

The Earning Capacity Assessment Form-2: An Exploratory Study of Its Inter-Rater Reliability

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This exploratory study examined the inter-rater reliability of the Earning Capacity Assessment Form-2 (ECAF-2). Four raters used the instrument to evaluate 20 claims of loss of earning capacity, relying on clinical interview information and standardized test results an experienced vocational expert reported; they also reviewed relevant records and performed research to conduct their analyses. Correlation coefficients significant at the .001 levels emerged in analyses of all 14 ECAF-2 factors, and ranged from .71 to .90. Analyses of ECAF-2 Drivers and Inhibitors, and raters' estimates of loss of earning capacity yielded the following correlation coefficients: ECAF-2 Inhibitors, .91; ECAF-2 Drivers, .93; and loss of earning capacity assessments, .94. Subjects agreed or strongly agreed the ECAF-2 facilitated their evaluations 78.6% of the time.

Inter-rater reliability—a measure of raters' agreements of observations—has particular relevance when subjective assessments contribute to analyses and opinions, such as opinions related to claims of loss of earning capacity. The Earning Capacity Assessment Form-2 (ECAF-2; Shahnasarian, 2001; 2004a; 2010a; 2010b, 2011), a standardized instrument developed to facilitate vocational expert witness' analyses of claims of loss of earning capacity, has undergone numerous studies (summarized below) to establish its validity and reliability. To further assess its utility to vocational experts and others interested in earning capacity questions, the present exploratory study examined the instrument's inter-rater reliability.

This article provides general information about the ECAF-2. The present inter-rater reliability study is then described.

The Earning Capacity Assessment Form-2: An Overview

Developed in 2001 (Shahnasarian, 2001) and commercially available since 2004 (Shahnasarian, 2004a), Psychological Assessment Resources, Inc., published the ECAF-2 (Shahnasarian, 2010a) in 2010. It is the only validated measure available to facilitate voca-

tional evaluators' assessments of claims of loss of earning capacity.

Ten postulates, specified by Shahnasarian and Leitten (2008a) and Shahnasarian (2010b), undergird the ECAF-2. Briefly, the postulates recognize that, when evaluating loss of earning capacity claims, there are premorbid and postincident factors that could facilitate (Drivers) or restrict (Inhibitors) a claimant's vocational rehabilitation. Drivers include stability of career development, work propensity, demonstrated earnings history, career motivation, and cognition. Inhibitors include phase of career development, subject specific issues, ability to apply prior skills, future career development prospects, prognosis, need and capacity for retraining, preexisting vocational handicaps, acquired vocational handicaps, and vocational adjustment issues.

Other ECAF-2 postulates include an appreciation that Drivers and Inhibitors have an interactive effect on vocational rehabilitation potential, assuming an individual has motivation to pursue this. Positive Drivers can help mitigate earning capacity damages, and Driver and Inhibitor indices can be used to assess claims of loss of earning capacity, with corresponding degrees of loss (Shahnasarian and Leitten, 2008a; Shahnasarian, 2010b).

Vocational evaluators use the ECAF-2 to rate claimants on 14 factors—the Drivers and Inhibitors enumerated above—derived from vocational rehabilitation and related literature, and empirical analysis. Its use culminates with vocational evaluators' construction of a vocational profile, and application of profile interpretations to an impairment to earning capacity rating scale (Shahnasarian, 2004c; 2010a; 2010b), presented on a continuum of earning capacity damages ranging from no loss to total loss.

