent & Smith, 2006; Risdale & Thompson, 2002) are related to the quality of peer interactions for students with hearing loss.

Due to the varied psychosocial and emotional difficulties associated with being deaf or hard of hearing, teen life satisfaction can be adversely affected. A 2004 study by Gilman, Easterbrooks, and Frey compared life satisfaction of 88 hearing impaired youth in residential and day schools to a control group of 71 normally hearing peers. Using the Multidimensional Students' Life Satisfaction Scale (MSLSS; Huebner, 1994), they found that youth with hearing impairment expressed lower life satisfaction than their peers with normal hearing. Friendship satisfaction was influenced the most by hearing status, but many domains were affected (Global, Family, and Living Environments). A recent pilot study investigated the health related quality of life (HRQOL) for children and adolescents with unilateral hearing loss, comparing their self-perceptions with those of parents, peers with bilateral hearing loss, and peers with normal hearing (Borton, Mauze, & Lieu, 2010). With respect to social-emotional well being, both similarities and differences existed between the adolescents' perceptions and those of their parents and peers. Youths' beliefs regarding personal quality of life changed over time and across activities, sometimes varying considerably. Evidence that hearing loss impact is neither static nor predictable should strengthen the

desire of audiologists to explore each adolescent's perception of disability and handicap through self-assessments and dialogue.

Adolescents can be challenging to counsel due to their unique developmental characteristics and needs. Teens are usually more apprehensive than adults to discuss their communication problems (Borton, Mauze, & Lieu, 2010; Elkayam & English, 1999). Despite the inherent road blocks, personal adjustment counseling is critical at the adolescent stage. Discussing psychosocial issues can allow a teen to capitalize on self-reflection, hypothetical thinking, and increased problem-solving skills (Petersen & Leffert, 1995). Counseling can ultimately lead to positive changes in behavior or perception (Lukomski, 2007).

### ***Psychometric Evaluation of the SAC-A***

The Self-Assessment of Communication-Adolescent is an ideal tool for discussing hearing disability and handicap with teens. For the SAC-A to be considered clinically useful, it must be found to have high psychometric validity and reliability (Nunnally, 1978). Validity determines whether a questionnaire assesses what it intends to measure. The other component of psychometric accuracy, reliability, is the degree of consistency between two or more observations of the same event.

When rated by a panel of pediatric experts (one educational audiologist, one school social worker, and one school administrator/teacher of students with hearing loss), the SAC-A was found to have high face validity (Elkayam & English, 2003). Each expert responded to a three-item questionnaire regarding the validity of SAC-A items. Face validity is described as how well a test appears to measure the domain in which it intends (Carmines & Zeller, 1979). Because the SAC-A was rated as having high face validity, audiologists can be confident that results assess the realms of hearing & understanding, feelings about communication, and other people.

Measurement of reliability is the next element of psychometric evaluation for the SAC-A. Reliability correlations demonstrate how stable responses remain each time questions are given under the same conditions (Carmines & Zeller, 1979). For a self-assessment to measure benefit or assess progress over time, it must have good reliability (Demorest & Walden, 1984).

Two of the most common reliability measures used for health-related questionnaires are test-retest reliability and internal consistency (Demorest & Walden, 1984). Test-retest reliability indicates how well patients maintain their relative score from one test session to another under the same conditions. The amount of time between test and retest must be large enough to minimize the effects of memory on the second administration (Nunnally, 1978). Pearson-product moment correlation ( $r$ ) is used to calculate test-retest reliability.

As mentioned above, the second reliability measure used for

self-assessments is internal consistency. Internal consistency is an estimate of how well items in a group are interrelated (Nunnally, 1978). Cronbach’s alpha ( $\alpha$ ) is calculated for internal consistency. High alpha values provide justification for generalizing an observed score to others in a similar set of items (Demorest & Walden, 1984).

The present study (approved by the Institutional Review Board at the University of Akron) was designed to measure the test-retest reliability and internal consistency of the SAC-A. High reliability and consistency results would provide credibility to this instrument and help to fill the void of self-assessment measures specific to this population.

**Method**

**Participants**

Twenty individuals (14 females, 6 males) ranging in age from 11 to 19 years old (mean=16.69 years) participated. Each adolescent had an educationally-significant hearing loss, as defined by the Ohio Department of Education (2008), and received services from educational audiologists.

Participants were recruited from several parts of the United States: 11 from Ohio, 5 from Minnesota, 2 from Illinois, and 2 from Washington (see “Acknowledgements” for names of data collectors). Teens were informed orally and in writing that their participation was voluntary and they could refuse continued participation at any time, per National Institutes on Deafness and Other Communication Disorders (1999) guidelines. Parental consents and participant assents were collected per IRB protocols. All students remained in the study for the entire duration.

