

National Council for Strength & Fitness
Personal Trainer Certification Examination



In-Service Analyses Report

April 7, 2010



Confidential

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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. Four forms were in the field in 2009. 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 the percentage of candidates taking each form of the examination, 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 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 Figures 1- 4 also show, the score distribution of NCSF examination is

slightly negatively skewed (-0.35 to -0.19), but close to normal (2.44 to 2.78) with respect to the kurtosis.

Table 1. NCSF Summary Test Statistics, January 1, 2009 — December 31, 2009

	Form C	Form D	Form E	Form F
Percent of Candidates	22.6%	23.4%	26.7%	27.3%
Items	125	125	125	125
Maximum	108	111	115	115
Median	77	81	86	82
Minimum	32	41	47	43
Mean	75.55	80.01	85.50	82.42
Standard Deviation	14.20	14.27	14.12	14.92
Skew	-0.27	-0.35	-0.21	-0.19
Kurtosis	2.69	2.78	2.61	2.44
Internal Consistency Reliability Estimate	0.88	0.89	0.88	0.91
Standard Error of Measurement	4.89	4.85	4.84	4.89
Subkoviak C	0.82	0.84	0.87	0.85
Proportion Passing	0.52	0.63	0.74	0.65

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. 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 average of the KR-20 of NCSF scale is 0.89. 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 \pm one SEM about 68% of the time. The overall proportion of passing candidates on the NCSF examination is 0.64 or 64% given the cut score of 62 (%).

