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# DEVELOPING TEACHING COMPETENCY SCALE in Non-Formal Post-Secondary Education

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# ACKNOWLEDGMENT

We wish to extend our deepest gratitude to all individuals and organizations who contributed to the successful completion of this research.

First and foremost, we express our sincere appreciation to our esteemed research consultant, Mr. Joseph T. La Phan, for his invaluable guidance, profound insights, and expertise throughout the research process. His contributions were instrumental in shaping the direction and depth of this study.

We are equally indebted to our dedicated research team—U Se Hkawng Naw, Khun Thein Zaw, Thu Mar, Saw Aung Htay, Aung Ling, and Saw Thein Phod Awar—whose tireless efforts ensured the accuracy and quality of the data collected. Their commitment to excellence and unwavering dedication to this project are truly commendable.

Special recognition is also due to the students who participated in interviews and surveys, and their host organizations. Their willingness to share their perspectives and experiences provided a crucial foundation for our findings. Their contributions have enriched this study in immeasurable ways.

Furthermore, we extend our heartfelt gratitude to the Child's Dream Foundation for their generous support. Their funding and encouragement played a pivotal role in making this research possible. Their belief in our vision and objectives has been a constant source of motivation.

Lastly, we wish to acknowledge all individuals and institutions who supported this research in various capacities. This publication is the result of collective efforts, and we deeply appreciate the opportunity to bring this work to fruition.

Sincerely,
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# ABSTRACT

This study aimed to develop psychometrically sound teaching competency scale (TCS) to assess performance of teachers at non-formal post-secondary education institutions. The teaching competency scale questionnaire, which comprised of 51 items, was administered to 491 current students and alumni of non-formal education institutions across Chin, Kachin, Karen, Karenni and Shan states of Myanmar. We performed exploratory factor analysis (EFA) to identify the factor structure, and Crobach's Alpha formula to examine internal consistency reliability. The data obtained demonstrated that the teaching competency scale which comprised of four subscales with a total of 44 items is valid and reliable measurement instrument to evaluate teaching competency in non-formal post-secondary education. The first subscale was the Assessment and Reporting Skills with 14 items. The second subscale was Learning Stimulation with 12 items. The third subscale was the Mastery of Subject Matter and Delivery with 9 items, and the fourth subscale was the Personality with 9 items. Interfactor correlations ranged from r = .38 to .65, indicating adequate discriminant validity. The overall reliability was excellent ($\alpha$ = .94, 95% CI [.93, .95]), with subscale reliabilities ranging from $\alpha$ = .82 to .88, 95% CI [.79, .90]. The Root Mean Square Residual (RMSR) of .038 indicated good model fit. Overall, the TCS demonstrated strong reliability and validity as a measurement tool for evaluating teaching competency in non-formal post-secondary education contexts in Myanmar.

*Keywords : non-formal education, teaching competencies, Myanmar exploratory factor analysis, scale development*

# INTRODUCTION

Throughout the successive military rules and protracted political instability, the state-sponsored education services have been seriously shortcoming in Myanmar. Frequent armed conflicts not only technically deprived a large proportion in peripheral areas of access to government schools, but also constrained economic opportunities. Recognizing the needs, a variety of non-state education providers have been serving those youths who have been marginalized from state services (Lal & South, 2012; Lwin, 2021). The 2021 military coup seriously exacerbated deterioration of the government educational services, leading into a near collapse in many parts of the country. According to Proserpio and Fiori (2022), approximately 35 percent to 50 percent of higher education staff, including professors and instructors, undertook civil disobedient movement (CDM) and left their official position in defiance to the junta's rule. In the same motive, a large number of students dropped out of schools which had

become controlled by the junta, triggering the surge in demand for nonformal education services.

Many existing and newly emerged non-formal education service providers, despite their capacity constraints, afforded to accommodate the needs for alternative education provisions. However, many of them are insufficiently resourced and untrained in many key aspects of their core services. Strikingly, "the shortage in skilled teachers", according to the study by Julian and Siangpum (2022), "is a nationwide problem for both state and non-state education institutions at all level" (p. 22). The capacity of the teachers directly influences and affects the students' learning process and the quality of their education. In addition, the teachers' performance is traditionally viewed as correct standard and exemplar (Xungzi 2014, p. 14). Therefore, insufficiency of skilled teacher implies significant and long-term impacts of non-formal education services which more students are becoming reliant on.

In many cases of non-formal education services in Myanmar, teaching tasks are performed as needed by untrained persons regardless of their individual experience and skills in teaching. Such practices could lead to serious impacts on students' learning as well as on quality of education as a whole.

To address teaching performance issue systematically, schools should have instruments to measure individual teacher performance so that appropriate and customized training or professional development actions could be crafted based on identified strengths and weakness of teaching competence. However, many of non-formal education providers, for example, members of Myint-mo Education Foundation, lack tools to systematically measure professional performance of their teachers. Therefore, this research aims to develop psychometrically robust instrument to measure teaching competency among teachers at non-formal post-secondary schools which could be used for performance management, professional development and quality assurance. To that end, we formulated the follow research questions to guide our study.

What is the factor structure of teaching competency scales with a sample of current students and alumni of non-formal education institutions?

What is the internal consistency reliability and validity of the teaching competency scales with a sample of current student and alumni of nonformal education institutions?

The remaining of the study report is organized into four parts. The first part dealt with literature on teaching competency and on teaching competency assessment and methods. The second part explain the methods, process and techniques used. The third part presents the results from data analysis before discussing their significance, implications and limitations in the fourth section. The report concludes by asserting reliability, validity and appropriateness of the teaching competency scale developed by this study.


# LITERATURE REVIEW

## DEFINITIONS OF TEACHING COMPETENCY

Teaching competency has been conceptualized and defined in multiple perspectives. In Medley and Crook's (2010) view, teacher competence is defined as any set or combination of knowledge, skill or attitudes specific to teaching, in which, the specific knowledge may involve general knowledge, subject matter knowledge and knowledge of pedagogy, while skills may be related to communication, performance, planning, and integration and implementation of complex strategies (p. 295). They refer the attitude aspect of teacher competency to personal dispositions: toward oneself, toward his or her profession and towards students and colleagues.

Streifer and Iwannicki (1987) suggest, based on their empirical study, that teaching competencies can be divided into five major categories: planning (effective instruction), instruction (use of varied teaching styles, maintaining effective teacher/

student interaction, etc.,), student evaluation (creating effective evaluation techniques), profession knowledge (knowledge of the subject matter and knowledge of learning psychology), professional responsibilities (demonstrate professional behavior) (p. 44).

In the task-based view, teaching competency is framed as multidimensional construct constituted with common teaching competencies and domain-specific teaching competencies. The common teaching competencies prescribe the general pedagogy knowledge as essential parts of teacher professional competencies (Blömeke, 2017, p. 123) on the basis that instruction and classroom management are the two core tasks of teachers (König et al., 2011, p. 189). The general pedagogy knowledge is pertinent to "knowledge of theories of learning and general principles of instruction, an understanding of the various philosophies of education, general knowledge about learners, and knowledge of the principles and techniques of classroom management," according to Grossman and Richert (1988, p. 54). The general pedagogical knowledge is said to be a central component of teacher knowledge and homogenous construct, and therefore, can be used for developing large scale assessment and comparison across different contexts (König et al., 2011).

Subject-specific competencies are also integral to professional qualification of teaching. Because, competencies of any teachers are also determined by the content knowledge or the knowledge of the subject matter to be taught, and the pedagogical content knowledge or subject-specific knowledge for teaching. In addition, the situation-specific skills or the ability to meet contextual demands also significantly influence competencies of teachers (Blömeke et al., 2015).

In a progressive view, technological competency has also been increasingly recognized as an essential ingredient of teaching competencies Zhu et al., 2013). It has become inseparable part of good teaching to integrate technology tool, according to (Pierson, 2001, p. 414), and crucial for success in innovative teaching (Zhu et al., 2013). As the rapid advancement of information and communication technologies (ICT) and situational demands have brought about commonality of online learning, the Internet and artificial intelligence into learning environment, it is necessary to integrate of technology into teaching practices (Han et al., 2024).

## ASSESSMENT OF TEACHING COMPETENCIES

Teaching competency assessment is essential for both organizational and professional developments of education institutions. The professional competence of the teacher or his/her ability to deliver quality professional service is critical to student's successful learning (Hunter, 1976, p. 162). Therefore, evaluating performance of teacher in educational institutions has been increasingly recognized as important as evaluating the learning of students, because

through evaluation, the performance and effectiveness of the teachers, which are the main means of achieving education goals, can be determined (Calaguas, 2012).

Increased attention is paid to teaching assessment for various reasons. The main reasons include the demands for quality assurance, for greater recognition of teaching profession, for accountability, for policymaking by schools, and for implementation of competence-based training (Roelofs & Sanders, 2007, pp. 123–124). Moreover, teacher competency assessments are used also for formalizing qualifications, such as, licensing, certification, accreditation, for teacher-quality initiatives, and plan teacher induction and in-service development (Darling-Hammond, 2010).

Assessing teaching competencies are considered to be critical factors in advancing professionals in teaching (Martin & Ritzhaupt, 2021, p. 265). For example, Paganin and Seghiri (2002), as cited by Calaguas (2012), assert that "specific measures are necessary to identify particular strengths and behaviors upon which individual teacher can improve" (p. 5). Empirical evidence suggests that evaluating teacher performance increases not only teacher's productivity but also students' achievements (Taylor & Tyler, 2012). Therefore, teaching competency scale as an instrument for assessing teaching performance holds significant importance for organizational development and professional development of education providers.

## METHODS OF COMPETENCY MEASUREMENT

Literature suggests multiple approaches to assessment and evaluation of teaching competencies (Darling-Hammond, 2010; Goe et al., 2008; Goe & Croft, 2009). The main approaches include teacher self-evaluation, peer assessment, student rating of teacher performance, evaluation by external bodies, assessing teaching effectiveness based on student's achievements and behaviors. Among them student's rating of teacher performance has been increasingly recognized as important and necessary aspects of teaching competencies evaluation from various perspectives. Since students are the direct consumers of the services provided by teachers and in a good position to assess and evaluate teachers' performance, and therefore, student rating of teachers' performance should be included in teacher evaluation process (Goe, Bell and Little 2008, p. 41).

Given that teaching contexts vary widely, it is essential that local input is considered when decisions are made about what to prioritize in a composite measure of teacher effectiveness (Goe et al., 2008, p. 48). Although previous studies have identified numerous teaching competence measurement instrument empirically tested in various contexts, there is no, as far as this study is concerned, such instrument validated and tested specifically in Myanmar non-formal education context. This research attempted to develop one using methods and techniques described in the following section.


# METHODOLOGY

The research team developed the teaching competency scale following the procedures suggested by DeVillis (DeVellis, 2017) and by applying the technical guidelines for exploratory factor analysis using STATA by Watkins (Watkins, 2022). DeVillis' procedures include eight steps: (1) determine what to measure, (2) create measure items, (3) format the measurement, (4) review the measure items by expert, (5) consider inclusion of validation items, (6) administer measure items to a sample, (7) evaluate items, and (8) optimize scale length. We applied Watkins' technical guidelines for data screening, determining if exploratory factor analysis is appropriate, choosing factor analysis, determining factor extraction method and number of factors to retain, rotating factors, interpreting the results and reporting.

## INITIAL MEASURE ITEMS DEVLOPMENT

The initial measure items were developed following the three steps, which include reviewing relevant literature, consulting local non-formal practitioners, and expert review of draft measure items. We reviewed literature on teaching competency and teaching effectiveness, (e.g., Blömeke, 2017; Calaguas, 2012; Catano & Harvey, 2011; Morales, 2022; Moreno-Murcia et al., 2015, 2015; Nessipbayeva, 2012; Southeast Asia Teachers Competency Framework (SEA-TCF), 2018; Sumaryanta et al., 2018; Zhu et al., 2013), which provided sources for developing the initial scale on teaching competencies which led to identification of a total of 71 measure items with potential of five dimensions of teaching competencies, namely: subject matter expertise, pedagogy, teaching skills, assessment skills, and personality.

The draft questionnaire for teaching competencies scale was then reviewed by expert group which comprised of non-formal education practitioners and a non-formal education specialist. This review aimed for better clarity, relevance, and cultural appropriateness of the measure items, which resulted in reducing number of measure items to 51. These items were organized into five dimensions with subject matter expertise 6 items, pedagogy 10 items, teaching skills 17 items, assessment skills 8 items and personality 6 items. The items were designed in five-points Likert scales with response options (1) Strongly Disagree, (2) Disagree, (3) Neutral, (4) Agree, and (5) Strongly Agree. Based on student feedback, these variables are expected to exhibit good psychometric properties.