**Instrument**

The Self-Assessment of Communication-Adolescent (see Appendix) is a 12-item questionnaire that explores an adolescent’s hearing disability and handicap experience (Elkayam & English, 2003). It was modified from an existing tool for adults (Schow & Nerbonne, 1982). The SAC-A is composed of three domains: Hearing & Understanding, Feelings about Communication, and Other People. For each question, teens are asked to rate the frequency of occurrence for specific behaviors or feelings along a five-point Likert scale ranging from “almost never” (one point) to “almost always” (five points). Higher score values indicate greater perceived disability/handicap.

**Procedures**

Teens with hearing impairment received a recruitment handout from their educational audiologist inviting them to participate in the study. An unknown percentage of students who were approached regarding the study decided not to participate. After

parental consent and participant assent forms were signed, each participant completed the SAC-A using a paper-and-pencil method on two separate occasions. All twenty participants completed the SAC-A in its entirety for both test administrations. The average interval between the first and second session was 19 days (range = 14 to 28 days). Nunnally (1978) suggests that allowing two weeks between test and retest allow for short-term fluctuations in ability and personality to be established.

During both instances, the questionnaire was given in the student’s preferred modality (read by the student or signed in ASL by an interpreter). The chosen modality was consistent between test and retest sessions. Participants were given \$10 gift cards after they completed the retest administration.

**Analysis**

Statistics were compiled separately for the total SAC-A and its three subcategories. Descriptive values (mean, standard deviation, and range) were analyzed for both test sessions. Test-retest reliability was calculated using Pearson’s product moment correlation coefficient ( $r$ ). Internal consistency reliability was also evaluated for both test sessions using Cronbach’s alpha ( $\alpha$ ).

**Results**

Mean, standard deviation, and range for both test sessions are shown in Table 1. The mean scores for total SAC-A and each subcategory were closely related between the two assessments. The variability of responses, as shown by standard deviation, was also similar between test and retest.

Table 2 displays the Pearson product moment correlations ( $r$ ) for total SAC-A and the three subcategories. Nunnally (1978)

**Table 1. Mean, Standard Deviation, and Range Associated with Test-Retest Assessment of the Total SAC-A and the Three Subcategories (N=20)**

		1st SAC-A	2nd SAC-A
Total SAC-A	Mean	28.9	28.1
	SD	8.6	8.2
	Range	15-45	14-44
Hearing & Understanding at Different Times	Mean	16.6	15.2
	SD	4.5	4.2
	Range	9-23	8-23
Feelings about Communication	Mean	6.2	6.5
	SD	3	3.5
	Range	3-12	3-15
Other People	Mean	6.3	6.2
	SD	2.2	2.5
	Range	3-11	3-11

**Table 2. Pearson Product Moment Correlation (r) Associated with Test-Retest Assessment of the Total SAC-A and the Three Subcategories (N=20)**

	r
Total SAC-A	0.76
Hearing & Understanding at Different Times	0.70
Feelings about Communication	0.68
Other People	0.83

proposed a correlation coefficient of 0.7 or higher to be considered modest reliability. Using this criterion, the test-retest reliability for total SAC-A was adequate (0.76). Levels of correlation for the subcategories ranged from 0.68 - 0.83.

Cronbach's alpha values are displayed in Table 3 for the first and second test sessions. Alpha values of 0.85 or higher are considered satisfactory in health-related fields for outcome measures (Hyde, 2000). The scale yielded adequate internal consistency with Cronbach alpha values of 0.85 for the first test session and 0.81 for the second.

### Discussion

The purpose of the present study was to determine the reliability of the Self Assessment of Communication-Adolescent using a paper-and-pencil method. Degree of correlation for test-retest was adequate for the total SAC-A and its three subcategories.

This finding suggests SAC-A responses are generally consistent between test periods. Internal consistency was high ( $\alpha = 0.85$ ) for the first test administration. This indicates how well items on the SAC-A are interrelated. The second test had a slightly below adequate alpha value of 0.81. Because test-retest reliability and internal consistency were both sufficient, the SAC-A is considered a reliable measure for personal adjustment counseling of adolescents with hearing loss when used as a qualitative catalyst for dialogue.

There are several possible reasons for the variance in internal consistency between the two test sessions (0.85 & 0.81). Studies of reliability have several opportunities for error. Mood, health, and concentration of the participant can all be factors (Cox & Gilmore, 1990). These variables may be especially important to consider when working with adolescents, given their immature cognitive

**Table 3. Cronbach's Alpha ( $\alpha$ ) Associated with Test-Retest Assessment of the SAC-A and the Three Subcategories (N=20)**

	1 <sup>st</sup> SAC-A $\alpha$	2 <sup>nd</sup> SAC-A $\alpha$
Total SAC-A	0.85	0.81
Hearing & Understanding at Different Times	0.74	0.62
Feelings about Communication	0.73	0.81
Other People	0.44	0.74

processing of information and emotion (Weinberger, Elvevag, & Giedd, 2005).

