# MSP Research Note

## SQQ Reliability and Validity

### Introduction

This paper describes the reliability and validity of the SQQ. Evidence for the reliability and validity of SQQ is presented against some of the key the criteria in the EFPA Review Model for the Description and Evaluation of Psychological Tests. The EFPA Review Model was produced to support and encourage the process of harmonising the reviewing of tests. It provides a standard set of criteria to assess the quality of tests. These cover the common areas of test review such as norms, reliability and validity.

### Reliability

This section covers internal consistency reliability – that is, the extent to which tests or procedures assess the same characteristic, skill or quality. It is a measure of the precision between the observers or of the measuring instruments used in a study.

Cronbach's Coefficient Alpha is a frequently used measure of internal consistency reliability. It gives the average of the correlations between all possible pairs of items on a scale. Table 1 presents internal consistency estimates for the SQQ scales and shows that the instrument has a median scale reliability of 0.83, which is in the category defined as excellent by the EFPA Review Model.

The Standard Error of Measurement (SEm) provides an error band around a score. The SEM allows us to put confidence bands around the scores of individual test takers. If one standard error is added to a score and one standard error is subtracted from it, a range is created within which we can be 68% certain the true score falls. If two standard errors are added to the score and two standard errors are subtracted from it, a wider range is created within which we can be 95% certain that the true score falls.

The SQQ scale SEms range from 2.10 to 2.88 with a mean SEm of 2.60. This is equivalent to a primary scale sten score SEm of approximately 1. In other words, there is a 68% likelihood that the person's true score on one of the primary competency scales will lie 1 sten either side of the observed score.

**Table 1.** Internal consistency reliabilities for the SQQ (N = 1,500)

| Scale | Alpha | Mean | SD | Raw Score SEm |
|---|---|---|---|---|
| Religious Concepts | 0.76 | 22.37 | 5.88 | 2.88 |
| Prayer | 0.91 | 24.25 | 7.00 | 2.10 |
| Tolerance | 0.70 | 21.95 | 5.00 | 2.74 |
| Centrality | 0.77 | 19.38 | 6.00 | 2.88 |
| Practices | 0.87 | 17.77 | 7.60 | 2.74 |
| Experiences | 0.86 | 22.37 | 6.59 | 2.46 |
| Coping | 0.91 | 23.07 | 7.38 | 2.21 |
| Purpose | 0.79 | 22.52 | 5.53 | 2.53 |
| Worship Place | 0.86 | 18.31 | 7.19 | 2.69 |
| Living Out | 0.60 | 22.49 | 4.30 | 2.72 |

## Validity

Validity refers to the degree to which a study accurately reflects or assesses the specific concept that the researcher is attempting to measure. While reliability is concerned with the accuracy of the measure, validity is concerned with whether the instrument measures what it sets out to measure. There are four types of validity.

Face validity is concerned with how the instrument appears. Criterion related validity demonstrates the accuracy of the measure by comparing it with other measures, for example, job performance ratings. Construct validity seeks agreement between a theoretical concept and the measuring device. Construct validity can be broken down into convergent validity and discriminate validity. Convergent validity is the agreement among ratings, gathered independently of one another, where measures should be theoretically related. Discriminate validity is the lack of a relationship among measures that should not be related. Finally, content validity is based on the extent to which a measure reflects the domain of content.

This section focuses on the construct and criterion validity of the SQQ. The evidence for construct validity is based on information about SQQ scale inter-correlations, factor analysis of the SQQ, and correlations between the SQQ scales and marker variables from other measures of religiosity. The evidence for criterion validity is based on analysis of the relationship between SQQ scores and job performance ratings from respondents in the standardisation sample. The evidence for face and content validity is based on the general overlap between the SQQ model and factors in the literature on religiosity.

## Inter-correlations

Table 2 shows the inter-correlations of SQQ scales based on the standardisation sample. The correlations range from -0.03 to 0.76 with a median correlation of 0.41. This indicates a moderate degree of independence for the scales. We examined the pattern of correlations using factor analysis and identified three clusters of scales, and it is in each of these clusters that you find the strongest scale inter-correlations.

