

The validation of scores on a questionnaire about indecision of school choice with the optimal scoring method

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The scores on a 57-item multiple-choice questionnaire dealing with eight-graders' indecision about school choice, were validated on a sample of 329 junior high school students from Northern Italy. Guttman's optimal scaling method, complemented by an iteration of factor analysis, was applied. Ten factors were extracted and interpreted. The factor termed "decisiveness" was found to be correlated with parental support and help, disposition for long-term schooling, willingness to answer the questionnaire, and help from teachers. School suitability, attitude towards the questionnaire, and the opinions of friends or parents did not correlate with the decisiveness scale. The findings of the experimental procedure supported the multidimensional nature of career indecision.

This article describes the validation of scores obtained with a questionnaire aimed at assessing students' indecision about high school choice. In order to understand Italian students' problems in making a vocational choice, a brief description of the school system is in order.

In Italy, compulsory schooling starts when the child is six years old and ends with a final examination after five years of elementary school and three of "middle school" (junior high school). The same curriculum is taught to all students. Then, students are required to choose whether and where they intend to continue with studies. In the latter case, they must choose between a regional two-year crafts course, a national three-year vocational or crafts course, a five-year technical high school or a *liceo* (a school emphasising humanities or science) which prepares the student for university study. There are no entrance or placement examinations, but the various options are quite rigid: once a high school has been selected, the relative subjects of study cannot be varied. Some specialisation is obviously allowed in certain technical schools, but no choice of subjects is permitted in most high schools. There is the possibility, however, of complementing the national vocational course with additional years of instruction which prepare the student for university study. The university is open to any student graduating from any five-year high school. A mechanical technician may study classic humanities at university, and an accountant can become a doctor.

Thus, Italian students are required to make their first important vocational decision when they are 14. Choosing at this age is not easy, even though the school, according to policy, is required to offer young students occupational counselling. Making such choices at an age when interests are not yet stable (Super, 1974) can be a source of anxiety and stress. A wrong decision may bring about depression, lowered self-esteem, dropping out of school or the effective loss of a school year. A psychologist working as a career or academic counsellor requires an instrument that identifies undecided students who might benefit from counselling.

The scores from a short questionnaire evaluating student indecision had previously been validated on a sample of 457 junior high school students in Northeast Italy (Flebus, 1988). This short questionnaire (named MIQUISS) was based upon nine hypotheses, each of them in multiple choice form, which tested psychological readiness for choice of high school. Its alpha coefficient was .81 and the test/retest stability coefficient was .74. The concurrent validity of such scores had been ascertained through interviews with undecided students (Flebus, 1988).

In order to get a more detailed picture of indecision among junior high school students, an expanded form was used in the present study. This expanded form contained questions about family relationships, school achievement, values, knowledge about high schools, self-knowledge, need for counselling, locus of control and importance of the opinions of significant others. The hypotheses were drawn from social learning theory (Mitchell, 1974), vocational development theory (Super, 1960) and career matur-

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ity theories (Crites, 1973; Dellar, 1994), while keeping in mind that 14-year-old-students must choose a school and not a career.

Besides personal feelings about school choice and self-evaluation of school achievement, several additional hypotheses were also assessed. The hypothesis that undecided students do not know to what extent they are suited for a given high school was tested using ten rating scales regarding various kinds of high schools (vocational, technical, *liceo*), including the option of leaving school to go to work.

The hypothesis concerning significant others' opinions is derived from attachment theory; i.e., a student who has made up his/her mind places great importance on the opinions of his/her family and friends. A related hypothesis states that dependent youngsters are less determined (Ashby, 1966).

Readiness to make a decision was thought to be related to the subject's willingness to answer the questionnaire itself (two questions were used to assess this hypothesis). By the same token, it was hypothesised that a decision-making process in progress would result in a reluctant attitude toward the questionnaire and its topics: three questions were used to assess attitudes towards the questionnaire itself.

The questionnaire was thus made up of the following items: 9 questions from the original form (item N1 to N9, as from Flebus, 1988), 24 additional questions (N10 to N33), 11 ratings of 10 schools and choosing to go to work (*how suitable these schools are to you*, N34 to N44), 8 significant others' opinions, (*how important the following persons' opinions are in making a choice*, N45 to N52), 2 questions about willingness to answer the questionnaire (N53 and N54) and 3 questions to evaluate attitude toward the questionnaire (N55 to N57) for a total of 57 items. A sample questionnaire is included in the appendix.