## ADMINISTRATION OF THE INITIAL SCALE

To identify factor structure and evaluate psychometric properties, the initial teaching competency scale was administered in survey form to students and alumni from the five target states. Prior to that, the questionnaires were translated into Burmese and pretested. After that, 15 enumerators were recruited and provided data collection training which included pretesting survey questionnaire before carrying out the survey in different regions. Actual data were collected using both digital and paper forms. Kobo Toolbox was used where the internet was accessible, and the paper-based forms where internet was unavailable. The survey was designed for self-completion by participants and were given clear instructions by enumerators on procedure to complete the survey.

## PARTICIPANTS

A total of 491 current students and alumni of fourteen non-formal education institutions completed the survey. All the current students participated in the survey had completed at least one semester or three courses offered by their schools. The list of the schools and number of participants from each school are shown in Table 1. These criteria were set to ensure that participants had sufficient exposure to the teaching practices so that they can provide substantive and informed

responses to the survey questions. The survey participants' age ranged from 15 to 30 years old. The sample comprised of 35.8 percent male, 61.7% females, and 2.4% non-binary gender. Regionally, there were 100 participants each from Kachin State, Karen State, and Karenni State respectively, and 99 participants from Shan State and 92 from Chin State.

*Table 1. Distribution of Participants Per School*

| SRN | Name of Schools | Number of Participants |
|---|---|---|
| 1 | Cherry Myay Academy | 52 |
| 2 | Chin Christian University | 28 |
| 3 | Chinbridge Institute | 7 |
| 4 | Integrated Development Institute | 21 |
| 5 | Kachin Land College | 30 |
| 6 | Kanza Community College | 51 |
| 7 | Kayan Taung Tan Community College | 18 |
| 8 | Level Up Academy | 31 |
| 9 | Naushaung college | 20 |
| 10 | Pinnya Tagar Academy | 50 |
| 11 | Tounge Là Yat Education Gathering Group | 76 |
| 12 | Victoria Academy | 57 |
| 13 | Young Smart Teachers Program | 26 |
| 14 | Zwekabin Myay Hpa-an Education Project | 24 |
| **Total** | | **491** |

Participants were current students or alumni of 13 non-formal education programs and distribution of participants per program is shown in Table 2 below.

## DATA ANALYSIS

We employed exploratory factor analysis to evaluate the scale validity and Crobach Alpha formula to evaluate internal consistency reliability of the measure items.

*Table 2. Distribution of Participants Per Program*

| SRN | Name of Schools | Number of Participants |
|---|---|---|
| 1 | Bachelor in Applied Social Sciences | 1 |
| 2 | Bachelor of Art in English | 26 |
| 3 | Bachelor of Business Administration | 2 |
| 4 | Community Development Program | 18 |
| 5 | Diploma in Social and Development Studies | 271 |
| 6 | Diploma in Education | 26 |
| 7 | Diploma in Integrated Development Studies | 21 |
| 8 | Diploma in Politics and Governance | 7 |
| 9 | Foundation Program | 14 |
| 10 | Junior college program | 15 |
| 11 | Pre diploma | 15 |
| 12 | Young Leadership and Development Program | 51 |
| 13 | Zwekabin Myay Hpa-an Education Project | 24 |
| **Total** | | **491** |

As we were unsure about the structure of teaching competency scales for non-formal schools, and we wanted to explore the latent constructs underlying the 51 teaching competency items, we implemented exploratory factor analysis (Alavi et al., 2020) using StataIC 15. We followed procedures delineated by Watkins (2022) in his "A Step-by-step Guides to Exploratory Factor Analysis with Stata". Common factor analysis, instead of principle component analysis, was chosen because it could be more accurate in estimating parameters of latent constructs (Widaman, 1993). Our data were collected in ordinal format and exhibit presence of multivariate nonnormality. Therefore, we employed iterated principal factor extraction method, which is more robust and less sensitive to nonnormality (Watkins, 2022, p. 124).

We use polychronic correlation matrix for our EFA as we expected nonnormality of our data which can be problematic for Pearson correlation estimate (Watkins 2021, p.116). We checked univariate skewness and kurtosis following recommendations by Current et all (1996), which suggested that univariate skewness should not exceed 2.0 and univariate kurtosis should be less than 7.0. The multivariate normality was determined through expected value of Mardia's kurtosis for a multivariate normal population which is v(v+2) where v is the number of variables. The expected value was 2703, but Mardia's kurtosis was 3366.2 (^2 [1]=9988.5,p< .001), exhibiting multivariate nonnormality. Thus, polychronic correlation was judged to be more appropriate (Watkins, 2022, p. 119).

For determination of number of factors to retain, we adopted recommendations by Velicer et al., (2000). They suggested employing three empirical methods along with consideration for interpretability in deciding factor retention. The empirical methods suggested include the minimum average partials (Velicer, 1976), the Parallel Analysis (Horn, 1965) and the screen test (Cattell, 1966). Accordingly, we implemented the empirical procedures and determined number of factors which are most interpretable and empirically grounded. As we believed the latent variables underlying the teaching competency measure items would be somewhat correlated, as is reported to be the case for most social science variables (Meehl, 1990), a Promax rotation with a k value 3 was chosen (DeVellis, 2017, p. 167; Tataryn et al., 1999).

In order to identify the most interpretable solution, we sequentially examined models with different number of factors as variously indicated by the Minimum Average Partials, the Parallel Analysis and the screen test. For evaluation of those models, we used four criteria: (1) items must have factor loading value of at least .32 to ensure that they are practically and statistically significant (Fabrigar & Wegener, 2012); (2) with the aim of approximating a simple structure, check if items have salient loadings on more than one factor and remove them; (3) retained factors must have at least three salient items; and (4) check if the alpha reliability of scales created from the salient loadings of each factor is at least .80 to be acceptably good for use of group research (DeVellis, 2017). Additionally, each model was examined for symptoms of overextraction, such as having fewer than three salient loadings, and under extraction such as no common unifying theme.

# RESULTS

Before proceeding to factor analysis, the data were checked for accuracy and plausibility. We particularly screened data for characteristics such as outliers and nonnormality, which could bias the results. As for univariate normality, no item has skewness > 2 nor kurtosis > 7 (See Table 5, in Appendix). There were no missing data. The variance ranges from 0.57 to 0.98. The mean values are high and the average item means was 3.9 (minimum score 1 and maximum value 5). Therefore the data were accurate and plausible to proceed.

We then examined the correlation matrix for the data was first examined for sufficient variance to check if the data were appropriate for EFA. Many of correlation coefficients were greater than .30 (Watkins 2021, p. 122). Stata factor test command reported the determinant of the correlation matrix to be .000. However, according to Watkins (2021, p. 122), Stata reports this results only to three decimal places, and the Barlett's test of sphericity (Bartlett, 1950) also tests whether the determinant is zero, which could indicate a more

precise value of determinant. The Barlett's test of our data rejected the identify matrix hypothesis (chi-square of 10093.3 with 1275 degree of freedom) at p< .001. Therefore, determinant was not zero. Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy for the whole set of variables (Kaiser, 1974) was .95. Individual variables' KMO ranges from .86 to .96 which indicate our sampling was adequate. We inspected the correlation matrix and found that several coefficients >.30, indicating factorability (Tabachnick & Fidell, 2013, p. 619). In sum, these measures indicate that the correlation matrix of our data is appropriate for EFA.

We performed scree test and parallel analysis and examine minimum average partials (MAP), to determine number of factors. The screen test and MAP (see Appendix 1) indicated that four factors should be retained for rotation and interpretation. However, Parallel Analysis indicated only two factors. Therefore, models with four, three and two factors were evaluated in comparison for their acceptability, model fitness and interpretability.

The four-factor model explained 45% of total variance before rotation, of which as expected, factor one accounted for 35%, while factor two and three accounted for 4.9% and 2.6% respectively. Factor four explained 1.9% of total variance. The four-factor model resulted in factor 1 with 17 salient loadings, factor 2 with 15 salient loadings, factor 3 with 12 salient loadings, and factor 4 with 9 salient loadings. Two measured items, item 29 and item 35 insufficient loadings, while four items loaded on more than one factors. Item 5 loaded on both factor 2 and factor 3, item 10 loaded on factor 1 and factor 2, while item 18 and item 19 both loaded on factor 1 and factor 3. In terms of Alpha reliability, factor 1, factor 2, and factor 3 have .89, .86, and .82 respectively. The alpha reliability coefficient of factor 4 was .82. All the factors demonstrated acceptable internal consistency for group research purpose. Regarding the model fitness, the root mean squared residual (RMSR) of the four-factor model was 0.039, and 19 residual coefficients exceeded .10 (1.49%), suggesting somewhat under factoring of the model. The four-factor model seems to be a better fit than models with fewer factors as will be reported later. However, it still contained complex loading items which were examined after evaluating three-factor model and two-factor model.

The three-factor model explain 43% of total variance prior to rotation. The factor one and factor two explain 35.4% and 4.9%, respectively. Factor 3 accounted for 2.6% of total variance before rotation. This model has two non-salient loadings (item 15 and item 27), and five cross loading items (item 5, item 10, item 21, item 40 and item 41). Each of the three factors has high internal consistency reliability: factor 1 = .89, factor 2 = .88, and factor 3 = .85. The increase in Alpha reliability coefficient may have been caused by increase in number of items per factor resulting from extraction of fewer factors (DeVellis, 2017, p. 139). However, it seems to have weaker model fitness than the four-factor model as indicated by its RMSR = .044 with 41 (3.22%) residual coefficients >.10, suggesting symptom of much more under extraction than the four-factor model.

The two-factor model explain 40.2% of total variance before rotation, of which factor 1 accounted for 35.3% and factor 2 accounted for 4.8%. The first factor had 35 salient loadings, and the second factor had 17 salient loadings. Two items, item 33 and item 39 cross loaded, while item 34 was non-salient on either of the two factors. Alpha reliability of factor 1 and factor two were .94 and .86, respectively. The two-factor model fitness was much weaker than both three-factor and four-factor models with its RMSR 0.051. Additionally, it manifests more severe symptom of under factoring as 64 (5%) residual coefficients were >.10. Furthermore, since the measured variables, which were expected to reflect up to five latent variables, collapsed into only two factors, the factor structure was difficult to interpret.

Therefore, the four-factor model exhibits better interpretability and model fitness among the three models, and was therefore, potential to be the most acceptable structure of teaching competency scale. But it contained two non-salient items and four cross loading items as reported earlier. Therefore, to achieve simple, statistically and practically significant solution, we removed the non-salient item 29 and item 35, and the cross loading items item 5, item 10, item 18 and item 19, and reanalyzed after creating a new polychronic correlation matrix with a new set of 45 items. The resultant factor loadings had one more cross loading item, the item 14, and was therefore, removed. Another version of polychronic correlation matrix was produced to rerun factor analysis, and there was no more complex nor non-salient item, which gave us a total of 44 items under the four-factor model as presented in Table 3. The four factors comprised of Factor 1: Assessment and reporting skills with 14 items, Factor 2: Learning stimulation with 12 items, Factor 3: Mastery of subject matters and delivery with 9 items; and Factor 4: Personality with 9 items.