**Table 2.** Inter-correlations of SQQ scales (n=1,500)

| Scale | Religious Concepts | Prayer | Tolerance | Centrality | Practices | Experiences | Coping | Purpose | Worship Place | Living Out |
|---|---|---|---|---|---|---|---|---|---|---|
| Religious Concepts | 1.00 | | | | | | | | | |
| Prayer | 0.65 | 1.00 | | | | | | | | |
| Tolerance | -0.18 | -0.09 | 1.00 | | | | | | | |
| Centrality | 0.67 | 0.61 | -0.32 | 1.00 | | | | | | |
| Practices | 0.58 | 0.62 | -0.37 | 0.70 | 1.00 | | | | | |
| Experiences | 0.60 | 0.60 | -0.03 | 0.60 | 0.49 | 1.00 | | | | |
| Coping | 0.70 | 0.76 | -0.16 | 0.72 | 0.61 | 0.64 | 1.00 | | | |
| Purpose | 0.23 | 0.21 | 0.12 | 0.34 | 0.26 | 0.41 | 0.36 | 1.00 | | |
| Worship Place | 0.53 | 0.45 | -0.31 | 0.61 | 0.76 | 0.41 | 0.52 | 0.32 | 1.00 | |
| Living Out | 0.33 | 0.30 | 0.14 | 0.35 | 0.31 | 0.39 | 0.32 | 0.51 | 0.35 | 1.00 |

## Factor analysis

Principal components extraction with oblique rotation was carried out using SPSS on the SQQ scales with the 1,500 respondents from the standardisation sample. With a cut of 0.45 for inclusion of a variable in interpretation of a factor, all the variables loaded on at least one factor. Table 3 shows loadings of variables on factors with the main factor loadings shown in bold.

The first factor accounting for 39% of variance in the solution is made up 5 SQQ scales: Prayer, Coping, Religious Concepts, Experiences and Centrality.

The second factor accounting for 19% of variance is made up of 2 scales: Purpose and Living Out. The third factor accounting for 18% of variance is made up of 3 scales: Tolerance (negative loading), Worship Place and Practices.

**Table 3.** Pattern matrix for SQQ factor analysis (principal components extraction, oblique rotation, n=1,500)

| Scale | 1 | 2 | 3 |
|---|---|---|---|
| Prayer | **0.97** | -0.13 | -0.08 |
| Coping | **0.88** | 0.01 | 0.03 |
| Religious Concepts | **0.84** | -0.04 | 0.08 |
| Experiences | **0.77** | 0.17 | -0.14 |
| Centrality | **0.61** | 0.15 | 0.35 |
| Purpose | -0.07 | **0.89** | -0.02 |
| Living Out | 0.04 | **0.83** | -0.06 |
| Tolerance | 0.11 | 0.21 | **-0.90** |
| Worship Place | 0.21 | 0.37 | **0.62** |
| Practices | 0.44 | 0.17 | **0.55** |

Main factor loadings are in **bold**.

## Relationship between SQQ and other measures

A study of the relationship between the SQQ and other measures of religiosity was conducted to establish whether the SQQ measures dimensions similar to those assessed by other measures. Table 4 shows that correlations between SQQ scales and the markers ranged from 0.52 to 0.81 with a median correlation of 0.71. A median correlation of 0.71 is classified as good construct validity by the EFPA Review Model.

**Table 4.** Correlations of SQQ scales and markers from other measures of religiosity (n=1,500)

| Scale | Correlation | Marker Source |
|---|---|---|
| Religious Concepts | 0.63 | Religious Attitude Scale |
| Prayer | 0.81 | Structure of Prayer Scale |
| Tolerance | 0.52 | Religious Values Scale |
| Centrality | 0.61 | Religious Status Inventory |
| Practices | 0.79 | Religious Status Inventory |
| Experiences | 0.65 | Index of Core Spiritual Experiences |
| Coping | 0.76 | Religious Problem Solving Scale |
| Purpose | 0.76 | Well-Being Questionnaire |
| Worship Place | 0.80 | Religious Commitment Scale |
| Living Out | 0.52 | Religious Values Scale |

All correlations significant at the 0.01 level.

