The Relationship Between the Allen Cognitive Level Test and the Life Skills Profile

Suzie Keller, Robyn Hayes

Key Words: adaptive behavior • independent living skills (human activities) • schizophrenia

Objectives. The purpose of this study was to further evaluate the validity of the Allen Cognitive Level Test (ACL-90) as a measure of the construct of "adaptive functioning" and to determine its effectiveness in discriminating between persons who live in the community and persons who are institutionalized.

Method. Forty-one persons with schizophrenia living in the community and 17 persons with schizophrenia living in a long-term psychiatric hospital were assessed with the ACL-90 and the Life Skills Profile (LSP). Scores on the two measures were compared, as was the effectiveness of the two measures in discriminating between the participant groups.

Results. The ACL-90 scores correlated moderately with the LSP total, \( r(56) = .54, p < .01 \), and Self-Care Subscale, \( r(56) = .53, p < .01 \). Only the Non-turbulence subscale of the LSP discriminated between the community and institutionalized participant groups. The behavior of the participants living in the community was less turbulent than that of the participants who were institutionalized, \( F(1,54) = 15.24, p < .001 \).

Conclusion. Although the moderate correlations between the ACL-90 and the LSP measures support the ACL as a measure of adaptive functioning and reflect its theoretical perspective, additional information is needed to predict the community functioning and support needs of persons with schizophrenia.

The Allen Cognitive Level Test (ACL) has been used extensively by occupational therapists in North America, Israel, and Australia as a standardized screening test of cognitive function (Allen, 1985). According to Allen's model, a person's performance on the ACL can be generalized to tasks such as activities of daily living (ADL) and is indicative of his or her ability to function in the community or his or her adaptive functioning (Denton, 1988). Clinicians use ACL scores to describe (a) the functional abilities that can be expected of clients at each cognitive level, (b) the type of assistance they would require to safely complete different tasks, and (c) the rehabilitation necessary for clients at different levels to relearn tasks, learn new tasks, or perform adapted tasks (Allen, Earhart, & Blue, 1992). This article evaluates aspects of the psychometric properties of the ACL to help clarify whether it reliably measures adaptive functioning.

Literature Review

The ACL has been revised in response to extensive research, and several versions have been published: ACL-Original (ACL-O) (Allen, 1985), ACL-Extended (ACL-E) (Earhart & Allen as cited in Allen et al., 1992), ACL-
Problem Solving (Josman & Katz, 1991), Enlarged ACL (Kehrberg, Kuskowski, Mortimer, & Shoberg, 1992), and ACL-90 (Allen, 1990). Of all of these, the ACL-90 is thought to be the most sensitive to changes in cognitive functioning (Allen, 1991, 1992).

The ACL involves the sensorimotor task of leather lacing. Clients are required to replicate three different leather lacing stitches of increasing complexity: the running stitch, the whip stitch, and the single cordovan stitch. The first two stitches are attempted after a demonstration by the therapist. The single cordovan stitch is completed independently to test the client's problem-solving ability (Allen et al., 1992). Although the test has no time limit, it is relatively quick and easy to administer, usually taking less than 15 min per client (Howell, 1993).

ACL scores are based on the quality and complexity of the stitches produced. Results yield an ordinal score on a 25-point scale, ranging from Cognitive Level 3.0 (realizes the presence of the leather by grasping it or pushing it away) to Cognitive Level 5.8 (able to replicate the most complicated stitch independently). Cognitive Levels 1 and 2 cannot be assessed with the ACL because persons at these levels are unable to attempt the task (Josman & Katz, 1991). Allen and Allen (1987) observed that occupational therapy practice usually focuses on persons functioning from Cognitive Levels 3 to 5 and that clients with long-term schizophrenia commonly function at Cognitive Level 4. High levels of interrater reliability have been obtained with the ACL for a range of psychiatric disorders (e.g., Davidhizar, Cosgray, Smith, & Fawley, 1991; Howell, 1993; Penny, Mueser, & North, 1995), and test–retest reliability has been established with clients with schizophrenia (Allen et al., 1992).