*Table 3. Factor loadings for teaching competency scale*

| Items | Factors | | | |
|---|---|---|---|---|
| | Factor 1 | Factor 2 | Factor 3 | Factor 4 |
| Reports on students' progress and achievements accurately | 0.80 | 0.04 | -0.18 | 0.03 |
| Tracks closely students' completion of assignments | 0.60 | 0.06 | -0.07 | -0.03 |
| Provides timely and regular feedback | 0.59 | -0.16 | 0.21 | 0.09 |
| Clearly relate assessment tasks to course objectives | 0.57 | 0.01 | 0.23 | -0.07 |
| Provides clear instruction on assessment tasks | 0.56 | 0.04 | 0.10 | 0.08 |
| Uses different assessment methods effectively | 0.56 | 0.10 | 0.02 | 0.06 |
| Has clear and appropriate assessment plans | 0.55 | 0.20 | 0.01 | -0.02 |
| Questions students in various ways to check understanding | 0.52 | 0.15 | 0.10 | -0.03 |
| Uses appropriate correction and feedback | 0.51 | -0.10 | 0.20 | 0.22 |
| Provides evidence of learning achievements | 0.51 | 0.22 | -0.09 | -0.01 |
| Implemented modifications effectively to maximize student's learning | 0.45 | 0.27 | 0.02 | 0.06 |
| Use class time effectively | 0.43 | -0.20 | 0.30 | 0.06 |
| Caters for student's individual learning needs | 0.38 | 0.16 | 0.04 | 0.15 |
| Makes learning relevant to students' knowledge and background | 0.34 | 0.20 | 0.24 | 0.01 |
| Uses a variety of tasks in his/her teaching | -0.14 | 0.80 | 0.02 | 0.02 |
| Organizes interesting extracurricular activities | -0.10 | 0.66 | 0.12 | -0.13 |
| Organizes activities for participative learning | 0.22 | 0.61 | -0.10 | 0.07 |
| Practically promote independent learning | 0.01 | 0.58 | 0.09 | 0.00 |
| Designs tasks to promote collaborative learning | 0.18 | 0.57 | 0.03 | -0.04 |
| Innovative and resourceful in locally available teaching materials | -0.02 | 0.45 | 0.18 | 0.02 |
| Fosters interest and motivation in learning | 0.22 | 0.44 | 0.00 | 0.13 |

| Items | Factors | | | |
|---|---|---|---|---|
| | Factor 1 | Factor 2 | Factor 3 | Factor 4 |
| Relates his/her subject area clearly to other subjects | 0.04 | 0.43 | 0.24 | -0.07 |
| Teaches effectively learning strategies | 0.13 | 0.42 | 0.21 | 0.04 |
| Uses various student-centered methods in delivering lessons | 0.10 | 0.40 | 0.03 | 0.11 |
| Designs learning activities that promote creative and critical thinking | 0.07 | 0.40 | 0.17 | 0.03 |
| Provides out-of-class counselling | 0.21 | 0.37 | -0.06 | 0.13 |
| Is skillful in presenting concepts of the subject clearly and accurately | -0.04 | 0.07 | 0.80 | -0.04 |
| Demonstrates mastery of the subject he/she teaches | -0.18 | 0.05 | 0.78 | 0.13 |
| Frames lessons appropriately to address the skills outlined in the syllabus | -0.05 | 0.06 | 0.70 | -0.03 |
| Knows how to answer questions about the lesson content | 0.20 | -0.18 | 0.66 | 0.07 |
| Informs clearly of the course objectives, contents and assessments | 0.06 | 0.23 | 0.52 | -0.02 |
| Always come to class well-prepared | 0.16 | 0.10 | 0.42 | 0.10 |
| Provides initial and final overview of the subject in class | 0.09 | 0.21 | 0.42 | 0.06 |
| Present clear and achievable lesson objectives | 0.17 | 0.30 | 0.37 | -0.02 |
| Delivers the content in a clear and logical manner, highlight important aspects | 0.18 | 0.29 | 0.34 | 0.00 |
| Is friendly, kind, and supportive to all students | -0.16 | 0.16 | 0.03 | 0.81 |
| Treats all students equally and fairly, and doesn't who favoritism | 0.06 | -0.24 | 0.07 | 0.74 |
| Creates a welcoming and respectful learning environment | -0.01 | 0.10 | 0.13 | 0.66 |
| Admits when he/she made mistakes | 0.12 | -0.07 | 0.01 | 0.60 |
| Is easily accessible | 0.02 | 0.10 | -0.19 | 0.60 |
| Resolves problems and issues in a sensitive and respectful manner | 0.05 | 0.07 | 0.05 | 0.56 |
| Adheres to confidentiality | 0.15 | -0.10 | 0.01 | 0.56 |
| Encourages feedback on his/her teaching | 0.09 | 0.20 | -0.03 | 0.41 |
| Is good at student-teacher and student-student interactions | 0.16 | 0.27 | -0.04 | 0.37 |

Correlation between factor one and two was .62, between factor one and three was .60, between factor one and four was .65, between factor 2 and three was .58, between factor two and four was .43, and between factor three and four was .38. Interfactor correlation ranges from .38 to .65 and thus were low enough to indicate discriminant validity (Brown, 2015, p. 116).

**Table 4. Inter-factor correlation of the final four-factor model**

| Factors | Factor 1 | Factor 2 | Factor 3 | Factor 4 |
|---|---|---|---|---|
| Factor 1 | 1 | | | |
| Factor 2 | 0.62 | 1 | | |
| Factor 3 | 0.6042 | 0.581 | 1 | |
| Factor 4 | 0.6525 | 0.4336 | 0.3877 | 1 |

The reliability of the four-factor model with a total of 44 measured items was checked by calculating the Cronbach's alpha values for entire set of the items as well as for each set of subscale items. We calculated 95% confidence intervals around each reliability point estimate using bootstrapping method, as recommended by Dunne et al (Dunn et al., 2014). The alpha reliability coefficient for the whole scale was .94, 95% CI [.93, .95]. The factors manifested alpha reliability coefficient of .88, 95% CI [.865, .900] for factor 1 (Assessment and reporting skills), .85, 95% CI [.825, .869] for factor 2 (learning stimulation), .84, 95% CI [.82, .86] for factor 3 (mastery of subject matters and delivery), and .82, 95% CI [.79, .84] for factor 4 (personality). Thus, alpha values of the four factors demonstrated strongly acceptable internal consistency reliability. The RMSR for the final four-factor model was .038, with 13 residual coefficients greater than .10, which exhibited a closer model fitness than the initial four-factor model.

# DISCUSSION

The objective of this study was to develop psychometrically robust instrument to measure teaching competency in non-formal post-secondary education by examining the factor structure and internal consistency reliability using data obtained from a sample of alumni and current students. The results of the study offered evidence to consider teaching competency scale, which consists of four subscales and 44 items, as valid and reliable measure to assess teaching competency of non-formal postsecondary education.

The first subscale, Assessment and Reporting Skills with 14 items, highlighted performance and skills non-formal educators demonstrate for assessing and informing student's learning progress. The second subscale, Learning Stimulation with 12 items, highlights knowledge about and skillful application of general teaching methods and learning psychology to create engaging and motivating learning environment. The third subscale, Mastery of Subject Matter and Delivery with 9 items, highlights knowledge of the subject matter to

be taught as well as pedagogical knowledge specific to the teaching of the subject matter. The fourth subscale, Personality with 9 items, highlights interpersonal skills, ethical and professional behaviors.

The findings of our research emphasize the practical benefits of the teaching competency scale, which may be utilized as part of end-of-term evaluation efforts by members of the Myint Mo Education Foundation. Moreover, the utility of instrument can be extended its utility to various non-formal post-secondary education providers. The structured approach covers essential aspects of teaching, ensuring a thorough assessment. By adopting this framework, the Myint Mo Education Foundation and similar institutions can enhance their performance management and thus the quality of teaching by identifying specific needs for continuous improvement.

## LIMITATIONS

While this research offered useful results, there are some limitations which should be acknowledged. Firstly, the study participants were recruited from non-formal education institutions based in Chin, Kachin, Karenni, Karen, and Shan states, which are ethnically non-Burmese dominant. Secondly, all measure items were worded positively and did not include negative questions, which might have limited avoidance of potential affirmation bias (DeVellis, 2017, p. 112). Considering above-mentioned limitations, we recommend similar research using larger, regionally and ethically more inclusive, sample to extend applicability of results of this study.

# CONCLUSION

This study aimed to develop psychometrically sound instrument to measure teaching competencies in non-formal post-secondary education. We first developed a measuring instrument with 51 items based on literature and expert review, and administered it to a sample of current students and alumni of non-formal post-secondary schools. After sequentially evaluating two-factor model, three-factor model and four-factor model as indicated by results from scree test, Parallel Analysis and Minimum Average Partials, the data revealed four factor structure of teaching competency scale as the fittest and most interpretable among the three models. The identified four factor structure comprised of four subscales: Assessment and Reporting, Learning Stimulation, Mastery of Specific Subject Matter and Delivery, and Personality. As indicated by Crobach's Alpha coefficient value of .93, the internal consistency reliability of the entire scale was strongly acceptable. Each subscale also manifested strongly acceptable internal consistency reliability. The subscale Assessment and Reporting has alpha value of .88 and the subscale Learning Stimulation has alpha value .85. The subscales Mastery of Subject Matter and Delivery and the subscale Personality have alpha value of .84 and .82, respectively. These results provided empirical evidence that the identified competency scale can be used as a reliable and valid measurement tool to assess teaching competencies of individual teachers at non-formal post-secondary institutions. The scale will be particularly relevant for schools affiliated with Myint-mo Education Foundation or those that operate in similar nature.

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# APPENDIX 1:

## Table 5. Summary Statistics of 51 Teaching Competency Items

| stats | N | mean | sd | min | max | skewness | kurtosis |
|---|---|---|---|---|---|---|---|
| *q1* | 491 | 4.26 | 0.57 | 2.00 | 5.00 | -0.20 | 3.22 |
| *q2* | 491 | 4.09 | 0.59 | 1.00 | 5.00 | -0.44 | 4.94 |
| *q3* | 491 | 3.76 | 0.98 | 1.00 | 5.00 | -0.62 | 2.78 |
| *q4* | 491 | 3.91 | 0.77 | 1.00 | 5.00 | -0.59 | 3.54 |
| *q5* | 491 | 4.14 | 0.71 | 1.00 | 5.00 | -0.68 | 3.88 |
| *q6* | 491 | 4.23 | 0.70 | 2.00 | 5.00 | -0.57 | 2.97 |
| *q7* | 491 | 3.98 | 0.64 | 2.00 | 5.00 | -0.49 | 3.95 |
| *q8* | 491 | 4.05 | 0.68 | 2.00 | 5.00 | -0.34 | 3.04 |
| *q9* | 491 | 3.91 | 0.78 | 1.00 | 5.00 | -0.50 | 3.32 |
| *q10* | 491 | 3.84 | 0.70 | 1.00 | 5.00 | -0.45 | 3.56 |
| *q11* | 491 | 3.43 | 0.88 | 1.00 | 5.00 | -0.21 | 2.68 |
| *q12* | 491 | 3.91 | 0.76 | 1.00 | 5.00 | -0.43 | 3.12 |
| *q13* | 491 | 4.04 | 0.91 | 1.00 | 5.00 | -0.80 | 3.12 |
| *q14* | 491 | 4.05 | 0.75 | 1.00 | 5.00 | -0.90 | 4.81 |
| *q15* | 491 | 3.75 | 0.79 | 2.00 | 5.00 | -0.43 | 2.91 |
| *q16* | 491 | 3.84 | 0.87 | 1.00 | 5.00 | -0.64 | 3.25 |
| *q17* | 491 | 3.98 | 0.72 | 1.00 | 5.00 | -0.51 | 3.57 |
| *q18* | 491 | 3.79 | 0.66 | 1.00 | 5.00 | -0.41 | 3.69 |
| *q19* | 491 | 4.02 | 0.68 | 1.00 | 5.00 | -0.64 | 4.23 |
| *q20* | 491 | 4.27 | 0.70 | 2.00 | 5.00 | -0.64 | 3.05 |
| *q21* | 491 | 3.95 | 0.69 | 2.00 | 5.00 | -0.45 | 3.46 |
| *q22* | 491 | 3.99 | 0.76 | 1.00 | 5.00 | -0.55 | 3.38 |
| *q23* | 491 | 3.94 | 0.76 | 2.00 | 5.00 | -0.45 | 3.00 |
| *q24* | 491 | 3.82 | 0.77 | 1.00 | 5.00 | -0.33 | 3.14 |
| *q25* | 491 | 3.98 | 0.76 | 1.00 | 5.00 | -0.72 | 3.75 |
| *q26* | 491 | 3.96 | 0.71 | 1.00 | 5.00 | -0.54 | 3.72 |
| *q27* | 491 | 3.90 | 0.74 | 1.00 | 5.00 | -0.41 | 3.22 |
| *q28* | 491 | 4.05 | 0.79 | 1.00 | 5.00 | -0.82 | 4.00 |
| *q29* | 491 | 3.82 | 0.82 | 1.00 | 5.00 | -0.44 | 3.12 |
| *q30* | 491 | 3.93 | 0.75 | 1.00 | 5.00 | -0.51 | 3.56 |
| *q31* | 491 | 3.95 | 0.72 | 2.00 | 5.00 | -0.48 | 3.30 |
| *q32* | 491 | 3.71 | 0.80 | 1.00 | 5.00 | -0.44 | 2.96 |
| *q33* | 491 | 3.87 | 0.71 | 1.00 | 5.00 | -0.47 | 3.54 |
| *q34* | 491 | 4.18 | 0.75 | 2.00 | 5.00 | -0.74 | 3.43 |
| *q35* | 491 | 3.94 | 0.77 | 1.00 | 5.00 | -0.47 | 3.15 |
| *q36* | 491 | 3.83 | 0.78 | 1.00 | 5.00 | -0.47 | 3.16 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| *q37* | 491 | 4.19 | 0.76 | 1.00 | 5.00 | -0.86 | 3.81 |
| *q38* | 491 | 4.10 | 0.72 | 1.00 | 5.00 | -0.68 | 3.85 |
| *q39* | 491 | 4.10 | 0.70 | 1.00 | 5.00 | -0.60 | 3.81 |
| *q40* | 491 | 3.91 | 0.77 | 1.00 | 5.00 | -0.59 | 3.59 |
| *q41* | 491 | 4.03 | 0.68 | 1.00 | 5.00 | -0.51 | 3.91 |
| *q42* | 491 | 3.57 | 0.89 | 1.00 | 5.00 | -0.37 | 2.84 |
| *q43* | 491 | 3.80 | 0.76 | 1.00 | 5.00 | -0.60 | 3.87 |
| *q44* | 491 | 4.14 | 0.78 | 1.00 | 5.00 | -0.84 | 4.00 |
| *q45* | 491 | 3.92 | 0.93 | 1.00 | 5.00 | -0.70 | 3.23 |
| *q46* | 491 | 4.12 | 0.70 | 1.00 | 5.00 | -0.56 | 3.58 |
| *q47* | 491 | 4.05 | 0.77 | 1.00 | 5.00 | -0.54 | 3.17 |
| *q48* | 491 | 4.22 | 0.69 | 2.00 | 5.00 | -0.51 | 2.86 |
| *q49* | 491 | 4.07 | 0.84 | 1.00 | 5.00 | -0.79 | 3.59 |
| *q50* | 491 | 4.11 | 0.69 | 1.00 | 5.00 | -0.51 | 3.56 |
| *q51* | 491 | 4.19 | 0.69 | 2.00 | 5.00 | -0.57 | 3.24 |