The sample size for the present investigation was small. This is typical for studies that involve teens who are hearing impaired. Because of the limited number of participants, it was not possible to determine if degree of hearing loss, gender, age, or hearing aid style was a significant factor in the responses given.

### Future Studies

Self-assessments are often used as a measurement of treatment efficacy. For the SAC-A to be used this way, further psychometric evaluation is necessary. Outcome measures should have a test-retest correlation of 0.8 or better (Nunnally, 1978). This study found a reliability level close to this threshold, but not quite high enough (0.76 for the total SAC-A). Another analysis, standard error of measurement, should also be calculated for outcome measures (Nunnally, 1978). Standard error of measurement must be low so that changes due to treatment can be accurately documented.

Elkayam and English (2003) suggest that completing the SAC-A in a face-to-face format allows for greater flexibility during the interview. Orally discussing SAC-A questions is also likely to avoid misunderstandings due to poor reading comprehension. When responses are used only for dialogue, rather than treatment efficacy, the need for high reliability is not as pressing. Discussing differences between two SAC-A test sessions allows clinicians to spur conversation and personal adjustment. This opportunity can be used to discover why a teen has varied his or her response. Despite the lesser importance for reliability in dialogue format, it would be valuable to determine the SAC-A psychometric reliability when completed face-to-face.

Psychometric reliability and validity should also be measured for the SAC-A companion questionnaire, the Significant Other Assessment of Communication-Adolescent (SOAC-A) (Elkayam & English, 2003). This assessment allows a friend to answer 12 questions, which mirror those on the SAC-A. The friend is asked to rate his impression of the hearing impaired teen's communication skills, social and emotional well-being. By comparing these two surveys with the patient, clinicians can stimulate discussion and help facilitate the personal adjustment process (Elkayam & English, 2003).

Another suggestion for further study is to compare SAC-A responses for different degrees of hearing loss, gender, or age. Although each teen is unique, small sample sizes may impact the statistical significance of measured differences or make it problematic to account for all variables. A large scale study involving the SAC-A would be very valuable for the field of audiology to increase accuracy of the psychometric data, identify characteristics that may influence adolescent approaches to hearing loss management,



and expand audiologists' knowledge about the attitudes and beliefs of adolescents who are hard-of-hearing or deaf.

In conclusion, the acceptable test-retest correlation and adequate internal consistency found in this study attest to the psychometric reliability of the SAC-A. These findings support the use of the SAC-A as a discussion tool for hearing disability and handicap in adolescents. Continued research is necessary if the assessment is to be used as an outcome measure for the adolescent population.

## Appendix

### Questions from the

### ***SELF-ASSESSMENT OF COMMUNICATION-- ADOLESCENT (SAC-A)***

**1 = almost never 2 = occasionally 3 = about half the time 4 = frequently 5 = almost always**

Please select the appropriate number to answer the following questions:

- 1) Do you experience communication difficulties in situations when speaking with only one other person? (for example, when talking to a teacher or classmate; a clerk at a store; a server at a restaurant; a co-worker or your boss; someone providing information/directions, etc.)
- 2) Do you experience communication difficulties when talking with a small group of people? (for example, during holidays or other family gatherings; in language or science labs or in small discussions; while driving or riding in a car; during extracurricular activities like sports, clubs, etc.)
- 3) Do you experience communication difficulties when listening to someone speak to a large group? (for example, during class discussions or school assemblies; when taking notes in school; in a house of worship, etc.)
- 4) Do you experience communication difficulties while participating in various types of entertainment? (for example, movies, TV, radio/CD's, musical entertainment, plays, shopping, talking with friends, etc.)
- 5) Do you experience communication difficulties in situations when other people could also have trouble hearing? (for example, at a noisy party; when there is background noise/music; when someone whispers or is soft-spoken; when someone talks while moving around; from a great distance or outdoors; in the hallways at school before, after, or in between classes; in the cafeteria or gym, etc)
- 6) Do you experience communication difficulties when using or listening to various communication devices? (for example, telephone, telephone ringing; doorbell; radio; PA system at school' alarms; computer, etc)
- 7) Does your hearing loss interfere with your social life?
- 8) Does any problem or difficulty with your hearing loss upset you?
- 9) Does the hearing loss keep you from doing things that might be fun?
- 10) Do other people ever notice that you have a hearing loss?
- 11) Do you feel left out of conversations or do other people become frustrated when talking to you because of hearing problems?
- 12) Do people get a wrong impression when they first meet you because of hearing problems?

\*Modified, with permission, from *Self Assessment of Communication* (Schow and Nerbonne, 1982).

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