ECAF and ECAF-2 validation study highlights include:

- A study involving 78 vocational rehabilitation counselors the Florida Division of Vocational Rehabilitation Services employed found variances within experimental groups using the ECAF significantly less than control group subjects' variances (Shahnasarian, 2004c). Further, subjects' ECAF use reduced within-group variances in loss of earning capacity estimates.
- In a study examining the relevance of the ECAF's 14 factors, practicing vocational rehabilitation experts evaluated 70 pending claims of lost earning capacity (Shahnasarian & Leitten, 2006). They agreed or strongly agreed 74.5% of the time the ECAF facilitated efforts to provide a loss of earning capacity opinion. Motivation and cognition were most often identified as material in the assessments. The highest correlation (.85) was between demonstrated earnings history and work propensity.
- Shahnasarian and Leitten (2006) performed a factor analysis that yielded three clusters with Eigen values ranging from 1.02 to 4.98. The clusters accounted for 47.1% of the total variance and included global factors affecting career development (composed of five ECAF factors: stability of career development, work propensity, demonstrated earnings history, career motivation, and need and capacity for retraining); disability-related factors (composed of five ECAF factors: phase of career development, future career development prospects, prognosis, acquired vocational handicaps, and vocational adjustment issues); and ability to apply prior skills (composed of a single ECAF factor: ability to apply prior skills).
- A longitudinal study (Shahnasarian & Leitten, 2008b) found positive work attitudes highly predictive of return to work and minimal loss of earnings—especially when accompanied by higher levels of intelligence. This finding supported the investigators' 2006 factor analysis results. The study incorporated both demographic variables and standardized test data to analyze ECAF factors and to configure models predictive of return to work. Subjects participated in a telephone interview 5 to 7 years after undergoing a vocational rehabilitation evaluation in conjunction with a pending claim of loss of earning capacity. Fifty-four percent reported post-evaluation employment and 45.8% reported being employed at the time of their interviews.
- Also noteworthy from the above-cited longitudinal study were significant positive correlations during the 5- to 7-year measurement interval between return to work and the following variables: Education, Verbal IQ, and Full Scale IQ. Further, a significant inverse correlation between return to work and scores on the MMPI-2 L-scale emerged. A stepwise discriminant function analysis detected use of two variables (Full Scale IQ and MMPI-2 Work Interference scale scores) resulted in an 83.3% correct return-to-work classification rate.
- Shahnasarian and Leitten, (2008b) investigated establishing ECAF cut-off scores for the instrument's Impairment to Earning Capacity Rating Scale with practicing vocational experts and insurance company employee subjects. Generally, subjects viewed loss of earning capacity claims similarly; when significant differences arose, insurance company employees appraised damages more conservatively. The investigators concluded the results provided empirical support for applying ECAF factors in claims of loss of earning capacity assessments and supported differentiating Driver and Inhibitor factors to conceptualize claimed damages. Regarding establishing cut-off scores, however, Shahnasarian and Leitten concluded, while this may be attainable, current empirical support is lacking.
- A test-retest reliability study, conducted over a 2-week interval, with 25 graduate rehabilitation students responding to three case studies (Shahnasarian & Leitten, 2008a), yielded coefficients measuring subjects' assessments of loss of earning capacity from .85 to .97 ($p < .01$), with an overall correlation coefficient of .98 ($p < .01$). As subjects gained ECAF use experience, they reported its utility increased. When examined cumulatively by case, all 14 ECAF factors yielded test-retest correlation coefficients significant at the .01 level. On a 5-point Likert scale, with limits designated as "strongly agree" and "strongly disagree," in all three cases, across both trials, subjects agreed or strongly agreed the ECAF enhanced evaluations at least 68% of the time.
- Shahnasarian (2009) investigated subjects' perceptions of plaintiff or defense retention source as a confounding variable in the assessment of earning capacity claims, using a single-blind, random assignment experimental design involving 32 practicing vocational experts' assessments of dam-

ages in two case studies. Group assignment–retention by plaintiff lawyer or defense lawyer—served as the study’s independent variable, and subjects’ responses to three referral questions, facilitated by ECAF-2 use, served as dependent variables. No significant differences between group ratings of the dependent variables emerged, supporting the investigator’s hypothesis that the ECAF-2 can help mitigate expert response bias.

More information about ECAF and ECAF-2 validation studies appears in the *Professional Manual for the Earning Capacity Assessment Form-2* (Shahnasarian, 2010). Shahnasarian (2010c) described the instruments’ theoretical bases.