## Examination of Data for Exploratory Factor Analysis

### Test for Multivariate Normality

| | | |
|---|---|---|
| Mardia mSkewness = 557.3659 | chi2(23426) =45900.556 | Prob>chi2 = 0.0000 |
| Mardia mKurtosis = 3366.253 | chi2(1) = 9988.579 | Prob>chi2 = 0.0000 |
| Henze-Zirkler = 1.124059 | chi2(1) = 4.74e+12 | Prob>chi2 = 0.0000 |
| Doornik-Hansen | chi2(102) = 1256.726 | Prob>chi2 = 0.0000 |

### Factor Test

Determinant of the correlation matrix

Det = 0.000

Bartlett test of sphericity

Chi-square = 10093.305

Degrees of freedom = 1275

p-value = 0.000

H0: variables are not intercorrelated

Kaiser-Meyer-Olkin Measure of Sampling Adequacy

KMO = 0.951

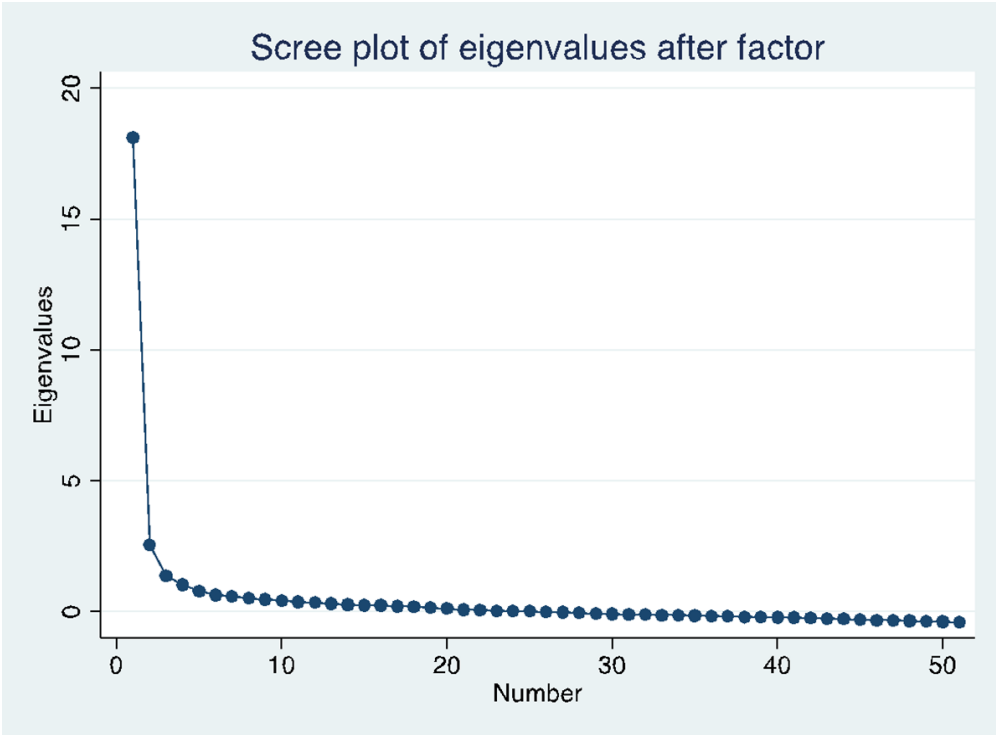
## Table . Polychoric Correlation Matrix of 51 Teaching Competency Items