Aims

The purpose of the present study was to investigate the factorial validity of an expanded form of the original MIQUISS (Questionnaire about indecision). More specifically, principal component analysis procedure, along with the optimal scaling procedure, were used to determine whether recognizable groups of the 57 items could be distinguished when the instrument was administered to junior high school students in the process of making a decision about high school.

The sample

The questionnaire was filled out during vocational counselling by 350 eighth-graders from the city of Trieste. This sample was composed of 52% boys, and 90% were 14 years old; the rest were one year older (having repeated a

year of school, generally because of poor grades). The two high schools most likely to be chosen were also recorded; 21 questionnaires were discarded because some answers were missing. The final grades of each student were recorded at the end of the school year; the five possible categories are *Fair* (49%), *Good* (20%), *Remarkable* (15%), *Excellent* (13%) and *Failure* (3%).

METHODS

The optimal scoring method outlined by Guttman (1950) was applied to score the questionnaire. It is based on the single value decomposition of the co-occurrence matrix of the answers and enables any kind of answer to be scored, including missing or any other nominal-scale answer. Optimal scores (as opposed to *integer* or *a priori* scores) are those which maximise within-to-between variance in subjects. Guttman defines *weight* as the numerical value assigned to each answer and *score* as the sum of the weights for each subject. The main feature of optimal scores is that the optimal weight regarding, for example, answer C in item 3 is equal to the score of the mean of the group who answered C in item 3. Nishisato (quoted by Greenacre, 1984) lists a rather large number of different names that have been given to this method in various fields such as biology, linguistics, archaeology and psychology. These names include correspondence analysis, canonical analysis, dual scaling, dual plot, Hayashi quantification theory, simultaneous linear regression and others (see also Weller & Romney, 1990). When used in the construction of tests, the optimal scoring method permits any kind of answer to be scaled, and the weights it yields increase the alpha coefficient due to accrued internal consistency. A proposed empirical method for obtaining these weights is as follows: (a) assign integer values (1, 2, 3 ...) to all the items, as is done for any rating scale; (b) add up the items for each subject and standardise the scores; (c) compute the mean values for each group, which is made up of subjects who answered *a*, *b*, *c*, for each item (d) use the mean as a weight for answers *a*, *b*, *c*... (e) repeat steps (b) to (d) until stabilisation occurs.

A quicker, mathematically more elegant method is to follow Guttman's procedure (1950) by computing the first component extracted from a co-occurrence matrix, using a program of correspondence analysis or a specific program of optimal scaling (Flebus, 1995a).

One drawback to this method is that the test must be one-dimensional. Since the present questionnaire was not designed to be one-dimensional, an alternative method was followed: (a) a parallel analysis (using an SPSS program from Thompson & Daniel, 1996, modified with portions of another program, Flebus, 1995b) established that 9 factors

were to be extracted; (b) a program for optimal scaling was applied to the entire questionnaire in order to compute provisional optimal weights; (c) such overall optimal weights were applied to the questionnaire; (d) a factor analysis including all 57 items extracted and then rotated the 9 factors to Varimax criterion; (e) after the items making up the 9 factors were identified, 9 local optimal analyses were performed; (f) the new weights were applied again, and steps (d) to (f) were repeated until items no longer switched between scales; (g) once all items had been stabilised (i.e. when an item was optimally scaled with the same items that loaded on the same factor), the analysis was terminated and the results were interpreted. Such stabilisation occurred after 12 iterations.

During iteration, a check was made to verify that optimal weighting was consistent with the content of the items. In the few instances in which inconsistency occurred, integer scaling was again applied. Upon application of integer scaling, the item's correlations with other items changed, which in turn caused the item to load onto another factor.

Item analysis was also performed, and some items were discarded in order to obtain the highest alpha coefficient.

Item analysis of Factor VI yielded unusual results: the items which had been optimally scaled together were found to span two semantically unrelated factors. An attempt to remove one item at a time brought about greater internal consistency, while the discarded items, which were similar in content, turned out to be acceptably correlated when taken alone. Thus, these items were used as a new factor (Factor X). Because of this result, the total optimal scaling was repeated with ten scales.

RESULTS

A correlation matrix of the 48 items selected by item analysis was computed. From this matrix, ten factors were extracted and rotated to Varimax criterion. This matrix is presented in Table 1.

