National Council for Strength & Fitness

Personal Trainer Certification Examination

In-Service Analyses Report

May 26, 2011

Confidential

Background

The National Council on Strength and Fitness (NCSF) is a professional, member-driven, education and credentialing organization for personal trainers and exercise science professionals. The NCSF is committed to serving the public through research, service, and advancement of the certified personal trainer profession.

The NCSF Board for Certification sponsors the Personal Trainer Certification examination. The purpose of this report is to document test and item analyses performed by Prometric in an effort to evaluate the psychometric quality of the examination.

The Certification Exam

The Certification exam is a computer based test. The candidates need to complete the examination within 180 minutes. Two forms are active during a testing period. Form E and Form F were in the field in 2010. Each form consisted of 150 multiple choice items, including 125 operational, scored items and 25 pretest, unscored items. The cut score to pass the Certification examination is 77 or 62% of the total items.

Test Form Analysis

Table 1. provides the summary statistics of the NCSF examination for each form. In the table includes Pass rates for forms, percentage of candidates taking each form of the exam, the number of scored items in the examination, the score range (i.e., Minimum and Maximum score), the median score, the mean and the standard deviation, and the skewness and kurtosis of the score distribution. The overall proportion of passing candidates on the NCSF examination in 2010 was 0.67 or 67% given the cut score of 62% of the total items.

The skewness indicates the degree of asymmetry in the distribution of scores. A positive value indicates that the tail of the distribution stretches toward high scores; a negative value indicates that the tail extends toward the low scores.

The kurtosis indicates the degree of peakedness in a distribution of scores. The Pearson Kurtosis is calculated. The Pearson Kurtosis of a normal distribution is 3.0. As the Figure 1 and Figure 2 also show, the score distribution of NCSF examination is slightly negatively skewed (-0.34 to -0.28), but close to normal (2.66 to 2.93) with respect to the kurtosis.

Table 1. NCSF Summary Test Statistics, January 1, 2010 — December 31, 2010

	Form E	Form F
Percent of Test Candidates	50.8%	49.2%
Items	125	125
Maximum	120	119
Median	84.50	83.00
Minimum	34	24
Mean	83.97	82.65
Standard Deviation	15.67	16.68
Skew	-0.28	-0.34
Kurtosis	2.66	2.93
Internal Consistency Reliability Estimate	0.904	0.915
Standard Error of Measurement	4.86	4.86
Subkoviak C	0.874	0.863
Proportion Passing	0.70	0.65
CSEM @ Cut score	5.24	5.22

Table 1. presents the internal consistency reliability estimate (KR-20) and the associated standard error of measurement. The KR-20 reliability coefficient assesses the statistical homogeneity of the scale or the consistency of responses to all of the questions in the test. The closer the reliability is to 1.00, the more dependable the test scores. An achievement type of test like NCSF needs to show a KR- 20 coefficient of 0.70 or above. The KR-20 coefficients of the NCSF scale ranged from 0.904 to 0.915. The standard error of measurement (SEM) provides an estimate of the extent to which an examinee's score would be expected to vary if he or she were to take the same test repeatedly. On repeated administrations, an examinee's score should be within ± one SEM about 68% of the time. Sixty seven percent (67%) of the total candidates achieved "passing" status in 2010.

The rest of Table 1. displays the Subkoviak C, and the conditional standard error of measurement at the cut score of 62 (%). The Subkoviak statistic provides an estimate of the decision consistency of a pass/fail decision. Using the passing

score selected, it estimates the probability that an individual candidate would receive the same decision on two separate administrations of the examination.

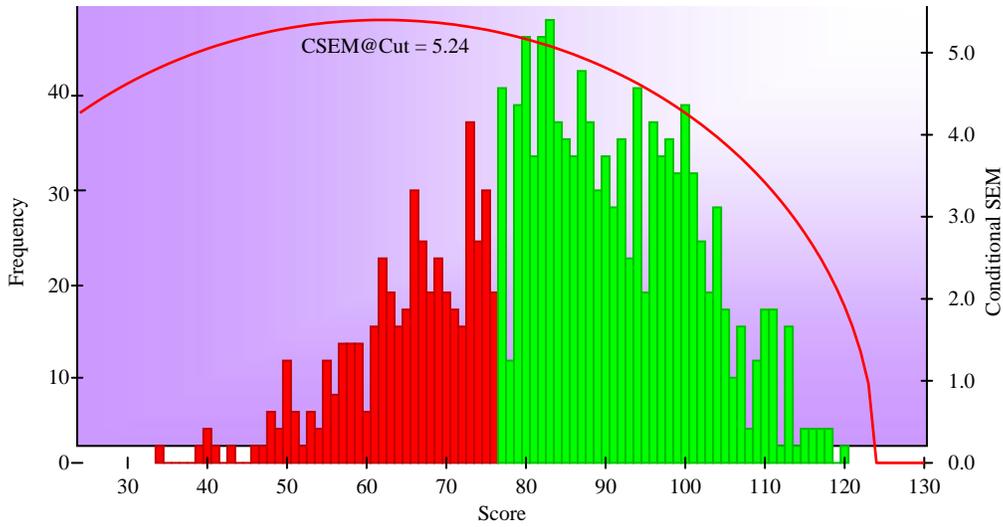Figure 1. NCSF Form E Score Frequency Distribution 2010