| items | q1 | q2 | q3 | q4 | q5 | q6 | q7 | q8 | q9 | q10 | q11 | q12 | q13 | q14 | q15 | q16 | q17 | q18 | q19 | q20 | q21 | q22 | q23 | q24 | q25 | q26 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| q1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | |
| q2 | 0.5775 | 1.0000 | | | | | | | | | | | | | | | | | | | | | | | | |
| q3 | 0.2271 | 0.3931 | 1.0000 | | | | | | | | | | | | | | | | | | | | | | | |
| q4 | 0.3706 | 0.3277 | 0.3787 | 1.0000 | | | | | | | | | | | | | | | | | | | | | | |
| q5 | 0.4769 | 0.4024 | 0.3317 | 0.4878 | 1.0000 | | | | | | | | | | | | | | | | | | | | | |
| q6 | 0.5448 | 0.4577 | 0.2312 | 0.3348 | 0.4174 | 1.0000 | | | | | | | | | | | | | | | | | | | | |
| q7 | 0.5083 | 0.4886 | 0.4039 | 0.3896 | 0.4603 | 0.5176 | 1.0000 | | | | | | | | | | | | | | | | | | | |
| q8 | 0.5913 | 0.5440 | 0.2790 | 0.4672 | 0.5155 | 0.5652 | 0.5379 | 1.0000 | | | | | | | | | | | | | | | | | | |
| q9 | 0.2574 | 0.2681 | 0.2539 | 0.3771 | 0.3415 | 0.2685 | 0.3192 | 0.3039 | 1.0000 | | | | | | | | | | | | | | | | | |
| q10 | 0.4028 | 0.3312 | 0.3634 | 0.4727 | 0.3489 | 0.3610 | 0.5042 | 0.4502 | 0.3834 | 1.0000 | | | | | | | | | | | | | | | | |
| q11 | 0.3271 | 0.3153 | 0.3922 | 0.3714 | 0.3858 | 0.2561 | 0.3446 | 0.4253 | 0.3438 | 0.3913 | 1.0000 | | | | | | | | | | | | | | | |
| q12 | 0.4728 | 0.4187 | 0.3066 | 0.3518 | 0.4839 | 0.3803 | 0.5140 | 0.4795 | 0.3330 | 0.4875 | 0.4110 | 1.0000 | | | | | | | | | | | | | | |
| q13 | 0.3541 | 0.2736 | 0.5228 | 0.3900 | 0.4341 | 0.2869 | 0.4270 | 0.3318 | 0.3781 | 0.4370 | 0.4417 | 0.4296 | 1.0000 | | | | | | | | | | | | | |
| q14 | 0.2912 | 0.4232 | 0.4040 | 0.3858 | 0.4023 | 0.3416 | 0.4093 | 0.4235 | 0.3014 | 0.4457 | 0.4134 | 0.3964 | 0.4193 | 1.0000 | | | | | | | | | | | | |
| q15 | 0.2653 | 0.1784 | 0.2236 | 0.3109 | 0.3732 | 0.2847 | 0.4270 | 0.2943 | 0.3032 | 0.3728 | 0.3027 | 0.2954 | 0.3044 | 0.2901 | 1.0000 | | | | | | | | | | | |
| q16 | 0.2464 | 0.2362 | 0.2869 | 0.3612 | 0.3484 | 0.2944 | 0.3073 | 0.2420 | 0.3132 | 0.3987 | 0.3023 | 0.2910 | 0.3933 | 0.2494 | 0.3419 | 1.0000 | | | | | | | | | | |
| q17 | 0.4203 | 0.3963 | 0.3485 | 0.4664 | 0.5434 | 0.3693 | 0.4596 | 0.4348 | 0.2919 | 0.4743 | 0.3334 | 0.4949 | 0.4330 | 0.4446 | 0.4081 | 0.4314 | 1.0000 | | | | | | | | | |
| q18 | 0.4282 | 0.3929 | 0.2922 | 0.3624 | 0.4360 | 0.4226 | 0.5321 | 0.4951 | 0.3451 | 0.4963 | 0.3218 | 0.4741 | 0.3413 | 0.4155 | 0.4573 | 0.3446 | 0.4518 | 1.0000 | | | | | | | | |
| q19 | 0.4011 | 0.3059 | 0.1679 | 0.2077 | 0.2652 | 0.4190 | 0.4648 | 0.4181 | 0.3079 | 0.3653 | 0.2791 | 0.3389 | 0.2367 | 0.3492 | 0.2950 | 0.2911 | 0.3122 | 0.5426 | 1.0000 | | | | | | | |
| q20 | 0.4361 | 0.4392 | 0.2716 | 0.3021 | 0.4046 | 0.4491 | 0.4198 | 0.4877 | 0.2870 | 0.4361 | 0.3082 | 0.4720 | 0.3579 | 0.3941 | 0.2297 | 0.3401 | 0.4179 | 0.3838 | 0.4362 | 1.0000 | | | | | | |
| q21 | 0.4605 | 0.3559 | 0.3844 | 0.3740 | 0.4168 | 0.4612 | 0.4828 | 0.5208 | 0.3344 | 0.5247 | 0.3610 | 0.4873 | 0.3988 | 0.4838 | 0.3543 | 0.3584 | 0.5494 | 0.4652 | 0.3569 | 0.5302 | 1.0000 | | | | | |
| q22 | 0.4526 | 0.3734 | 0.4114 | 0.3338 | 0.3984 | 0.4180 | 0.4581 | 0.5381 | 0.3300 | 0.4062 | 0.4161 | 0.4494 | 0.3849 | 0.4796 | 0.3303 | 0.2713 | 0.3998 | 0.5102 | 0.4135 | 0.4683 | 0.5644 | 1.0000 | | | | |
| q23 | 0.3065 | 0.4120 | 0.2717 | 0.3896 | 0.3541 | 0.4575 | 0.4854 | 0.4282 | 0.3781 | 0.4364 | 0.2846 | 0.4300 | 0.3602 | 0.4597 | 0.3865 | 0.3093 | 0.4651 | 0.4910 | 0.3532 | 0.5070 | 0.4717 | 0.5325 | 1.0000 | | | |
| q24 | 0.3702 | 0.2958 | 0.3560 | 0.3899 | 0.4553 | 0.2328 | 0.3704 | 0.3490 | 0.4008 | 0.4383 | 0.3277 | 0.4182 | 0.4688 | 0.3989 | 0.3314 | 0.3122 | 0.4318 | 0.4561 | 0.3293 | 0.3414 | 0.3820 | 0.3771 | 0.4406 | 1.0000 | | |
| q25 | 0.3337 | 0.3320 | 0.3774 | 0.3229 | 0.2959 | 0.3052 | 0.4298 | 0.3549 | 0.4164 | 0.3829 | 0.3812 | 0.3929 | 0.5316 | 0.4155 | 0.3341 | 0.3667 | 0.4428 | 0.4075 | 0.3055 | 0.3982 | 0.4312 | 0.4725 | 0.4130 | 0.4930 | 1.0000 | |
| q26 | 0.4007 | 0.2911 | 0.2851 | 0.3316 | 0.4263 | 0.3191 | 0.3602 | 0.3293 | 0.3012 | 0.3553 | 0.3467 | 0.3406 | 0.3829 | 0.4370 | 0.2784 | 0.2111 | 0.4025 | 0.3558 | 0.2389 | 0.3247 | 0.4153 | 0.4456 | 0.3888 | 0.5193 | 0.4756 | 1.0000 |
| q27 | 0.3352 | 0.3354 | 0.2783 | 0.4101 | 0.3798 | 0.3857 | 0.4327 | 0.3894 | 0.2868 | 0.4035 | 0.3087 | 0.3695 | 0.2961 | 0.3338 | 0.4613 | 0.3106 | 0.4325 | 0.3824 | 0.2980 | 0.3939 | 0.4797 | 0.4370 | 0.4546 | 0.3318 | 0.3166 | 0.4765 |
| q28 | 0.2616 | 0.2547 | 0.2261 | 0.2476 | 0.3543 | 0.2996 | 0.3314 | 0.2743 | 0.3438 | 0.2801 | 0.2679 | 0.3117 | 0.3566 | 0.2583 | 0.3487 | 0.3641 | 0.3599 | 0.2910 | 0.2421 | 0.4173 | 0.4041 | 0.3558 | 0.3884 | 0.2783 | 0.4009 | 0.3295 |
| q29 | 0.2524 | 0.3497 | 0.3035 | 0.2787 | 0.2744 | 0.2630 | 0.4144 | 0.2906 | 0.3265 | 0.3062 | 0.3429 | 0.3188 | 0.3580 | 0.2970 | 0.3521 | 0.2899 | 0.3206 | 0.3459 | 0.3312 | 0.3342 | 0.3652 | 0.4203 | 0.3319 | 0.3563 | 0.4267 | 0.2623 |
| q30 | 0.3215 | 0.2770 | 0.3802 | 0.3363 | 0.4621 | 0.3256 | 0.4176 | 0.3523 | 0.3662 | 0.3710 | 0.3578 | 0.3698 | 0.5276 | 0.3145 | 0.4459 | 0.4032 | 0.5045 | 0.4019 | 0.3054 | 0.4194 | 0.5044 | 0.4346 | 0.4485 | 0.4766 | 0.5649 | 0.3513 |
| q31 | 0.2938 | 0.3279 | 0.3070 | 0.3913 | 0.4741 | 0.3194 | 0.3658 | 0.3741 | 0.4293 | 0.3617 | 0.2969 | 0.3610 | 0.3965 | 0.3398 | 0.3274 | 0.3429 | 0.5153 | 0.4255 | 0.3123 | 0.4679 | 0.4449 | 0.4502 | 0.5047 | 0.4172 | 0.4487 | 0.3375 |
| q32 | 0.2698 | 0.2740 | 0.2661 | 0.2853 | 0.3182 | 0.4023 | 0.3845 | 0.2716 | 0.2934 | 0.3636 | 0.2599 | 0.3810 | 0.2442 | 0.2884 | 0.3617 | 0.4302 | 0.4424 | 0.4835 | 0.3629 | 0.3189 | 0.4328 | 0.4327 | 0.4219 | 0.2861 | 0.3575 | 0.2666 |
| q33 | 0.2793 | 0.3071 | 0.3450 | 0.3643 | 0.3359 | 0.3662 | 0.3973 | 0.3237 | 0.3463 | 0.4601 | 0.3286 | 0.4306 | 0.3594 | 0.4266 | 0.3795 | 0.3967 | 0.4930 | 0.4779 | 0.2977 | 0.4237 | 0.4436 | 0.5224 | 0.5227 | 0.3809 | 0.3507 | 0.3693 |
| q34 | 0.2458 | 0.2935 | 0.0581 | 0.1894 | 0.2685 | 0.4557 | 0.3555 | 0.3252 | 0.2526 | 0.3456 | 0.1652 | 0.3185 | 0.1688 | 0.1694 | 0.2298 | 0.2173 | 0.3172 | 0.3477 | 0.3544 | 0.4512 | 0.3011 | 0.2998 | 0.3892 | 0.2881 | 0.2551 | 0.2189 |
| q35 | 0.4239 | 0.3307 | 0.2948 | 0.3261 | 0.3374 | 0.3609 | 0.3885 | 0.4272 | 0.3096 | 0.4985 | 0.3640 | 0.3726 | 0.3518 | 0.4252 | 0.3254 | 0.4087 | 0.3988 | 0.4428 | 0.3718 | 0.3783 | 0.4783 | 0.5164 | 0.3779 | 0.4649 | 0.4943 | 0.4691 |
| q36 | 0.3789 | 0.2913 | 0.2362 | 0.3609 | 0.3621 | 0.3025 | 0.4199 | 0.3272 | 0.3649 | 0.4794 | 0.3789 | 0.3681 | 0.3520 | 0.3161 | 0.4750 | 0.3638 | 0.3556 | 0.4766 | 0.3832 | 0.4007 | 0.4072 | 0.4675 | 0.3824 | 0.3878 | 0.3651 | 0.3851 |
| q37 | 0.3482 | 0.2845 | 0.2302 | 0.3066 | 0.3304 | 0.3698 | 0.3821 | 0.2999 | 0.2444 | 0.3426 | 0.2216 | 0.3717 | 0.3689 | 0.3166 | 0.3759 | 0.3357 | 0.4232 | 0.3602 | 0.1990 | 0.3747 | 0.3740 | 0.3859 | 0.3700 | 0.3292 | 0.4107 | 0.3457 |
| q38 | 0.4323 | 0.3946 | 0.2724 | 0.3511 | 0.3840 | 0.4013 | 0.4267 | 0.4331 | 0.2644 | 0.4872 | 0.2862 | 0.4088 | 0.3026 | 0.3969 | 0.3996 | 0.2839 | 0.4377 | 0.4679 | 0.3224 | 0.3558 | 0.4801 | 0.4242 | 0.4077 | 0.2930 | 0.4205 | 0.3586 |
| q39 | 0.3468 | 0.3327 | 0.2789 | 0.3087 | 0.3462 | 0.3853 | 0.4330 | 0.4219 | 0.3887 | 0.3674 | 0.3343 | 0.3642 | 0.3173 | 0.3957 | 0.3818 | 0.3011 | 0.3768 | 0.4208 | 0.4357 | 0.4395 | 0.4044 | 0.3782 | 0.4307 | 0.3393 | 0.4395 | 0.3067 |
| q40 | 0.3313 | 0.3002 | 0.1710 | 0.2370 | 0.3152 | 0.4882 | 0.3187 | 0.4115 | 0.2885 | 0.3467 | 0.2734 | 0.4269 | 0.2482 | 0.3159 | 0.3477 | 0.3205 | 0.3277 | 0.4135 | 0.3981 | 0.4367 | 0.3599 | 0.4376 | 0.4543 | 0.2745 | 0.3485 | 0.2915 |
| q41 | 0.4201 | 0.4033 | 0.1614 | 0.2574 | 0.2959 | 0.4442 | 0.4317 | 0.3435 | 0.3580 | 0.3835 | 0.3284 | 0.4666 | 0.2721 | 0.3515 | 0.3824 | 0.4153 | 0.3924 | 0.4101 | 0.3930 | 0.4321 | 0.4703 | 0.4355 | 0.4142 | 0.2645 | 0.4345 | 0.2762 |
| q42 | 0.2028 | 0.2610 | 0.1415 | 0.2386 | 0.1964 | 0.2373 | 0.2594 | 0.2835 | 0.2784 | 0.3916 | 0.3663 | 0.2936 | 0.2603 | 0.2007 | 0.3553 | 0.3560 | 0.2778 | 0.3386 | 0.3150 | 0.2927 | 0.2801 | 0.3057 | 0.3434 | 0.2288 | 0.3520 | 0.2389 |
| q43 | 0.2247 | 0.2151 | 0.2524 | 0.2575 | 0.3002 | 0.3689 | 0.2297 | 0.2624 | 0.3321 | 0.3973 | 0.2373 | 0.3595 | 0.3112 | 0.2873 | 0.4738 | 0.3329 | 0.3789 | 0.3147 | 0.3105 | 0.3547 | 0.3445 | 0.3660 | 0.4083 | 0.3029 | 0.3780 | 0.2961 |
| q44 | 0.2045 | 0.1656 | 0.0840 | 0.1209 | 0.2006 | 0.2116 | 0.2295 | 0.1658 | 0.2288 | 0.1600 | 0.1472 | 0.2596 | 0.1519 | 0.2455 | 0.2240 | 0.1964 | 0.2055 | 0.1616 | 0.2318 | 0.2902 | 0.2179 | 0.2300 | 0.2875 | 0.2466 | 0.2321 | 0.2021 |
| q45 | 0.0899 | 0.0497 | 0.0602 | 0.0776 | 0.1339 | 0.1609 | 0.1411 | 0.0549 | 0.1761 | 0.1272 | 0.1593 | 0.1766 | 0.2242 | 0.0840 | 0.1906 | 0.2692 | 0.1814 | 0.1742 | 0.1217 | 0.2283 | 0.1731 | 0.1612 | 0.1875 | 0.0917 | 0.1936 | 0.1969 |
| q46 | 0.3502 | 0.3088 | 0.1672 | 0.2626 | 0.3888 | 0.3486 | 0.3144 | 0.3960 | 0.3010 | 0.3293 | 0.3186 | 0.3470 | 0.2787 | 0.3982 | 0.3693 | 0.3658 | 0.4000 | 0.3549 | 0.2595 | 0.3769 | 0.3685 | 0.3610 | 0.3095 | 0.3260 | 0.3680 | 0.3324 |
| q47 | 0.2507 | 0.1358 | 0.0700 | 0.1903 | 0.1812 | 0.2731 | 0.2301 | 0.1606 | 0.2168 | 0.1744 | 0.1527 | 0.2742 | 0.1941 | 0.2383 | 0.3038 | 0.2446 | 0.2979 | 0.2086 | 0.1987 | 0.2854 | 0.2476 | 0.2378 | 0.2974 | 0.2019 | 0.2494 | 0.2602 |
| q48 | 0.3062 | 0.1956 | 0.1555 | 0.2039 | 0.2813 | 0.3024 | 0.2942 | 0.2683 | 0.3537 | 0.2138 | 0.2516 | 0.2886 | 0.3088 | 0.3288 | 0.2784 | 0.3181 | 0.3511 | 0.2911 | 0.2568 | 0.3455 | 0.2979 | 0.3545 | 0.3419 | 0.2493 | 0.2918 | 0.2343 |
| q49 | 0.1882 | 0.1397 | 0.0135 | 0.1507 | 0.1764 | 0.3170 | 0.1712 | 0.1366 | 0.1927 | 0.0957 | 0.1151 | 0.2482 | 0.0565 | 0.2141 | 0.2735 | 0.2115 | 0.2164 | 0.2456 | 0.2180 | 0.2306 | 0.2539 | 0.1838 | 0.3022 | 0.1749 | 0.1129 | 0.1849 |
| q50 | 0.2911 | 0.2511 | 0.1999 | 0.2090 | 0.2518 | 0.2664 | 0.3001 | 0.2339 | 0.2629 | 0.2479 | 0.3427 | 0.2893 | 0.2634 | 0.3088 | 0.2739 | 0.2730 | 0.2777 | 0.2897 | 0.2854 | 0.2809 | 0.2511 | 0.3606 | 0.3217 | 0.2331 | 0.2106 | 0.2770 |
| q51 | 0.3018 | 0.1653 | 0.1848 | 0.2800 | 0.3393 | 0.2149 | 0.2732 | 0.2405 | 0.2845 | 0.1875 | 0.1781 | 0.2774 | 0.2547 | 0.2662 | 0.3065 | 0.3526 | 0.3501 | 0.2573 | 0.2871 | 0.2507 | 0.2509 | 0.3276 | 0.3206 | 0.2814 | 0.2700 | 0.2344 |