Method

Again, this study examined the ECAF-2’s inter-rater reliability. Procedures, claimant and rater information, and measurements are delineated below.

Procedures

An experienced vocational expert witness (the first author and developer of the ECAF-2) conducted clinical interviews and prescribed standardized test protocols in 20 cases involving claims of loss of earning capacity. He summarized this information in written reports—absent his analyses and opinions—for four raters (described below). His involvement in the data collection thereafter ceased, and the raters assimilated the case information using the ECAF-2 to guide their appraisals. Additionally, raters had the benefit of a review of relevant records (e.g., medical, psychological, educational, earnings, employment), and performed subsequent research they deemed necessary to formulate their ratings and opinions.

All claimant examinations—including clinical interviews and administrations of standardized testing—occurred in 2010, and observed methods

Shahnasarian specified (2001, 2004, and 2011). The mean duration of clinical interviews was 3 hours and 24 minutes ($SD = .63$ hours). Testing protocols required an average of 4 hours and 9 minutes to complete ($SD = 1.54$ hours).

Clinical interviews elicited information related to disabling problems claimants attributed to issues in dispute; claimant histories (e.g., medical, psychological, educational, and vocational); and assorted information including functional capacities, preinjury/postinjury career ambitions, and vocational rehabilitation initiatives. Documentation of scholastic performance, employment, and earnings, for example, provided supplemental information. Finally, standardized testing protocols measured intellect and aptitude, occupational interests, and personality.

Claimants

Table 1 provides demographic information about the 13 male and 7 female claimants. Their reported occupations at the onset of disabling problems varied considerably and included cashier, case manager, interior designer, attorney, sales clerk, nurse, and data manager. Several claimants had been small business owners.

Types of claimant disabling problems, likewise, were diverse. Head injury with associated cognitive difficulties, back injury, paralysis, and various neurological and musculoskeletal problems were the primary maladies underlying claimants’ symptom presentation. Mechanisms of injuries included vehicular accidents, slip-and-fall incidents, assaults, and work-related mishaps.

Analyses revealed a wide range of preclaim annual compensation levels. The limits included a college student who reported no earnings at the time of her claim, and a company president who reported annual income of \$275,000.

Table 1
Demographic Information for the Case Studies

	<i>M</i>	<i>SD</i>
Age	39.5	11.75
Education	13.4	2.74
Number of Years Employed	15.6	9.84
Number of Years at Current Occupation	5.5	7.44
Preaccident Annual Compensation	\$58,122	\$67,566

Note. $n = 20$.

Raters

Four raters, employees in the private practice in which the vocational expert performed his assessments, had from 1 to 6 years of experience providing vocational rehabilitation expert witness support services. Their experiences included reviewing records, administering and scoring tests, conducting labor market research, and debriefing patients following vocational rehabilitation evaluations.

None of the raters had testified in cases involving acquired disabling injuries. Raters' levels of education ranged from 15 to 23 years ($M = 18.0$; $SD = 2.0$). Two raters held graduate degrees related to vocational rehabilitation, along with Certified Rehabilitation Counselor and Certified Life Care Planner credentialing.

In preparation of their assessments, raters reviewed *The Professional Manual for the Earning Capacity Assessment Form-2* (Shahnasarian, 2010b). They were blind as to retention source (plaintiff/defendant), independently completed their assessments, and had no knowledge of other raters' assessments.

Measurement of Inter-rater Reliability

The Intraclass Correlation Coefficient (ICC; Shrout & Fleiss, 1979) describes how strongly measures in the same group resemble each other. It operates on data structured as groups, rather than data structured as paired observations, and is commonly applied to assess consistency or reproducibility of quantitative measurements made by two or more raters measuring the same phenomenon (McGraw & Wong, 1996). According to Richman, Makrides & Prince (1980), an ICC of .80 or higher indicates high reliability, .60 to .79 fair reliability, and below .60 poor reliability.