Factor I grouped items from the first version of the MIQUISS (item 1, 2, 3, 4, 6, 7) together with a few statements about decisiveness, agreement with teachers and search for information. Students with high scores appear to be certain of their choices, feel confident about future success in school, do not get upset because of the choice they have to make, made up their minds long ago, and indicated that they would not put off the decision. This factor can accurately be termed *decisiveness*.

Factor II comprises items concerning achievement in school, suitability for vocational courses and work (N37, N39) and suitability for schooling leading to university

study (N43, N35). Opposite algebraic signs identify short-term and long-term schools. Students who score high on this factor receive high grades, rate themselves as good students, foresee success in school, will certainly continue with their schooling, and believe themselves to be suited to liceo and completely unsuited to vocational courses or going to work. Their parents - they report - want them to attend university or a five-year school. This factor was termed *Long-term schooling*.

Factor III (Parental approval) included those items concerning family support and parental agreement (with the student's decision): a high score denotes a student who benefits from parental support and agreement in reaching a vocational decision suitable to both parents and students.

Factor IV measures *suitability* for six types of high schools. A low score denotes great uncertainty about being suited for certain technical schools (i. e. the student does not know whether he feels suited to these schools), whereas a high score denotes suitability for a technical school. Teacher training school (a four-year high school) is included in this factor. It is noteworthy that vocational courses or liceo ratings do not load on this factor.

Factor V (Importance of parental opinion) combines two items regarding importance of parental opinion. Students with high scores consider parental opinion to be important in making a decision.

Factor VI (Teachers' help) regards items dealing with teachers' help and support as well as the intention of following their advice.

Factor VII (Attitude) regards the student's attitude toward the questionnaire and the decision-making process. High scorers were willing to answer another questionnaire, were interested in the topic and found it pleasurable to answer.

Factor VIII (Friends' opinions) measures the importance of the opinions of friends, acquaintances and other people in making the choice.

Factor IX (Parental help) deals with the amount of help provided by family. High scorers received a great deal of help (such as advice and discussion) from their family in making their choice.

Factor X (Willingness) measures the student's ease to answer the questionnaire. High scores denote willingness to answer and ease of response.

Finally, ten scales were computed using the selected items. Table 2 presents the correlations among the scales. In order to assess how much variance in the indecisiveness scale was common to the other scales, a simultaneous regression equation was computed using the nine other scales as independent variables. Sex and final grade, coded as four dichotomous variables (leaving out Failure to avoid collinearity) were also included in the equation.

Table 1
Varimax rotated factor matrix.

Factor I Decisiveness, alpha =.814, 11 items, variance = 4.11		I	II	III	IV	V	VI	VII	VIII	IX	X	h2
N6	certainty about school choice	.792										.659
N11	finality of choice	.762										.650
N1	readiness to choice	.622										.463
N15	knowledge about high school	.554										.476
N4	feelings about success in school	.547										.423
N2	time when decision will be made	.545										.355
N3	anxiety about making a decision	.518										.371
N7	current vagueness about future job	.486										.370
N25	search for school information	.470										.413
N30	number of teachers who know about choice of school	.378					-.388				.371	.454
N14	importance of choice	.339										.173
Factor II Long-term schooling, alpha=.879, 10 items, variance =5.01												
N18	mother's expectations		.822									.703
N19	father's expectations		.800									.669
N10	achievement in school		.702									.605
N31	prediction of success		.656									.554
N39	probability of going to work		.637									.439
N35	suitability for liceo (humanities)		.636									.476
N37	suitability for vocational course		.633									.429
N43	suitability for liceo (scientific)		.622									.525
N20	level of achievement in school		.566									.487
N17	future intentions		.502									.374
Factor III Parental approval and support, alpha=.862, 3 items, variance =2.38												
N13	mother's agreement			.806								.753
N12	father's agreement	.315		.792								.776
N5	parental approval			.773								.726
Factor IV School suitability, alpha=.764, 6 items, variance =2.87												
N44	industrial HS				.716							.536
N41	clerical HS				.700							.524
N38	commercial HS				.696							.510
N42	technical design HS				.687							.489
N34	agricultural HS				.618							.434
N40	teacher training school				.581							.384
Factor V Importance of parental opinion, alpha =.967, 2 items, variance =2.06												
N47	importance of mother's opinion					.957						.937
N46	importance of father's opinion					.957						.933
Factor VI Help and support from teachers, alpha =.701, 4 items, variance =2.12												
N33	intention of taking teachers' advice						.770					.672
N49	importance of teachers' opinions						.734					.660
N9	help received from teachers						.621					.440
N27	teachers' judgement of school choice made						.541					.492
Factor VII Attitude toward the questionnaire, alpha =.769, 3 items, variance =2.13												
N56	interest in questionnaire							.831				.745
N57	will answer another questionnaire							.817				.677
N55	pleasure (or boredom) in answering							.762				.670
Factor VIII Importance of friends and others, alpha =.654, 4 items, variance =1.90												
N50	importance of friends' and acquaintances' opinions								.759			.586
N22	friends' opinions								.687			.565
N52	importance of other people's opinions								.606			.403