| q27 | q28 | q29 | q30 | q31 | q32 | q33 | q34 | q35 | q36 | q37 | q38 | q39 | q40 | q41 | q42 | q43 | q44 | q45 | q46 | q47 | q48 | q49 | q50 | q51 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.0000 | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.4449 | 1.0000 | | | | | | | | | | | | | | | | | | | | | | | |
| 0.3597 | 0.3829 | 1.0000 | | | | | | | | | | | | | | | | | | | | | | |
| 0.4071 | 0.4547 | 0.4150 | 1.0000 | | | | | | | | | | | | | | | | | | | | | |
| 0.3916 | 0.4241 | 0.3256 | 0.6695 | 1.0000 | | | | | | | | | | | | | | | | | | | | |
| 0.4279 | 0.4265 | 0.3125 | 0.4079 | 0.4695 | 1.0000 | | | | | | | | | | | | | | | | | | | |
| 0.4638 | 0.4498 | 0.3861 | 0.4420 | 0.5165 | 0.5556 | 1.0000 | | | | | | | | | | | | | | | | | | |
| 0.2892 | 0.2586 | 0.2645 | 0.2750 | 0.3666 | 0.3210 | 0.3809 | 1.0000 | | | | | | | | | | | | | | | | | |
| 0.4393 | 0.3465 | 0.4417 | 0.4501 | 0.3938 | 0.3343 | 0.4177 | 0.3283 | 1.0000 | | | | | | | | | | | | | | | | |
| 0.5473 | 0.3686 | 0.3624 | 0.4178 | 0.3493 | 0.3790 | 0.4666 | 0.2762 | 0.5000 | 1.0000 | | | | | | | | | | | | | | | |
| 0.5122 | 0.3897 | 0.3852 | 0.4639 | 0.3749 | 0.3109 | 0.4302 | 0.3853 | 0.4411 | 0.5409 | 1.0000 | | | | | | | | | | | | | | |
| 0.5073 | 0.3740 | 0.3152 | 0.3920 | 0.3659 | 0.3077 | 0.4622 | 0.3943 | 0.4369 | 0.5031 | 0.6114 | 1.0000 | | | | | | | | | | | | | |
| 0.4273 | 0.4168 | 0.3924 | 0.4453 | 0.4375 | 0.3611 | 0.4405 | 0.3963 | 0.4337 | 0.4518 | 0.5670 | 0.5605 | 1.0000 | | | | | | | | | | | | |
| 0.3594 | 0.3343 | 0.2683 | 0.3480 | 0.4118 | 0.4355 | 0.4365 | 0.4378 | 0.2976 | 0.3708 | 0.4057 | 0.4279 | 0.5483 | 1.0000 | | | | | | | | | | | |
| 0.4197 | 0.4238 | 0.3479 | 0.4054 | 0.3586 | 0.5107 | 0.4805 | 0.3978 | 0.4277 | 0.4956 | 0.4254 | 0.4683 | 0.4763 | 0.5415 | 1.0000 | | | | | | | | | | |
| 0.3326 | 0.2480 | 0.2930 | 0.3220 | 0.3724 | 0.3948 | 0.3551 | 0.2651 | 0.2962 | 0.4132 | 0.3354 | 0.3634 | 0.3911 | 0.3874 | 0.4908 | 1.0000 | | | | | | | | | |
| 0.4644 | 0.3965 | 0.3703 | 0.4314 | 0.4215 | 0.3747 | 0.4795 | 0.3004 | 0.4032 | 0.4441 | 0.4467 | 0.4348 | 0.5528 | 0.5073 | 0.5241 | 0.4909 | 1.0000 | | | | | | | | |
| 0.2666 | 0.3758 | 0.2450 | 0.2538 | 0.2303 | 0.1874 | 0.2127 | 0.2269 | 0.2976 | 0.3349 | 0.3594 | 0.2920 | 0.3971 | 0.3101 | 0.3738 | 0.2513 | 0.3991 | 1.0000 | | | | | | | |
| 0.2619 | 0.4094 | 0.2390 | 0.2542 | 0.2988 | 0.2326 | 0.2859 | 0.1387 | 0.1824 | 0.2305 | 0.2601 | 0.1931 | 0.2779 | 0.3079 | 0.3122 | 0.2155 | 0.2395 | 0.3086 | 1.0000 | | | | | | |
| 0.3531 | 0.4483 | 0.3376 | 0.4130 | 0.4346 | 0.3689 | 0.4425 | 0.2394 | 0.4064 | 0.3851 | 0.3793 | 0.4599 | 0.4824 | 0.4064 | 0.5285 | 0.3420 | 0.3537 | 0.4942 | 0.4627 | 1.0000 | | | | | |
| 0.3178 | 0.3383 | 0.3256 | 0.2924 | 0.2878 | 0.3607 | 0.2961 | 0.3190 | 0.2877 | 0.2464 | 0.3680 | 0.2444 | 0.3642 | 0.3484 | 0.3930 | 0.2460 | 0.3928 | 0.4298 | 0.3422 | 0.4761 | 1.0000 | | | | |
| 0.2684 | 0.4911 | 0.3961 | 0.3799 | 0.4225 | 0.4153 | 0.4182 | 0.3033 | 0.3201 | 0.3130 | 0.4144 | 0.3104 | 0.4133 | 0.3355 | 0.4204 | 0.2620 | 0.3335 | 0.3807 | 0.4617 | 0.5927 | 0.5118 | 1.0000 | | | |
| 0.2601 | 0.3417 | 0.2243 | 0.2173 | 0.2337 | 0.3237 | 0.2685 | 0.2866 | 0.2559 | 0.2379 | 0.2376 | 0.2216 | 0.2651 | 0.3362 | 0.3959 | 0.2484 | 0.3650 | 0.5280 | 0.3936 | 0.4671 | 0.5055 | 0.5029 | 1.0000 | | |
| 0.3638 | 0.3650 | 0.4226 | 0.3149 | 0.3548 | 0.3385 | 0.3911 | 0.2789 | 0.3409 | 0.4059 | 0.3310 | 0.3424 | 0.3477 | 0.3139 | 0.4322 | 0.2982 | 0.3875 | 0.4349 | 0.3298 | 0.5296 | 0.4265 | 0.4914 | 0.4491 | 1.0000 | |
| 0.3657 | 0.3371 | 0.2309 | 0.3568 | 0.3311 | 0.3362 | 0.3256 | 0.2126 | 0.2416 | 0.3549 | 0.4308 | 0.3132 | 0.3579 | 0.3069 | 0.3519 | 0.1889 | 0.3428 | 0.3234 | 0.2922 | 0.3788 | 0.3298 | 0.5253 | 0.3180 | 0.4199 | 1.0000 |

## Determining Number of Factor to Extract

*Figure 1. Screeplot*




## Minimum Average Partial Correlation for Number of Principal Components

| | | | | | |
|---|---|---|---|---|---|
| m | = | 0 | f0 | = | .12950414 |
| m | = | 1 | f1 | = | .012196 |
| m | = | 2 | f2 | = | .00895532 |
| m | = | 3 | f3 | = | .00824649 |
| m | = | 4 | f4 | = | .00801099 |
| m | = | 5 | f5 | = | .00825103 |
| m | = | 6 | f6 | = | .00860416 |
| m | = | 7 | f7 | = | .00894743 |
| m | = | 8 | f8 | = | .00936139 |
| m | = | 9 | f9 | = | .00977143 |
| m | = | 10 | f10 | = | .01027177 |
| m | = | 11 | f11 | = | .01089475 |
| m | = | 12 | f12 | = | .01155041 |
| m | = | 13 | f13 | = | .01226179 |

| | | | | | |
|---|---|---|---|---|---|
| m | = | 14 | f14 | = | .01303027 |
| m | = | 15 | f15 | = | .0138304 |
| m | = | 16 | f16 | = | .01444282 |
| m | = | 17 | f17 | = | .01523496 |
| m | = | 18 | f18 | = | .01616058 |
| m | = | 19 | f19 | = | .01717611 |
| m | = | 20 | f20 | = | .01819244 |
| m | = | 21 | f21 | = | .01939369 |
| m | = | 22 | f22 | = | .02061506 |
| m | = | 23 | f23 | = | .02214863 |
| m | = | 24 | f24 | = | .02343835 |
| m | = | 25 | f25 | = | .02496402 |
| m | = | 26 | f26 | = | .02674756 |
| m | = | 27 | f27 | = | .02863585 |
| m | = | 28 | f28 | = | .03061325 |
| m | = | 29 | f29 | = | .03237489 |
| m | = | 30 | f30 | = | .03503249 |
| m | = | 31 | f31 | = | .03747138 |
| m | = | 32 | f32 | = | .04046561 |
| m | = | 33 | f33 | = | .04274931 |
| m | = | 34 | f34 | = | .04634807 |
| m | = | 35 | f35 | = | .05041145 |
| m | = | 36 | f36 | = | .05499688 |
| m | = | 37 | f37 | = | .05998779 |
| m | = | 38 | f38 | = | .06622161 |
| m | = | 39 | f39 | = | .07307748 |
| m | = | 40 | f40 | = | .08085355 |
| m | = | 41 | f41 | = | .09023361 |
| m | = | 42 | f42 | = | .10218644 |
| m | = | 43 | f43 | = | .11675193 |
| m | = | 44 | f44 | = | .13643655 |
| m | = | 45 | f45 | = | .15864183 |
| m | = | 46 | f46 | = | .19556412 |
| m | = | 47 | f47 | = | .24066598 |
| m | = | 48 | f48 | = | .32398134 |
| m | = | 49 | f49 | = | .49276729 |
| m | = | 50 | f50 | = | 1 |

## Parallel Analysis

Parallel Analysis for Principal Components -- N = 491

PA Eigenvalues Averaged Over 500 Replications

| | PCA | PA | Dif | | PCA | PA | Dif |
|---|---|---|---|---|---|---|---|
| 1. | 18.11464 | 1.685895 | 16.42875 | 27. | -.0230985 | .947762 | -.9708605 |
| 2. | 2.551481 | 1.617049 | .9344319 | 28. | -.038638 | .9292968 | -.9679348 |
| 3. | 1.379541 | 1.566132 | -.1865909 | 29. | -.0731828 | .9100587 | -.9832416 |
| 4. | 1.029949 | 1.524686 | -.4947365 | 30. | -.0908264 | .8911374 | -.9819638 |
| 5. | .790727 | 1.486819 | -.6960919 | 31. | -.1074634 | .8733017 | -.9807651 |
| 6. | .6343569 | 1.451623 | -.8172664 | 32. | -.1160114 | .8550624 | -.9710738 |
| 7. | .5894608 | 1.418697 | -.8292366 | 33. | -.1252094 | .8361107 | -.9613201 |
| 8. | .5097101 | 1.387016 | -.8773059 | 34. | -.1386332 | .8181922 | -.9568254 |
| 9. | .4680344 | 1.357313 | -.8892786 | 35. | -.1519439 | .7998205 | -.9517644 |
| 10. | .4329666 | 1.328102 | -.8951353 | 36. | -.1642403 | .7825688 | -.9468091 |
| 11. | .3729717 | 1.3011 | -.9281282 | 37. | -.1695502 | .7639396 | -.9334897 |
| 12. | .3462765 | 1.275061 | -.9287846 | 38. | -.1948313 | .7458879 | -.9407192 |
| 13. | .3078475 | 1.249082 | -.9412349 | 39. | -.2098324 | .7280232 | -.9378555 |
| 14. | .2671446 | 1.224548 | -.9574032 | 40. | -.216741 | .7115364 | -.9282775 |
| 15. | .2446999 | 1.200298 | -.9555978 | 41. | -.2259772 | .6930318 | -.919009 |
| 16. | .2411014 | 1.177206 | -.9361048 | 42. | -.2445851 | .6752839 | -.9198691 |
| 17. | .2044609 | 1.154808 | -.9503471 | 43. | -.2652484 | .6569359 | -.9221843 |
| 18. | .1921386 | 1.132642 | -.9405031 | 44. | -.2730904 | .6393828 | -.9124732 |
| 19. | .1587435 | 1.11055 | -.9518067 | 45. | -.3049456 | .6201363 | -.9250819 |
| 20. | .1229953 | 1.089173 | -.9661773 | 46. | -.3236584 | .6010055 | -.9246639 |
| 21. | .0740986 | 1.068602 | -.9945039 | 47. | -.3319719 | .5814421 | -.913414 |
| 22. | .0632101 | 1.046606 | -.9833961 | 48. | -.3467611 | .5604274 | -.9071885 |
| 23. | .0367398 | 1.026963 | -.9902232 | 49. | -.3704508 | .5394284 | -.9098791 |
| 24. | .0219137 | 1.0073 | -.9853861 | 50. | -.3822407 | .514643 | -.8968837 |
| 25. | .0149115 | .9871829 | -.9722714 | 51. | -.4070067 | .4840118 | -.8910185 |
| 26. | -.0076438 | .9671183 | -.9747621 | | | | |