Results

Table 2 summarizes inter-rater reliability coefficients, presented categorically in terms of Inhibitor and Driver items, of individual ECAF-2 factors across the 20 cases. Also presented are correlation coefficients for Inhibitor and Driver items, and raters' estimates of loss of earning capacity across cases.

ICCs significant at the .001 level emerged on all 14 ECAF-2 factors. ECAF-2 factor correlations ranged from .71 (Preexisting Vocational Handicaps) to .90 (Future Career Development Prospects). Twelve of the 14 ECAF-2 factors had ICCs over .80.

Additional analyses included categorical inter-rater correlations of ECAF-2 Inhibitors and Drivers, and overall assessments of loss of earning capacity claims. These analyses revealed the following correlations: ECAF-2 Inhibitors, $r = .91$ ($p < .001$); ECAF-2 Drivers, $r = .93$ ($p < .001$); and loss of earning capacity assessments, $r = .94$ ($p < .001$).

Table 2

Inter-rater Reliability Coefficients of Individual ECAF-2 Factors, Drivers, Inhibitors, and Percent Loss of Earning Capacity Ratings

Item	ICC
Inhibitor Items	
Phase of Career Development	.84*
Subject-Specific Issues	.80*
Ability to Apply Prior Skills	.77*
Future Career Development Prospects	.90*
Prognosis	.81*
Need and Capacity for Retraining	.80*
Preexisting Vocational Handicaps	.71*
Acquired Vocational Handicaps	.85*
Vocational Adjustment Issues	.81*
Driver Items	
Stability of Career Development	.83*
Work Propensity	.82*
Demonstrated Earnings History	.89*
Career Motivation	.84*
Cognition	.88*
ECAF-2 Inhibitors	.91*
ECAF-2 Drivers	.93*
% Loss of Earning Capacity Ratings	.94*

Note. * $p < .001$.

The raters applied a 5-point Likert scale, with limits of "strongly disagree" and "strongly agree," to evaluate the ECAF-2's utility. They agreed or strongly agreed the instrument enhanced assessment efforts 78.6% of the time; its contribution was determined "neutral" in 23.6% of the cases.

Discussion

The overall, significant (above the .001 level) high rates of agreement, as measured by inter-rater correlation coefficients above .70, between raters on all measures evaluated provides strong support for the specification of ECAF-2 factors. Further, the even stronger correlations—namely, coefficients above .90—for Driver and Inhibitor factor categories supports former study findings for the recognition and categorization of ECAF-2 factors.

Of all ICCs computed, the highest emerged on percent loss of earning capacity ratings (.94). Since this assessment, after all, is the ECAF-2's raison d'être, the finding is especially reassuring.

The lowest levels of rater agreement (correlations below .80) were on factors involving indicia of claimants' vocational histories: preexisting vocational handicaps, and ability to apply prior skills. While these correlations were statistically significant, their relatively lower correlation strengths could be attributable to the complexity of evaluating these factors and raters' relatively modest clinical experience.

Generalization of results could improve if raters had more experience as vocational experts and, assuming they were sufficiently competent, independently performed the vocational rehabilitation examinations upon which they relied. Of course, real world constraints—including restrictions imposed by pending litigation under which the evaluations occurred—limited the degree of experimental control and rigor the investigators could impose.

This study's strengths include its reliance on pending litigated cases with disputes over earning capacity and implementation of standard procedures undertaken to conduct vocational rehabilitation evaluations. Arguably, inter-rater correlation coefficients could have been higher than the present study generated had raters independently conducted their interviews and analyzed test data. Eliciting information from claimants and formulating impressions via clinical interviews—opportunities the raters did not have—of course, contributes to refining assessments. In effect, raters responded to case study information.

An interesting extension of this exploratory study would be to add retention source (i.e., plaintiff or defendant counsel) as an independent variable. A study examining the ECAF-2's construct validity is in progress.

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