Figure 1. NCSF Form C Score Frequency Distribution 2009

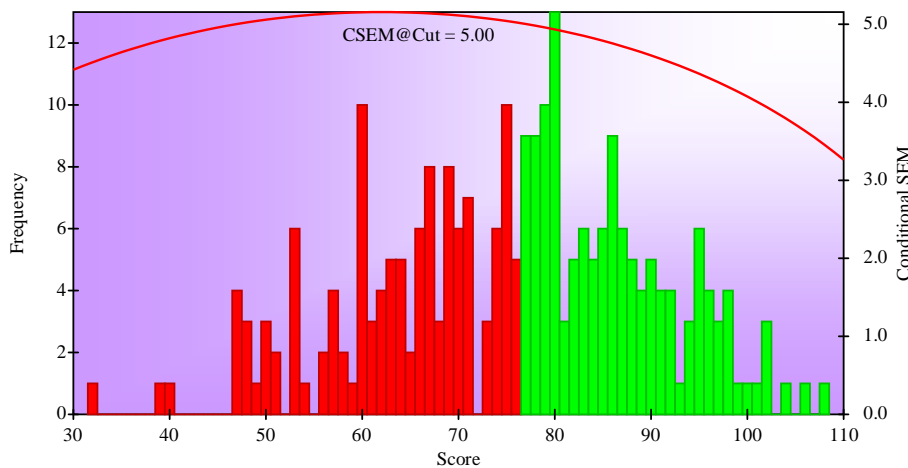


Figure 2. NCSF Form D Score Frequency Distribution 2009

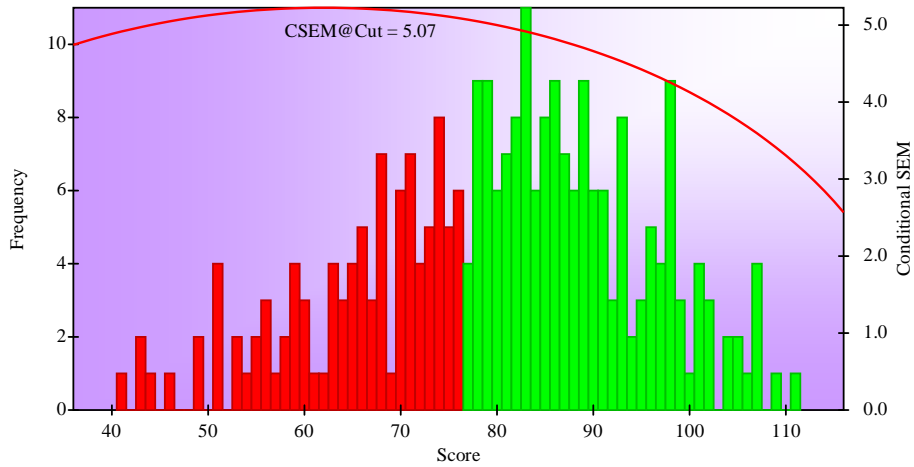


Figure 3. NCSF Form E Score Frequency Distribution 2009

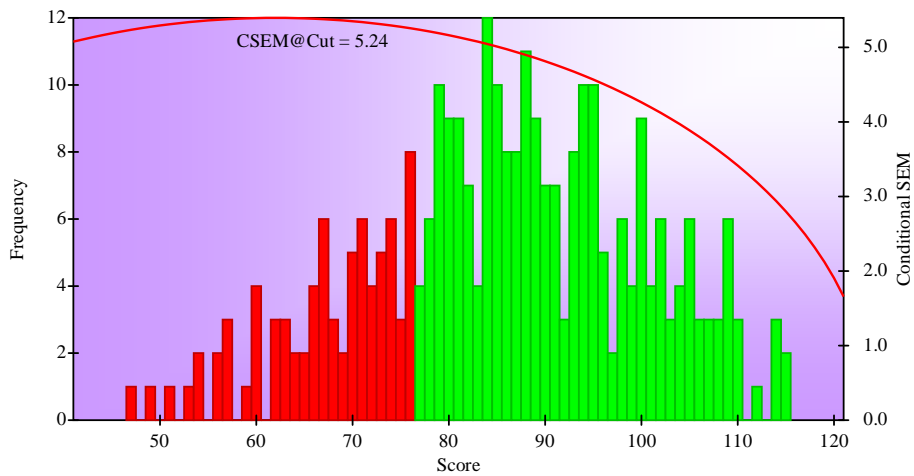
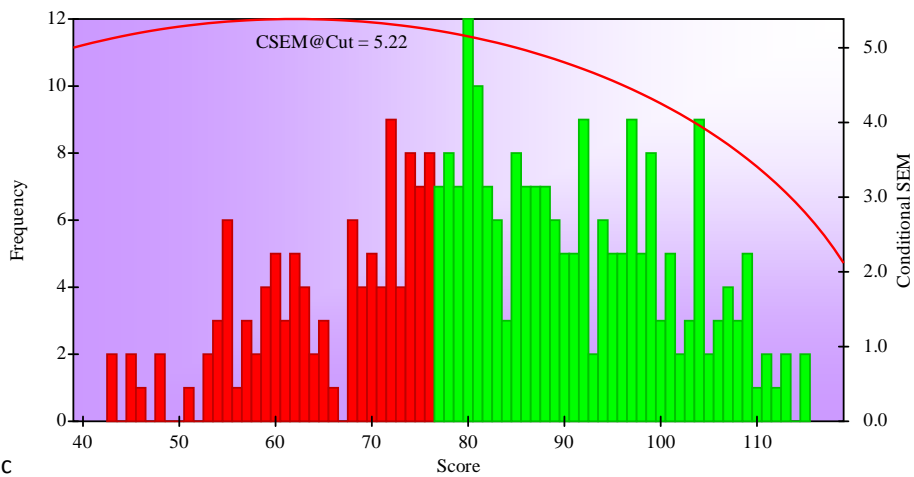


Figure 4. NCSF Form F Score Frequency Distribution 2009



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.

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, 2009 -- December 31, 2009

	Form C	Form D	Form E	Form F
Mean P+	0.61	0.65	0.69	0.66
SD of P+	0.18	0.17	0.12	0.12
Mean Pearson	0.25	0.26	0.25	0.28
Mean Biserial	0.34	0.35	0.34	0.38
SD of Biserial	0.14	0.14	0.15	0.15

Summary of Statistical Analysis

Passing rates for the NCSF exams in 2009 administrations are about 0.66. The average score across the NCSF exams is 80.8. The standard deviation of the

forms ranged from 14.1 in Form C to 14.9 in Form F. The reliability coefficients from the NCSF exams in 2009 are approximately 0.90 and SEM showed to be stable and acceptable from the comparison with the previous year's outcomes.