## Model Evaluation

### Four-factor model

### Factor Analysis

Factor analysis/correlation — Number of obs = 491

Method: iterated principal factors — Retained factors = 4

Rotation: (unrotated) — Number of params = 198

| Factor | Eigenvalue | Difference | Proportion | Cumulative |
|---|---|---|---|---|
| *Factor1* | 18.0967 | 15.55361 | 0.786 | 0.786 |
| *Factor2* | 2.54309 | 1.17442 | 0.1105 | 0.8965 |
| *Factor3* | 1.36866 | 0.35466 | 0.0594 | 0.956 |
| *Factor4* | 1.014 | 0.27777 | 0.044 | 1 |
| *Factor5* | 0.73623 | 0.12042 | 0.032 | 1.032 |
| *Factor6* | 0.61581 | 0.04971 | 0.0267 | 1.0587 |
| *Factor7* | 0.5661 | 0.06903 | 0.0246 | 1.0833 |
| *Factor8* | 0.49707 | 0.04197 | 0.0216 | 1.1049 |
| *Factor9* | 0.4551 | 0.03453 | 0.0198 | 1.1247 |
| *Factor10* | 0.42057 | 0.05846 | 0.0183 | 1.1429 |
| *Factor11* | 0.36211 | 0.03091 | 0.0157 | 1.1587 |
| *Factor12* | 0.3312 | 0.0404 | 0.0144 | 1.1731 |
| *Factor13* | 0.2908 | 0.04181 | 0.0126 | 1.1857 |
| *Factor14* | 0.249 | 0.0188 | 0.0108 | 1.1965 |
| *Factor15* | 0.23019 | 0.0028 | 0.01 | 1.2065 |
| *Factor16* | 0.22739 | 0.03664 | 0.0099 | 1.2164 |
| *Factor17* | 0.19075 | 0.01001 | 0.0083 | 1.2247 |
| *Factor18* | 0.18074 | 0.03043 | 0.0079 | 1.2325 |
| *Factor19* | 0.15032 | 0.03549 | 0.0065 | 1.239 |
| *Factor20* | 0.11483 | 0.0581 | 0.005 | 1.244 |
| *Factor21* | 0.05672 | 0.0051 | 0.0025 | 1.2465 |
| *Factor22* | 0.05162 | 0.02823 | 0.0022 | 1.2487 |
| *Factor23* | 0.02339 | 0.01481 | 0.001 | 1.2498 |
| *Factor24* | 0.00858 | 0.01314 | 0.0004 | 1.2501 |
| *Factor25* | -0.00456 | 0.01539 | -0.0002 | 1.2499 |
| *Factor26* | -0.01995 | 0.02722 | -0.0009 | 1.2491 |
| *Factor27* | -0.04717 | 0.01496 | -0.002 | 1.247 |
| *Factor28* | -0.06212 | 0.03025 | -0.0027 | 1.2443 |
| *Factor29* | -0.09237 | 0.00773 | -0.004 | 1.2403 |
| *Factor30* | -0.1001 | 0.02133 | -0.0043 | 1.236 |
| *Factor31* | -0.12143 | 0.00785 | -0.0053 | 1.2307 |
| *Factor32* | -0.12928 | 0.01103 | -0.0056 | 1.2251 |

| Factor | Eigenvalue | Difference | Proportion | Cumulative |
|---|---|---|---|---|
| *Factor33* | -0.14031 | 0.01329 | -0.0061 | 1.219 |
| *Factor34* | -0.1536 | 0.01502 | -0.0067 | 1.2123 |
| *Factor35* | -0.16861 | 0.00468 | -0.0073 | 1.205 |
| *Factor36* | -0.17329 | 0.00609 | -0.0075 | 1.1974 |
| *Factor37* | -0.17938 | 0.03324 | -0.0078 | 1.1897 |
| *Factor38* | -0.21262 | 0.01397 | -0.0092 | 1.1804 |
| *Factor39* | -0.22658 | 0.00985 | -0.0098 | 1.1706 |
| *Factor40* | -0.23643 | 0.02297 | -0.0103 | 1.1603 |
| *Factor41* | -0.25939 | 0.00671 | -0.0113 | 1.149 |
| *Factor42* | -0.26611 | 0.02247 | -0.0116 | 1.1375 |
| *Factor43* | -0.28857 | 0.01045 | -0.0125 | 1.125 |
| *Factor44* | -0.29902 | 0.02477 | -0.013 | 1.112 |
| *Factor45* | -0.32379 | 0.01177 | -0.0141 | 1.0979 |
| *Factor46* | -0.33557 | 0.00651 | -0.0146 | 1.0833 |
| *Factor47* | -0.34208 | 0.02454 | -0.0149 | 1.0685 |
| *Factor48* | -0.36661 | 0.02437 | -0.0159 | 1.0525 |
| *Factor49* | -0.39098 | 0.00876 | -0.017 | 1.0356 |
| *Factor50* | -0.39974 | 0.01913 | -0.0174 | 1.0182 |
| *Factor51* | -0.41887 | . | -0.0182 | 1 |

LR test: independent vs. saturated: chi2(1275) = 1.5e+04 Prob > chi2 = 0.0000

## Rotated factor loadings (pattern matrix) and unique variance

| Variable | Factor1 | Factor2 | Factor3 | Factor4 | Uniqueness |
|---|---|---|---|---|---|
| *q1* | -0.159 | 0.052 | 0.758 | 0.121 | 0.441 |
| *q2* | -0.070 | 0.085 | 0.669 | 0.000 | 0.538 |
| *q3* | -0.095 | 0.671 | 0.087 | -0.126 | 0.602 |
| *q4* | 0.007 | 0.462 | 0.237 | -0.058 | 0.627 |
| *q5* | -0.161 | 0.431 | 0.398 | 0.107 | 0.529 |
| *q6* | 0.174 | -0.182 | 0.670 | 0.095 | 0.466 |
| *q7* | 0.104 | 0.216 | 0.518 | -0.035 | 0.476 |
| *q8* | -0.056 | 0.075 | 0.802 | -0.034 | 0.356 |
| *q9* | 0.151 | 0.370 | 0.028 | 0.089 | 0.699 |
| *q10* | 0.410 | 0.325 | 0.225 | -0.252 | 0.495 |
| *q11* | 0.010 | 0.455 | 0.168 | 0.006 | 0.665 |

| | | | | | |
|---|---|---|---|---|---|
| *q12* | 0.107 | 0.212 | 0.417 | 0.050 | 0.552 |
| *q13* | -0.094 | 0.787 | -0.003 | 0.012 | 0.457 |
| *q14* | -0.049 | 0.390 | 0.320 | 0.078 | 0.594 |
| *q15* | 0.479 | 0.224 | -0.069 | 0.014 | 0.634 |
| *q16* | 0.266 | 0.341 | -0.066 | 0.101 | 0.677 |
| *q17* | 0.097 | 0.433 | 0.224 | 0.064 | 0.517 |
| *q18* | 0.367 | 0.153 | 0.358 | -0.109 | 0.504 |
| *q19* | 0.339 | -0.075 | 0.395 | -0.018 | 0.640 |
| *q20* | 0.177 | 0.087 | 0.418 | 0.108 | 0.558 |
| *q21* | 0.185 | 0.300 | 0.352 | -0.017 | 0.496 |
| *q22* | 0.200 | 0.279 | 0.333 | 0.007 | 0.511 |
| *q23* | 0.334 | 0.181 | 0.248 | 0.034 | 0.543 |
| *q24* | 0.038 | 0.574 | 0.102 | -0.012 | 0.567 |
| *q25* | 0.221 | 0.548 | -0.004 | -0.025 | 0.526 |
| *q26* | 0.027 | 0.429 | 0.169 | 0.061 | 0.647 |
| *q27* | 0.444 | 0.188 | 0.085 | 0.038 | 0.564 |
| *q28* | 0.157 | 0.268 | -0.059 | 0.395 | 0.574 |
| *q29* | 0.179 | 0.312 | 0.022 | 0.174 | 0.671 |
| *q30* | 0.219 | 0.582 | -0.101 | 0.106 | 0.459 |
| *q31* | 0.219 | 0.412 | 0.014 | 0.154 | 0.542 |
| *q32* | 0.433 | 0.105 | 0.053 | 0.130 | 0.607 |
| *q33* | 0.460 | 0.260 | 0.006 | 0.074 | 0.508 |
| *q34* | 0.440 | -0.223 | 0.305 | 0.073 | 0.653 |
| *q35* | 0.271 | 0.305 | 0.157 | 0.040 | 0.572 |
| *q36* | 0.556 | 0.197 | 0.007 | -0.012 | 0.524 |
| *q37* | 0.457 | 0.151 | -0.004 | 0.147 | 0.566 |
| *q38* | 0.491 | 0.058 | 0.226 | -0.010 | 0.531 |
| *q39* | 0.506 | 0.046 | 0.110 | 0.145 | 0.501 |
| *q40* | 0.559 | -0.188 | 0.233 | 0.130 | 0.513 |
| *q41* | 0.534 | -0.118 | 0.183 | 0.230 | 0.439 |
| *q42* | 0.653 | 0.028 | -0.085 | -0.030 | 0.634 |
| *q43* | 0.726 | 0.057 | -0.175 | 0.098 | 0.464 |
| *q44* | 0.106 | -0.085 | 0.017 | 0.583 | 0.611 |
| *q45* | 0.063 | 0.073 | -0.196 | 0.578 | 0.649 |
| *q46* | -0.019 | 0.114 | 0.134 | 0.649 | 0.422 |
| *q47* | 0.108 | -0.060 | 0.000 | 0.619 | 0.559 |
| *q48* | -0.121 | 0.137 | 0.028 | 0.782 | 0.381 |
| *q49* | 0.062 | -0.244 | 0.085 | 0.727 | 0.487 |
| *q50* | 0.066 | 0.071 | 0.046 | 0.555 | 0.569 |
| *q51* | 0.051 | 0.181 | -0.003 | 0.439 | 0.666 |

## Three-factor model

Factor analysis/correlation — Number of obs = 491

Method: iterated principal factor — Retained factors = 3

Rotation: (unrotated) — Number of params = 150

| Factor | Eigenvalue | Difference | Proportion | Cumulative |
|---|---|---|---|---|
| *Factor1* | 18.07603 | 15.56445 | 0.8239 | 0.8239 |
| *Factor2* | 2.51158 | 1.15952 | 0.1145 | 0.9384 |
| *Factor3* | 1.35206 | 0.38732 | 0.0616 | 1 |
| *Factor4* | 0.96474 | 0.24744 | 0.044 | 1.044 |
| *Factor5* | 0.7173 | 0.11977 | 0.0327 | 1.0767 |
| *Factor6* | 0.59753 | 0.04737 | 0.0272 | 1.1039 |
| *Factor7* | 0.55016 | 0.0715 | 0.0251 | 1.129 |
| *Factor8* | 0.47866 | 0.03703 | 0.0218 | 1.1508 |
| *Factor9* | 0.44163 | 0.04924 | 0.0201 | 1.1709 |
| *Factor10* | 0.39239 | 0.04774 | 0.0179 | 1.1888 |
| *Factor11* | 0.34465 | 0.03489 | 0.0157 | 1.2045 |
| *Factor12* | 0.30976 | 0.04953 | 0.0141 | 1.2186 |
| *Factor13* | 0.26023 | 0.0275 | 0.0119 | 1.2305 |
| *Factor14* | 0.23272 | 0.02147 | 0.0106 | 1.2411 |
| *Factor15* | 0.21125 | 0.00581 | 0.0096 | 1.2507 |
| *Factor16* | 0.20544 | 0.03067 | 0.0094 | 1.2601 |
| *Factor17* | 0.17478 | 0.00889 | 0.008 | 1.2681 |
| *Factor18* | 0.16588 | 0.02743 | 0.0076 | 1.2756 |
| *Factor19* | 0.13845 | 0.0411 | 0.0063 | 1.2819 |
| *Factor20* | 0.09735 | 0.05693 | 0.0044 | 1.2864 |
| *Factor21* | 0.04042 | 0.0106 | 0.0018 | 1.2882 |
| *Factor22* | 0.02982 | 0.03521 | 0.0014 | 1.2896 |
| *Factor23* | -0.00539 | 0.00953 | -0.0002 | 1.2893 |
| *Factor24* | -0.01492 | 0.01291 | -0.0007 | 1.2886 |
| *Factor25* | -0.02783 | 0.02292 | -0.0013 | 1.2874 |
| *Factor26* | -0.05075 | 0.02136 | -0.0023 | 1.2851 |
| *Factor27* | -0.07212 | 0.01281 | -0.0033 | 1.2818 |
| *Factor28* | -0.08493 | 0.02818 | -0.0039 | 1.2779 |
| *Factor29* | -0.11311 | 0.007 | -0.0052 | 1.2728 |
| *Factor30* | -0.12011 | 0.02168 | -0.0055 | 1.2673 |
| *Factor31* | -0.14179 | 0.01219 | -0.0065 | 1.2608 |
| *Factor32* | -0.15398 | 0.00185 | -0.007 | 1.2538 |

| | | | | |
|---|---|---|---|---|
| *Factor33* | -0.15584 | 0.01452 | -0.0071 | 1.2467 |
| *Factor34* | -0.17036 | 0.01142 | -0.0078 | 1.2389 |
| *Factor35* | -0.18178 | 0.00741 | -0.0083 | 1.2306 |
| *Factor36* | -0.18919 | 0.01433 | -0.0086 | 1.222 |
| *Factor37* | -0.20351 | 0.02888 | -0.0093 | 1.2127 |
| *Factor38* | -0.23239 | 0.00835 | -0.0106 | 1.2022 |
| *Factor39* | -0.24074 | 0.01734 | -0.011 | 1.1912 |
| *Factor40* | -0.25809 | 0.02578 | -0.0118 | 1.1794 |
| *Factor41* | -0.28387 | 0.00998 | -0.0129 | 1.1665 |
| *Factor42* | -0.29385 | 0.01168 | -0.0134 | 1.1531 |
| *Factor43* | -0.30553 | 0.01406 | -0.0139 | 1.1392 |
| *Factor44* | -0.31958 | 0.02268 | -0.0146 | 1.1246 |
| *Factor45* | -0.34226 | 0.01382 | -0.0156 | 1.109 |
| *Factor46* | -0.35608 | 0.00467 | -0.0162 | 1.0928 |
| *Factor47* | -0.36075 | 0.0372 | -0.0164 | 1.0763 |
| *Factor48* | -0.39795 | 0.01291 | -0.0181 | 1.0582 |
| *Factor49* | -0.41086 | 0.00598 | -0.0187 | 1.0395 |
| *Factor50* | -0.41685 | 0.03189 | -0.019 | 1.0205 |
| *Factor51* | -0.44873 | . | -0.0205 | 1 |