## Correlation between SQQ and job performance ratings

Respondents were asked to rate their performance over the last twelve months using a 4-point scale (excellent, good, satisfactory, poor). They were also asked to say how their line manager had rated their performance using the same 4-point scale. Just over one thousand respondents completed the two rating scales and the sum of the two ratings was used as a single combined indicator of job performance.

We used standard multiple regression to explore the relationship between the single combined indicator of job performance as the dependent variable and the SQQ scale scores as independent variables. There were statistically significant correlations between two of the ten SQQ scale scores and job performance ratings at 0.21 (Living Out) and 0.26 (Purpose).

Table 5 presents the results from regression of SQQ key factor scores on job performance ratings. It displays the correlations between the variables, the unstandardised regression coefficients (B) and intercept, the standardised regression coefficients (Beta), the semi-partial correlations (Unique) and R, $R^2$ and Adjusted $R^2$. R for regression was significantly different from zero, $F(10, 1021) = 72.99$, $p < 0.001$.

Altogether, 8% of the variability in job performance ratings was predicted by knowing the scores on the SQQ scales.

**Table 5.** Regression of SQQ key factor scores on job performance ratings (n=1,032)

| Scale | Combined Assessment | Religious Concepts | Prayer | Tolerance | Centrality | Practices | Experiences | Coping | Purpose | Worship Place | Living Out | B | Beta | Sig |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Combined Assessment | 1.000 | 0.06 | 0.01 | 0.04 | 0.06 | 0.04 | 0.09 | 0.05 | 0.26 | 0.05 | 0.21 | | | |
| Religious Concepts | | 1.00 | 0.68 | -0.19 | 0.67 | 0.59 | 0.61 | 0.72 | 0.26 | 0.52 | 0.35 | 0.01 | 0.05 | 0.27 |
| Prayer | | | 1.00 | -0.07 | 0.60 | 0.61 | 0.63 | 0.77 | 0.21 | 0.45 | 0.32 | -0.01 | -0.07 | 0.17 |
| Tolerance | | | | 1.00 | -0.33 | -0.38 | -0.04 | -0.16 | 0.13 | -0.33 | 0.15 | -0.01 | -0.03 | 0.46 |
| Centrality | | | | | 1.00 | 0.70 | 0.60 | 0.72 | 0.34 | 0.61 | 0.36 | 0.00 | -0.03 | 0.56 |
| Practices | | | | | | 1.00 | 0.51 | 0.61 | 0.26 | 0.77 | 0.33 | 0.00 | 0.01 | 0.84 |
| Experiences | | | | | | | 1.00 | 0.67 | 0.42 | 0.42 | 0.40 | 0.00 | 0.00 | 0.93 |
| Coping | | | | | | | | 1.00 | 0.36 | 0.52 | 0.34 | 0.00 | -0.02 | 0.71 |
| Purpose | | | | | | | | | 1.00 | 0.30 | 0.53 | 0.04 | 0.22 | 0.00 |
| Worship Place | | | | | | | | | | 1.00 | 0.35 | -0.01 | -0.05 | 0.32 |
| Living Out | | | | | | | | | | | 1.00 | 0.03 | 0.14 | 0.00 |
| Mean | 4.98 | 22.46 | 24.19 | 22.18 | 19.41 | 17.58 | 22.66 | 22.98 | 23.07 | 18.24 | 22.79 | | $R^2$ | 0.08 |
| Std. Deviation | 0.92 | 5.96 | 7.11 | 5.02 | 6.09 | 7.76 | 6.72 | 7.56 | 5.30 | 7.35 | 4.31 | | Adj $R^2$ | 0.07 |
| | | | | | | | | | | | | | R | 0.29 |

## References


Bartram, D. (2002). EFPA Review Model for the Description and Evaluation of Psychological Tests: Notes for Reviewers. European Federation of Psychologists' Associations.

Hill, P.C. and Wood, R.W. (1999). Measures of Religiosity. Religious Education Press, Birmingham, Alabama.