table 1 continued

N48	importance of other family members' opinions	.590	.514
Factor IX Help from family, alpha=.667, 3 items, variance =2.33			
N8	help from family	.763	.596
N21	frequency of discussions at home	.740	.577
N26	rating of help from family	.727	.652
Factor X Willingness to answer, alpha =.564, 2 items, variance =1.61			
N54	time needed to answer	.743	.599
N53	difficulty in answering	.730	.611

Note: Only coefficients higher than |.30| are reported

Table 2
Standard deviation and correlations

	Std Dev	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Decisiveness	.350	1									
2. L. T. schooling	.476	-.31**	1								
3. Parental approval	.789	.45**	-.31**	1							
4. HS suitability	.459	-.08	-.04	-.07	1						
5. Parental importance	.969	.04	.05	.13*	.01	1					
6. Parental help	.609	.21**	-.23**	.18**	.00	.04	1				
7. Attitude	.688	-.11*	-.15**	-.05	.01	.01	-.05	1			
8. Teachers' help	.528	-.25**	.29**	-.11*	.06	-.12*	-.11	.09	1		
9. Friends' opinions	.495	-.06	.03	-.04	-.13*	.09	.09	.00	-.16**	1	
10. Willingness	.698	.28**	-.15**	.14**	-.15**	.04	.13*	-.08	-.03	-.05	1

Note. All means are zero. N=329

* p less than .05 ** p less than .01 (2-tailed).

Table 3

Simultaneous regression analysis of Decisiveness with Factor scales, sex and final grades as independent variables.

Variable	1 B	2 Beta	3 Correl	4 Partial	5 F	6 ETA	7 Sq. Power
L. T. schooling	.083	.113	.308**	.091	2.639	.008	.367
Parental approval	.155	.349	.446**	.365	48.182**	.133	1.000
HS suitability	.023	.030	.078	.036	0.401	.001	.059
Parental importance	-.006	-.016	.040	-.019	0.118	.000	.047
Parental help	.048	.084	.214**	.097	3.001	.009	.407
Attitude	.036	.072	.112*	.083	2.159	.007	.310
Teachers' help	.111	.167	.253**	.182	10.757**	.033	.904
Friends' opinion	-.050	-.071	-.061	-.083	2.176	.007	.312
Willingness	.094	.188	.282**	.215	15.290**	.046	.973
Grade: Fair	.052	.074	.123*	.032	0.328	.001	.038
Grade: Good	-.001	-.001	-.030	-.001	0.000	.000	.031
Grade: Remarkable	-.011	-.012	.078	-.006	0.011	.000	.033
Grade: Excellent	.073	.069	.207**	.036	0.406	.001	.061
Sex: female	.053	.076	.118*	.089	2.520	.008	.353
Constant	-.114				1.139		

Note: R=.576; R² = .331; Adjusted R² =.301; F (14,314) = 11.11; p< .0005.

* p<.05; ** p<.01 (two-tailed)

- col. 1 B coefficient of independent variable
- col. 2 beta coefficient
- col. 3 correlation coefficient with dependent variable
- col. 4 partial correlation with dependent variable
- col. 5 F value for unique contribution (partial correlation)
- col. 6 eta square
- col. 7 power of statistical test (probability of discovering that the beta coefficient is not zero)

DISCUSSION

Parental support (or lack thereof) is the factor which determines how students reach their first important vocational decision. Its impact is the highest, both as a direct effect (cf. correlation) and as a unique source (cf. eta squared).

The impact of parental approval becomes especially important when one considers that scales with similar content (parental help or parental opinion in making a decision) failed to show significance: emotional support helps, but advice does not.