Although researchers have investigated the validity of various versions of the ACL (e.g., Katz & Heimann, 1990; Katz, Josman, & Steinmetz, 1988), only a few have focused on the ACL's validity as a measure of "adaptive functioning." Heying (1985) found a correlation of .82 (p < .001) between the ACL-O and the combined scores of the Physical Self-Maintenance Scale (PSMS) and the Instrumental Activities of Daily Living (IADL) scale of the Lawton and Brody ADL scales when administered to persons with dementia. The correlations of the ACL-O with the PSMS ranged from .65 to .83, and the correlations of the ACL-O with IADL ranged from .32 to .68. Heying concluded that cognitive disability "produces observable limitations in routine task behavior" (p. 358). Other researchers have studied the relationship between the ACL-O and the Routine Task Inventory (the ADL scale adapted from the PSMS and IADL) when administered to persons with a range of psychiatric conditions and have found significant, moderate (r = .56, p < .01) to high (r = .88, p < .001) correlations (Heimann, Allen, & Yerxa, 1989; Kehrberg et al., 1992; Wilson, Allen, McCormack, & Burton, 1989). Velligan, True, Lefon, Moore, and Flores (1995) claimed to have provided some of the strongest evidence of the concurrent validity of the ACL. They found significant correlations to range from .46 (p < .01) to .67 (p < .001) for the ACL-90 and the Functional Needs Assessment when administered to persons with schizophrenia from different ethnic groups.

In contrast to these findings, Davidhizar et al. (1991) found a weak correlation between the ACL-E and the Nurses Observation Scale for Inpatient Evaluation-30 (NOSIE-30) (r = .35, p < .05) for persons with psychiatric disorders. The NOSIE-30 measures some behaviors related to adaptive functioning (e.g., self-care) as well as factors such as psychiatric symptomatology. In a study of persons with acute psychiatric disability, Fung Ho and Sturgess (1990) found no relationship between the ACL-E and the Task Oriented Assessment (TOA) component of the Bay Area Functional Performance Evaluation. The TOA requires participants to complete five abstract tasks which, its authors believe, require the same skills as those necessary for adaptive functioning (Bloomer & Williams, 1982). The TOA is a norm-referenced assessment unlike most other measures of adaptive functioning, which are criterion-referenced (Bloomer & Williams, 1982).

Although the ACL is thought to be a measure of adaptive functioning rather than of cognition, it appears to be most closely related to assessments that measure an ADL-based construct of adaptive functioning. To add to the body of studies evaluating the construct validity of the ACL, we hypothesized that persons with schizophrenia who obtain low scores on measures of adaptive functioning are more likely to be living in long-term institutional care than are persons with schizophrenia who obtain high scores on the same measures.

Method

Participants

The participants were 58 adults recruited from one long-term residential psychiatric hospital (n = 17) and one community psychiatric rehabilitation unit (n = 41) in Brisbane, Australia. The inclusion of both hospital and community participants increased the likelihood of a range of scores. The participant ages ranged from 20 to 57 years (M = 35.50 years, SD = 9.85). Fifty-three participants met Diagnostic and Statistical Manual of Mental Disorders (3rd edition, revised) criteria (American Psychiatric Association, 1987) for a diagnosis of schizophrenia, 4 had a schizo-affective disorder, and 1 had schizophreniform psychosis. All participants
were stable on their current medication. The hospital participants were 6 months into a trial of the antipsychotic medication clozapine. None of the participants had a concurrent neurological disorder (see Table 1).

**Instruments**

In addition to the ACL-90 (standard format), the LSP (Rosen et al., 1989) was used in this study. The LSP is an internationally accepted measure of the adaptive functioning of persons with schizophrenia, who are known to have deficits in this area. It is also one of six assessments being studied as a potential national outcome measure for persons with psychiatric disabilities living in Australia (Andrews, Peters, & Teeson, 1994). The LSP is composed of 39 items organized into five subscales: Communication (6 items), Nonturbulence (12 items), Responsibility (5 items), Self-Care (10 items), and Social Contact (6 items: e.g., abuse of alcohol and drugs, taking offense readily, violence toward others) (Parker & Rosen, 1989). Each item is rated on a four-point Likert scale, with 4 indicating the most functional and 1 indicating the most disabled. The LSP yields five subscale scores and a total score. Potential total scores range from 39 (lowest possible functioning) to 156 (highest possible functioning).

The LSP is intended to be completed by an objective rater who knows the client well and has observed his or her behavior over the previous 3 months. The items are free from jargon and include specific examples so that the rater need not be a health professional. Ratings may also be completed through interview of the client or primary caregiver. Time taken to complete the LSP varies from 20 min to 25 min (Andrews et al., 1994).