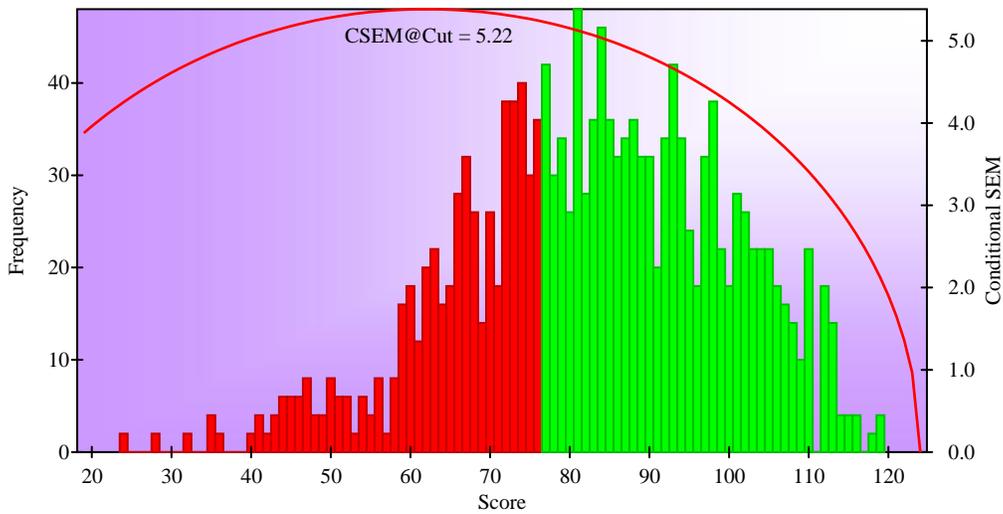Figure 2. NCSF Form F Score Frequency Distribution 2010

Table 2 includes the mean and the standard deviation for the item difficulty index (P+) and item discrimination (point biserial correlation and biserial) for each form. The difficulty index indicates the proportion of candidates that answered the item correctly. The mean P+ is the average of the proportions of candidates answering the items correctly averaged across all items included in the score. The standard deviation P+ is the standard measure of dispersion of P+ values around the mean P+.

The point biserial correlation is the Pearson product moment correlation. It indicates how well items discriminate between candidates who answer the item correctly and those who answer the item incorrectly, using the total score as the criterion (so it is called an item-total correlation). A high positive point biserial correlation suggests that candidates that performed well on the item also performed well overall, while candidates that did not perform well on the item did not perform well overall. The mean point biserial correlation is the average of the item-total correlations averaged across all items included in the score. Biserial correlation is another kind of item-total correlations that is used with a dichotomized variable (item scores) and a continuous variable (total scores). It tends to be larger at extremes. The standard deviation of biserial correlation is the standard measure of dispersion of biserial correlations around the mean biserial correlation.

Table 2. NCSF Summary Item Statistics, January 1, 2010 -- December 31, 2010

	Form E	Form F
Mean P+	0.68	0.67
SD of P+	0.12	0.12
Mean Pearson	0.28	0.30
Mean Biserial	0.37	0.40
SD of Biserial	0.13	0.13

Summary of Statistical Analysis

Passing rates for the NCSF exams in 2010 administrations are about 0.67. The average score of the NCSF exams is 83.97 for Form E and 82.65 for Form F, respectively. The standard deviation of the forms ranged from 15.67 in Form E to 16.68 in Form F. The reliability coefficients from the NCSF exams in 2010 are above 0.90 and SEM showed to be stable and acceptable from the comparison with the previous year's outcomes.