National Council on Strength & Fitness

Certified Personal Trainer Examination

Exam Analysis Report

January 1 to December 31, 2012

April 23, 2013

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 sponsors the Certified Personal Trainer examination. The purpose of this report is to document the test and item analysis performed by Prometric Test Development Services in an effort to evaluate the psychometric quality of the examination for the year 2012.

The Certified Personal Trainer Exam

The Certified Personal Trainer exam is a computer based test. The candidates need to complete the examination within 180 minutes. Two forms (Form E and Form F) were in the field in 2012. Each form consisted of 150 multiple-choice items, including 124 operational, scored items and 26 pretest, unscored items. The cut score to pass the examination is 77 or 62% of the total operational items.

Test Form Analysis

Table 1 provides the summary statistics of the NCSF examination for each form. The table includes pass rates for forms, the total number of candidates, the number of scored items in the examination, the score range (i.e., minimum and maximum total raw score), the median score, the mean score, the standard deviation of scores, and the skewness and kurtosis of the score distribution. The overall proportion of passing candidates on the NCSF examination on both forms combined is 0.63 or 63% 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 higher scores; a negative value indicates that the tail extends toward the lower 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 Figure 1 and Figure 2 also show, the score distribution of the NCSF CPT examination is slightly negatively skewed (-0.19 and -0.28), but close to normal (2.60 and 2.77) with respect to the kurtosis.

Table 1. NCSF CPT Exam Summary Test Statistics, January 1, 2012 — December 31, 2012

	Form E	Form F
Number of candidates	1456	1516
# of operational Items	124	124
Maximum score	118	118
Median score	83	81
Minimum score	32	28
Mean score	82.12	81.06
Standard Deviation of scores	15.05	16.63
Skewness	-0.19	-0.28
Kurtosis	2.60	2.77
Internal Consistency Reliability Estimate	0.89	0.91
Standard Error of Measurement	4.92	4.91
Subkoviak C	0.85	0.86
Proportion passing	0.65	0.62
CSEM @ cut score	5.23	5.22

Table 1 also 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 form. The closer the reliability is to 1.00, the more dependable the test scores are. A criterion-referenced test like the NCSF CPT exam needs to show a KR- 20 coefficient of 0.85 or above. The KR-20 coefficients of the NCSF scale were 0.89 and 0.91. 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. 1882 candidates or 63% of the 2972 total candidates achieved "passing" status in 2012.

The rest of Table 1 displays the Subkoviak C, and the conditional standard error of measurement (CSEM) 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 CPT Exam Form E Score Frequency Distribution 2012