Test–retest reliability of the LSP has been established for parents, residential caregivers, and health professionals (.78–.90) (Parker, Rosen, Emdu, & Hadzi-Pavlovic, 1991). High interrater reliability has been established for raters with the same background (e.g., health professionals compared with other health professionals [.77]), but low between raters of different backgrounds (e.g., family members compared with caseworkers [.36]). Excellent internal consistency has also been demonstrated (.67–.88) (Rosen et al., 1989).

Concurrent validity for the LSP has been established with the Katz Adjustment Scale (KAS) (Parker et al., 1991) (total r = .65). The total KAS scores were most strongly correlated with the Self-care (−.47), Nonturbulence (−.61), and Communication subscales (−.60) of the LSP. Predictive validity was demonstrated when Parker and Hadzi-Pavlovic (1995) found that the LSP predicted hospital readmission for clients with schizophrenia. Andrews et al. (1994) found adequate content and construct validity. The LSP is also sensitive to change; it detected improvement in clients with long-term mental illness who were receiving treatment from a mobile, community-management team (Hambridge & Rosen, 1994).

### Table 1
**Participant Demographics**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>43</td>
<td>74</td>
</tr>
<tr>
<td>Female</td>
<td>15</td>
<td>26</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>45</td>
<td>78</td>
</tr>
<tr>
<td>Separated or divorced</td>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td>Married or cohabiting</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>Employment status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disability pension</td>
<td>39</td>
<td>67</td>
</tr>
<tr>
<td>Unemployed or sickness benefits</td>
<td>12</td>
<td>21</td>
</tr>
<tr>
<td>Home duties</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Volunteer work</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Paid employment</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Retired</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

Note. N = 58.

**Procedure**

After obtaining informed consent from the participants, the ACL-90 and the LSP were administered, according to standardized guidelines. The principal rater of the ACL-90 was an experienced occupational therapist who had been trained in ACL-90 administration and scoring. All ACLs were scored and videotaped, and 60% were randomly selected and assessed by another occupational therapist to establish interrater reliability.

The LSP rater for each participant in the community group was the primary caregiver identified by the participant, usually a family member or case manager. All caregivers received an LSP form, a formatted letter explaining the form, and a stamped self-addressed return envelope. For participants in the hospital group, a research nurse trained in the administration of the LSP interviewed a nursing staff member who knew the person well.

The LSP and the ACL were administered in a random order, with both evaluations being completed within days of each other. Although LSP interrater reliability was not evaluated because there were almost as many LSP raters as participants, we believe that the results are likely to accurately reflect participants' functioning because each rating was either made by a person who knew the individual participant well or directly based on information obtained from someone who knew the individual participant well.

**Results**

Pearson product–moment correlations were used to analyze the relationship between the ACL-90 scores (M = 4.7, SD = .61) and the LSP total score (M = 124.41, SD = 14.97), the Communication subscale score (M = 20.12, SD = 2.9), the Nonturbulence subscale score (M = 40.98, SD = 5.26), the Responsibility subscale score (M = 16.88, SD = 2.76), the Self-Care subscale score (M = 31.22, SD = 5.87), and the Social Contact subscale score (M = 15.22, SD = 4.21). As indicated in Table 2, the ACL-90 correlated significantly with the LSP total and all five subscale scores. The ACL-90 correlated moderately with the LSP total, r(56) = .54, p < .01, and the
Self-Care subscale scores \( r(56) = .53, p < .01 \). The correlations between the ACL-90 and the other four LSP subscales were low.

Because of differences of opinion about whether the ACL-90 scores should be treated as ordinal or interval data (e.g., Penny et al., 1995; Velligan et al., 1995), Spearman rank-order correlation coefficients were also used to analyze the relationship between the ACL-90 and the LSP scores. The results were very similar to those obtained with the Pearson product-moment correlations and, therefore, are not included. Interrater reliability for the ACL was also calculated with Pearson product-moment correlations, and a moderate but acceptable correlation was obtained between the scores of the two raters, \( r(34) = .70, p < .00 \).

To assess differences in adaptive functioning between groups, a one-way multivariate analysis of variance (MANOVA) (Coakes & Steed, 1996) was performed with six dependent variables (ACL vs. five LSP subscales) and one independent variable (community vs. hospital living status). The overall group effect was significant, \( F(6, 51) = 3.07, p < .05 \), but the univariate ANOVAs were significant for the Nonturbulence scores only, \( F(1, 54) = 15.24, p < .001 \). That is, the only aspect of adaptive functioning that distinguished the community group from the hospitalized group was the turbulence of their behavior. Participants living in the community demonstrated considerably less turbulent behavior than did participants living in the hospital.