LR test: independent vs. saturated: chi2(1275) = 1.5e+04 Prob > chi2 = 0.0000

## Rotated factor loading (pattern matrix) and uniqueness

| Variable | Factor1 | Factor2 | Factor3 | Uniqueness |
|---|---|---|---|---|
| *q1* | 0.020 | 0.708 | -0.047 | 0.516 |
| *q2* | 0.068 | 0.671 | -0.119 | 0.568 |
| *q3* | 0.703 | 0.041 | -0.237 | 0.609 |
| *q4* | 0.491 | 0.235 | -0.113 | 0.631 |
| *q5* | 0.415 | 0.328 | -0.047 | 0.578 |
| *q6* | -0.189 | 0.766 | 0.131 | 0.468 |
| *q7* | 0.234 | 0.576 | -0.052 | 0.479 |
| *q8* | 0.060 | 0.819 | -0.160 | 0.391 |
| *q9* | 0.413 | 0.049 | 0.151 | 0.699 |
| *q10* | 0.415 | 0.389 | -0.079 | 0.528 |
| *q11* | 0.483 | 0.156 | -0.037 | 0.669 |
| *q12* | 0.229 | 0.460 | 0.050 | 0.556 |

| | | | | |
|---|---|---|---|---|
| *q13* | 0.819 | -0.077 | -0.088 | 0.473 |
| *q14* | 0.393 | 0.293 | -0.007 | 0.614 |
| *q15* | 0.312 | 0.076 | 0.274 | 0.670 |
| *q16* | 0.401 | -0.012 | 0.241 | 0.681 |
| *q17* | 0.467 | 0.238 | 0.067 | 0.521 |
| *q18* | 0.217 | 0.508 | 0.040 | 0.515 |
| *q19* | -0.036 | 0.539 | 0.130 | 0.645 |
| *q20* | 0.104 | 0.485 | 0.159 | 0.559 |
| *q21* | 0.340 | 0.422 | 0.025 | 0.496 |
| *q22* | 0.319 | 0.404 | 0.062 | 0.510 |
| *q23* | 0.235 | 0.362 | 0.182 | 0.547 |
| *q24* | 0.617 | 0.090 | -0.040 | 0.569 |
| *q25* | 0.622 | 0.041 | 0.063 | 0.527 |
| *q26* | 0.454 | 0.156 | 0.032 | 0.653 |
| *q27* | 0.265 | 0.224 | 0.267 | 0.584 |
| *q28* | 0.291 | -0.075 | 0.492 | 0.576 |
| *q29* | 0.352 | 0.044 | 0.260 | 0.671 |
| *q30* | 0.653 | -0.081 | 0.209 | 0.458 |
| *q31* | 0.465 | 0.046 | 0.256 | 0.542 |
| *q32* | 0.170 | 0.181 | 0.364 | 0.622 |
| *q33* | 0.342 | 0.140 | 0.316 | 0.530 |
| *q34* | -0.178 | 0.473 | 0.301 | 0.669 |
| *q35* | 0.362 | 0.234 | 0.156 | 0.573 |
| *q36* | 0.296 | 0.185 | 0.285 | 0.572 |
| *q37* | 0.225 | 0.122 | 0.400 | 0.584 |
| *q38* | 0.136 | 0.398 | 0.234 | 0.557 |
| *q39* | 0.120 | 0.265 | 0.417 | 0.522 |
| *q40* | -0.120 | 0.424 | 0.431 | 0.543 |
| *q41* | -0.056 | 0.349 | 0.524 | 0.457 |
| *q42* | 0.138 | 0.133 | 0.336 | 0.724 |
| *q43* | 0.174 | 0.050 | 0.514 | 0.563 |
| *q44* | -0.103 | -0.016 | 0.671 | 0.627 |
| *q45* | 0.062 | -0.262 | 0.657 | 0.662 |
| *q46* | 0.085 | 0.050 | 0.636 | 0.484 |
| *q47* | -0.078 | -0.038 | 0.709 | 0.577 |
| *q48* | 0.087 | -0.102 | 0.718 | 0.489 |
| *q49* | -0.283 | 0.033 | 0.792 | 0.528 |
| *q50* | 0.057 | -0.002 | 0.605 | 0.593 |
| *q51* | 0.178 | -0.050 | 0.476 | 0.682 |

## Two-factor Model

**Rotated factor loading and uniqueness of two-factor model**

| Variable | Factor1 | Factor2 | Uniqueness |
|---|---|---|---|
| q1 | 0.6463 | -0.0288 | 0.6041 |
| q2 | 0.6595 | -0.1011 | 0.6358 |
| q3 | 0.655 | -0.2011 | 0.6907 |
| q4 | 0.6504 | -0.0918 | 0.6412 |
| q5 | 0.6655 | -0.0269 | 0.5781 |
| q6 | 0.5112 | 0.1393 | 0.6328 |
| q7 | 0.7268 | -0.0341 | 0.5007 |
| q8 | 0.7789 | -0.1343 | 0.5024 |
| q9 | 0.4077 | 0.1696 | 0.7209 |
| q10 | 0.7247 | -0.0613 | 0.5251 |
| q11 | 0.5681 | -0.015 | 0.6874 |
| q12 | 0.6175 | 0.0659 | 0.5649 |
| q13 | 0.6436 | -0.0439 | 0.6181 |
| q14 | 0.614 | 0.0116 | 0.6142 |
| q15 | 0.342 | 0.2894 | 0.679 |
| q16 | 0.3414 | 0.2587 | 0.7092 |
| q17 | 0.6293 | 0.0889 | 0.5282 |
| q18 | 0.6514 | 0.0547 | 0.5294 |
| q19 | 0.4495 | 0.1369 | 0.7044 |
| q20 | 0.5256 | 0.1711 | 0.5851 |
| q21 | 0.6836 | 0.0429 | 0.4952 |
| q22 | 0.648 | 0.0802 | 0.5105 |
| q23 | 0.5334 | 0.1963 | 0.5496 |
| q24 | 0.6262 | -0.0121 | 0.6169 |
| q25 | 0.5842 | 0.0912 | 0.5856 |
| q26 | 0.5434 | 0.0527 | 0.6672 |
| q27 | 0.433 | 0.2826 | 0.5838 |
| q28 | 0.1809 | 0.5073 | 0.5984 |
| q29 | 0.3462 | 0.2781 | 0.6859 |
| q30 | 0.5001 | 0.2353 | 0.5515 |
| q31 | 0.4491 | 0.2768 | 0.5707 |
| q32 | 0.3088 | 0.3763 | 0.6218 |
| q33 | 0.4254 | 0.333 | 0.536 |
| q34 | 0.2639 | 0.2984 | 0.7456 |
| q35 | 0.531 | 0.1746 | 0.5749 |

| | | | |
|---|---|---|---|
| q36 | 0.4252 | 0.3006 | 0.5735 |
| q37 | 0.3015 | 0.4152 | 0.5846 |
| q38 | 0.4758 | 0.2467 | 0.57 |
| q39 | 0.3362 | 0.4305 | 0.5257 |
| q40 | 0.2698 | 0.4315 | 0.5995 |
| q41 | 0.2566 | 0.5288 | 0.4896 |
| q42 | 0.2371 | 0.346 | 0.7243 |
| q43 | 0.1893 | 0.5272 | 0.5649 |
| q44 | -0.122 | 0.6776 | 0.6264 |
| q45 | -0.1938 | 0.6629 | 0.6791 |
| q46 | 0.1046 | 0.6513 | 0.482 |
| q47 | -0.1202 | 0.7174 | 0.5756 |
| q48 | -0.0324 | 0.7319 | 0.4921 |
| q49 | -0.2367 | 0.7886 | 0.549 |
| q50 | 0.0338 | 0.6176 | 0.592 |
| q51 | 0.1027 | 0.489 | 0.6893 |

## Rotated factor loadings (pattern matrix) and unique variance

| Variable | Factor1 | Factor2 | Factor3 | Factor4 | Uniqueness |
|---|---|---|---|---|---|
| *Q1* | -0.1349 | 0.043 | 0.7408 | 0.1155 | 0.4534 |
| *q2* | -0.0576 | 0.066 | 0.7024 | -0.0244 | 0.5098 |
| *q3* | -0.1126 | 0.6726 | 0.1128 | -0.1271 | 0.5921 |
| *q4* | 0.0454 | 0.4323 | 0.2348 | -0.0693 | 0.6401 |
| *q6* | 0.2093 | -0.1814 | 0.6633 | 0.0597 | 0.4643 |
| *q7* | 0.082 | 0.2303 | 0.5102 | -0.0265 | 0.4896 |
| *q8* | -0.0362 | 0.072 | 0.7904 | -0.0434 | 0.3653 |
| *q9* | 0.1232 | 0.3919 | 0.019 | 0.1023 | 0.6973 |
| *q11* | -0.0312 | 0.4617 | 0.1846 | 0.0275 | 0.6622 |
| *q12* | 0.1018 | 0.2103 | 0.4158 | 0.0558 | 0.556 |
| *q13* | -0.1029 | 0.793 | 0.0025 | 0.0139 | 0.4494 |
| *q14* | -0.102 | 0.4053 | 0.3274 | 0.1126 | 0.5862 |
| *q15* | 0.508 | 0.2199 | -0.0799 | -0.0162 | 0.6326 |
| *q16* | 0.2486 | 0.3513 | -0.076 | 0.1112 | 0.6803 |
| *q17* | 0.1482 | 0.418 | 0.2075 | 0.0346 | 0.522 |
| *q20* | 0.1778 | 0.1 | 0.4191 | 0.0923 | 0.5562 |
| *q21* | 0.1685 | 0.3006 | 0.3721 | -0.0201 | 0.4931 |
| *q22* | 0.1659 | 0.2986 | 0.3486 | 0.0036 | 0.5101 |
| *q23* | 0.3242 | 0.2034 | 0.2567 | 0.0154 | 0.5367 |

| | | | | | |
|---|---|---|---|---|---|
| *q24* | 0.0221 | 0.5785 | 0.086 | 0.0046 | 0.5791 |
| *q25* | 0.194 | 0.5663 | 0.0258 | -0.0431 | 0.5165 |
| *q26* | 0.0478 | 0.4102 | 0.1769 | 0.0458 | 0.6522 |
| *q27* | 0.5143 | 0.1544 | 0.1069 | -0.0305 | 0.5467 |
| *q28* | 0.2012 | 0.2523 | -0.056 | 0.3539 | 0.5798 |
| *q30* | 0.2777 | 0.5807 | -0.1136 | 0.0485 | 0.4509 |
| *q31* | 0.2674 | 0.4218 | -0.0119 | 0.1115 | 0.5317 |
| *q32* | 0.4022 | 0.1435 | 0.0403 | 0.1315 | 0.613 |
| *q33* | 0.4413 | 0.269 | 0.0275 | 0.0616 | 0.5102 |
| *q34* | 0.451 | -0.2187 | 0.3035 | 0.0484 | 0.6592 |
| *q36* | 0.5428 | 0.1929 | 0.021 | -0.0207 | 0.541 |
| *q37* | 0.5545 | 0.0971 | 0.0296 | 0.0564 | 0.5441 |
| *q38* | 0.5391 | 0.0228 | 0.2519 | -0.0589 | 0.5154 |
| *q39* | 0.5405 | 0.0476 | 0.1165 | 0.0898 | 0.4967 |
| *q40* | 0.5782 | -0.1652 | 0.2296 | 0.0873 | 0.5126 |
| *q41* | 0.5104 | -0.1006 | 0.2076 | 0.2131 | 0.4442 |
| *q42* | 0.6053 | 0.0512 | -0.0576 | -0.0306 | 0.6578 |
| *q43* | 0.7771 | 0.0386 | -0.1552 | 0.0325 | 0.4516 |
| *q44* | 0.1168 | -0.0949 | 0.0183 | 0.5737 | 0.6125 |
| *q45* | 0.0571 | 0.0756 | -0.203 | 0.5848 | 0.6456 |
| *q46* | -0.0252 | 0.101 | 0.1291 | 0.6681 | 0.4124 |
| *q47* | 0.1168 | -0.0704 | 0.0079 | 0.6072 | 0.563 |
| *q48* | -0.1376 | 0.1467 | 0.0131 | 0.8005 | 0.3759 |
| *q49* | 0.0476 | -0.2385 | 0.0685 | 0.747 | 0.4763 |
| *q50* | 0.0369 | 0.0692 | 0.0548 | 0.5711 | 0.5677 |
| *q51* | 0.1036 | 0.1893 | -0.0395 | 0.4062 | 0.6668 |

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