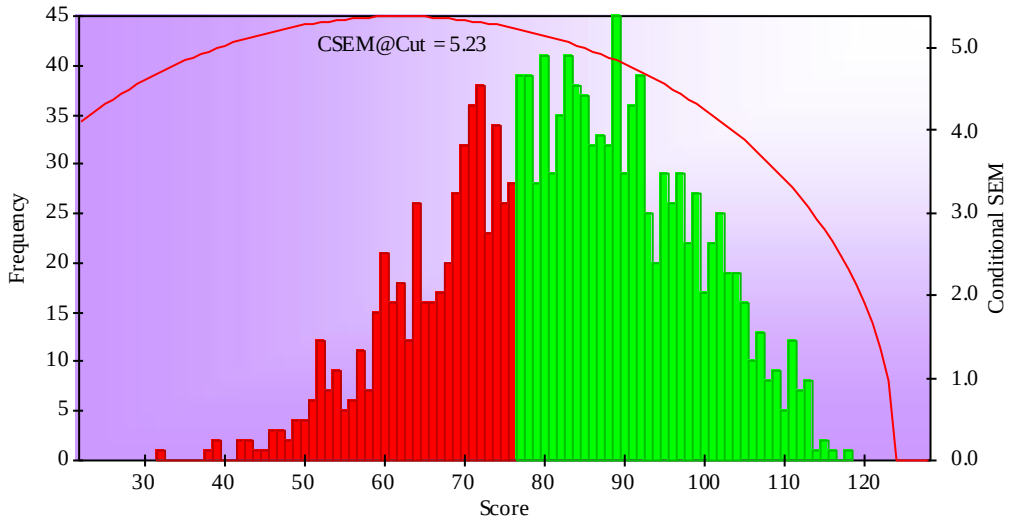

Figure 2. NCSF CPT Exam Form F Score Frequency Distribution 2012

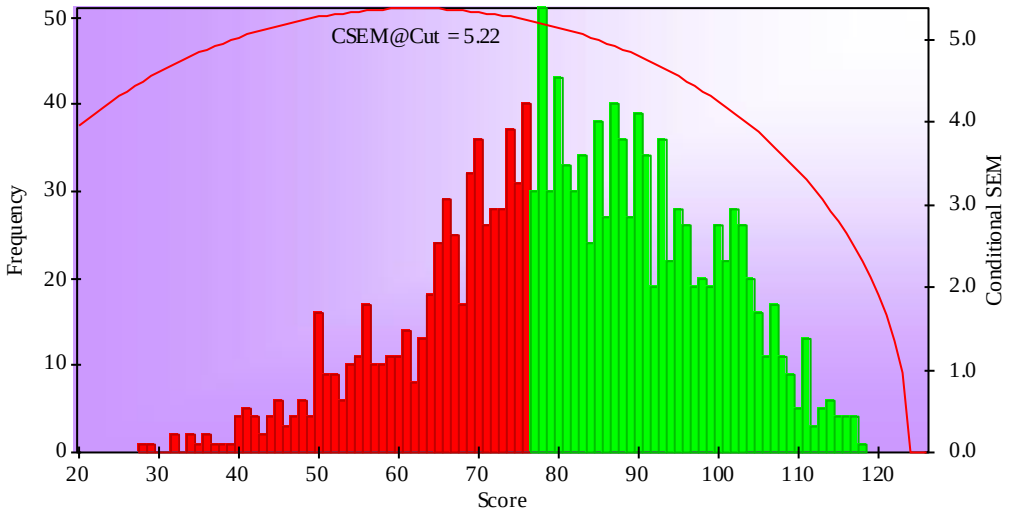

Table 2 includes the mean and the standard deviation for the item difficulty index (P+) and item discrimination (point-biserial correlation and biserial) for each form. The difficulty index indicates the proportion of candidates that answered the item correctly. The mean P+ is the average of the proportions 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 correlates how candidates score on individual dichotomously-scored (correct or incorrect) items with how they score on the exam overall, so it is called an item-total correlation and is an indication of how well individual items discriminate between higher ability and lower ability candidates. 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 correlation that is used with a dichotomized variable (correct vs. incorrect item scores) and a continuous variable (total scores). It assumes the continuous variable is normally distributed, tends to be systematically larger than the point-biserial correlation, and differs from the point-biserial correlation more at the extremes of the distribution. The standard deviation of a biserial correlation is the standard measure of dispersion of biserial correlations around the mean biserial correlation.

Table 2. NCSF CPT Exam Summary Item Statistics, January 1, 2012 -- December 31, 2012

	Form E	Form F
Mean P+	0.66	0.65
SD of P+	0.12	0.12
Mean Point-Biserial	0.27	0.29
Mean Biserial	0.35	0.39
SD of Biserial	0.12	0.13

Summary of Statistical Analysis

The overall passing rates for the NCSF CPT exam in 2012 are about 0.63. The average total raw score of the NCSF CPT exam is 82.12 for Form E and 81.06 for Form F, respectively. The standard deviation of the total raw score ranged from 15.05 in Form E to 16.63 in Form F. The reliability coefficients of the NCSF CPT exam forms in 2012 are close to 0.90 and the SEMs showed to be stable and acceptable from the comparison with the previous year's outcomes.