Discussion

Like a number of previous studies, this study found a significant, moderate relationship between the ACL-90 and a comparison measure—the LSP. A higher level of turbulence in the participants living in a hospital, as measured on the LSP, was the only rating that distinguished them from the participants living in the community.

The correlations between the ACL-90 and the LSP total and the LSP Self-Care subscale scores are similar to those found in other studies supporting the validity of the ACL-90. For example, Velligan et al. (1995), who obtained correlations of .46 to .67 for the ACL-90 and the Functional Needs Assessment for persons with schizophrenia, concluded that the ACL-90 “is a valid predictor of concurrent level of adaptive functioning” (p. 107). Streiner (1993) recommended a correlation between .30 and .70, stating that if the correlation between the new and gold standard tests is .70 or over, then the two are tapping very much the same thing and there is little room for the new test to be any better than the original. If the correlation is too low (below .30 or so), then the measures are not related at all. (p. 145)

The moderate correlation between the LSP Self-Care subscale and the ACL is in keeping with the theoretical perspective of the ACL. Of the five subscales, Self-Care is the one most closely aligned theoretically with the ACL. It measures aspects of functioning, such as grooming, bathing, food preparation, and budgeting, that deteriorate as a result of cognitive disability (Allen & Allen, 1987). In contrast, the other subscales generally measure behaviors that are less likely to be influenced by cognitive disability (e.g., talking about strange ideas [communication], being unwilling to take psychiatric medication [responsibility], taking things that do not belong to one [nonturbulence], and being generally inactive [social contact]).

Although different authors have suggested that moderate correlations support the concurrent validity of various versions of the ACL, a correlation of .54 only accounts for an overlap of about 30% of the ACL and LSP. Hence, the measures are not interchangeable; each measure taps an area of functioning that is not tapped by the other. Because the ACL and a number of measures with which it has been compared, including the LSP, are intended to measure adaptive functioning, it is important to identify the source of this difference and how important that difference is in predicting the adaptive functioning and support needs of persons with schizophrenia.

Limitations

A limitation of this study is the likelihood that some of the difference is due to discrepancies in raters’ scoring of the measures or to rater error, particularly for the LSP, which was rated by a different rater for each participant living in the community (\( n = 41 \)) and rated based on interviews with a number of different nursing staff members for the participants living in a hospital (\( n = 17 \)). With such a large number of raters from different backgrounds, interrater reliability is likely to be influenced. This issue is intrinsic to all such measures that need to be scored by a person who knows the participant well and, thus, cannot be the same for all or most participants.

Table 2

<table>
<thead>
<tr>
<th>Test</th>
<th>ACL Total</th>
<th>Communication</th>
<th>Nonturbulence</th>
<th>Responsibility</th>
<th>Self-Care</th>
<th>Social Contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACL</td>
<td>.543**</td>
<td>.652**</td>
<td>.482**</td>
<td>.244*</td>
<td>.478**</td>
<td>.430**</td>
</tr>
<tr>
<td>LSP Total</td>
<td>.367**</td>
<td>.746**</td>
<td>.371**</td>
<td>.413**</td>
<td>.509**</td>
<td>.627**</td>
</tr>
<tr>
<td>LSP Communication</td>
<td>.396**</td>
<td>.541**</td>
<td>.149</td>
<td>.330*</td>
<td>.278*</td>
<td>.189</td>
</tr>
<tr>
<td>LSP Nonturbulence</td>
<td>.260*</td>
<td>.818**</td>
<td>.314</td>
<td>.287*</td>
<td>.818**</td>
<td>.189</td>
</tr>
<tr>
<td>LSP Responsibility</td>
<td>.509**</td>
<td>.679**</td>
<td>.411**</td>
<td>.478**</td>
<td>.709**</td>
<td>.430**</td>
</tr>
<tr>
<td>LSP Self-Care</td>
<td>.509**</td>
<td>.818**</td>
<td>.371**</td>
<td>.413**</td>
<td>.509**</td>
<td>.430**</td>
</tr>
<tr>
<td>LSP Social Contact</td>
<td>.278*</td>
<td>.679**</td>
<td>.411**</td>
<td>.330*</td>
<td>.278*</td>
<td>.189</td>
</tr>
</tbody>
</table>

Note: ACL = Allen Cognitive Level Test; LSP = Life Skills Profile.

*Correlation is significant at the .05 level (one-tailed). **Correlation is significant at the .01 level (one-tailed).
Some differences in ratings could result from the different demands associated with the different situations in which different raters observe participants as well as the familiarity of raters with those whom they are rating. For example, parents are likely to know their children better than do health professionals and, thus, rate them differently (Parker et al., 1991). However, it would be extremely difficult to evaluate the influence of situational demands and familiarity with the participant on the LSP scores.

This concern is a dilemma not only for this study, but also for all occupational therapy practitioners who assess community functioning for clinical or research purposes. There is much debate regarding who can best evaluate a person's adaptive functioning: family members who are in frequent contact but might have high levels of emotional involvement, "impartial" health professionals who see the person relatively infrequently, or the person himself or herself (e.g., Strauss, 1992). The ACL, with its generally high levels of interrater reliability, does not suffer from these concerns because its rating depends on a rater's observations of one standardized task.

The inability of the two measures to discriminate between participants living in the community and participants living in a hospital, with the exception of the Nonturbulence subscale of the LSP, is possibly a reflection of the amount of support available to those living in the community. These participants live in an urban area that is well-served by a number of nongovernment and government agencies in Australia, including community mental health clinics that provide extensive case management. With high levels of community support available, even persons with schizophrenia who have very low levels of adaptive functioning skills are able to live in the community. The exception to this would be persons who exhibit characteristics like those on the Nonturbulence subscale of the LSP (e.g., violent, reckless, intrusive behavior; substance abuse; conflict with co-residents), which are likely to be unacceptable in most supported, shared accommodation. Additionally, persons with such behaviors could be unresponsive to the available community services.

Because the community participants were not a randomly selected sample, it is also possible that the difference in Nonturbulence scores was an artifact of the sampling method. Furthermore, they were recruited from a community rehabilitation program which may not be representative of the general population of persons with schizophrenia living in the community. Possibly only more cooperative, less "prickly," less "irresponsible" (Parker & Rosen, 1989) persons with schizophrenia would be accepted by and attend such a rehabilitation program. It is also possible that the turbulent behaviors identified in the hospitalized group resulted from and did not contribute significantly to the participants' institutionalization.

This study provides further support for the ACL as a measure of the construct of adaptive functioning. However, because no one study can establish construct validity, the ACL needs to be consistently correlated with different measures that tap "various aspects of the hypothetical construct" (Streiner, 1993, p. 146) demonstrating that the ACL conforms to predictions about it from underlying theory. The results of this study, therefore, need to be considered with the results of other studies, like those discussed in this article, which have correlated the ACL with other measures of adaptive functioning. Considered together, these studies suggest that the ACL is a valid measure of the construct of adaptive functioning. However, this cannot be stated conclusively without a systematic review and meta-analysis of all relevant data.

From this research, it is impossible to say whether the ACL or the LSP is the more accurate measure of the construct of adaptive functioning with the principal evidence being a significant, moderate correlation between the two assessments. The best indication of the efficacy of a measure of adaptive functioning is its ability to predict how a person functions in the community. However, given that, with sufficient support, even persons at a relatively low level of adaptive functioning are likely to be able to live in the community (if their behavior is not overly turbulent), researchers and clinicians need to consider how best to assess functional ability.

Although the ACL scores did not predict living status, this does not mean that they do not reflect adaptive functioning. Although the ACL is intended to be "a screening tool designed to provide a quick assessment of a person's ability to function" (Farhart, Allen, & Blue, 1993, p. 1), the construct of adaptive function is multifaceted and has been defined in different ways. This study reinforces the ACL as a measure of some aspects of function, particularly self-care. The results also suggest that adaptive functioning alone cannot predict community tenure, which likely involves a number of different areas of functioning, such as cognitive ability, communication skills, and the degree of turbulent behavior. Clinicians need to consider these factors when predicting a client's ability to function safely and lead a quality life in the community. ▲

Acknowledgments

We thank the staff members of the Queensland Centre for Schizophrenia Research (QCSR) and the Psychiatric Assessment and Rehabilitation Unit (PARU) for their assistance in participant recruitment, data collection, and coding. We also thank John McGrath, MBBS, PhD, FRANZCP, Ray Charrterton, MBChB, and Sue VanLent, RN, from QCSR; Kim Halford, PhD, Sarah Simpson, BSc Applied Science (OT), Grad Dip. CMH, and Kerrie Thompson, B.OC. Thy., from PARU; and Delaune Pollard, Dip. Occ. Thy., C.DOT, for her time and expertise in rating the ACL.

References