The second highest correlated scale is disposition for long-lasting schooling: students who describe themselves as more suited to higher education feel less insecure, presumably because they fit better into a school system which requires hard study and brilliant achievement. However, given the results shown on Table 3, it can be argued that orientation toward university study is not a real determining factor since partial coefficient is quite low as compared to its coefficient of correlation and not significant. The scale seems to show a spurious correlation with indecisiveness which disappears if final grade is taken into account. This can be explained by hypothesising that indecisiveness is related to vagueness of outcome; a student who gets higher grades is more likely both to foresee success in school and to feel insecure about failure. However, if the level of achievement (and consequently the effect of expectation) is kept under control, a lesser degree of correlation between school achievement and decisiveness results.

Again from Table 3, two contributing factors that are significant can be deduced: help from teachers and willingness to answer. Although both show a low (yet significant) correlation, their eta coefficient is comparatively high and significant. In other words, teachers do help students reach a decision. If teachers fail to help, students can sense and report this lack of guidance.

Willingness to answer should be interpreted as the most personality-dependent scale on the questionnaire. It is remarkable that a two-item scale, with the lowest alpha coefficient, ranks second in contribution. Although its correlation with decisiveness is far from being high, it accounts for 4.6% of total variance. Such correlation can be explained by recalling Gordon's internal indecision (1981), which may due to personality traits such as *Factor G* according to Guilford, Zimmerman and Guilford (1976) or *Surgency* according to Cattell, Eber and Tatsuoka (1970). The non-correlating scales indicate a finding of equal importance: a favourable attitude toward the questionnaire, the importance of friends' or other important people's opinions, and school suitability are not related to decisiveness. Finally, sex and grade, slightly but significantly correlated with the decisiveness scale, do not show unique contribution to it.

CONCLUSION

It can be concluded that decisiveness/certainty regarding high school choice can be measured at the age of 14 with a test which has yielded reliable, meaningful and interpretable scores in this sample. Uncertainty is principally explained by a lack of parental support, and (to a lesser extent) by lack of help from teachers and by the student's personal style of decision-making. Given the tender age of Italian students who must make this type of decision, it may be argued that these results cannot really be generalised to apply to other student groups; however, the existence of a multifaceted source of indecisiveness is in line with other findings. (Hartman, Fuqua, & Jenkins, 1988; Seifert, 1991).

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Appendix

Sample questionnaire. The decimal number is the optimal weight.[notes added in brackets]

N6 I can say

- A) .67 I am essentially certain of the choice I will make
- B) .60 I am fairly certain but still have some doubts
- C) -1.45 I only have an idea of which schools I will choose from
- D) -1.85 I don't have the faintest idea of what I might do later on.

N18 My mother would like me

- A) -1.67 to get a job
- B) -1.36 to enrol in a school lasting two or three years [local craft course or state-run vocational courses]
- C) -.45 to enrol in a school lasting three or five years [vocational schools]
- D) .09 to enrol in a school lasting four of five years [teacher training school or technical schools]
- E) .80 to enrol in any high school and university
- F) .80 to do something different from the above
- G) .01 [other responses]

(Same stem and same answers for Item N19)

N53 While I was reading and understanding the questions and answers above, I experienced

- A) .00 great difficulty [no cases]
- B) -1.68 rather strong difficulty
- C) -.69 only some difficulty
- D) .61 no difficulty

N33 When making my final choice

- A) 1.44 I will basically follow my teachers' advice
- B) .33 I will take my teachers' advice into consideration, but I am not sure whether I will follow it

- C) -.82 I will be only partially influenced by their advice
- D) -1.69 I will not take my teacher's advice into consideration.

N21 Discussions about what I will do after middle school are held at home

- A) -2.12 never or almost never
- B) -1.20 seldom
- C) -.18 sometimes
- D) .60 often
- E) .90 quite often

Here are my ratings of several schools according to whether I find them suitable, using the following scale:

- A) very suitable
 - B) fairly suitable
 - C) a little suitable
 - D) not at all suitable
 - E) I don't know, uncertain, unable to rate
- 35) Liceo scientifico
A) 1.00 B) .58 C) .32 D) -.77 E) -.53
- 37) Craft course
A) -1.16 B) -.69 C) .31 D) .64 E) .31
- 38) Commerce HS
A) -.14 B) -.20 C) .16 D) .72 E) -1.86
- 39) Going to work [after graduation]
A) -1.40 B) -.81 C) -.25 D) .46 E) -.29
- 40) Teacher training school
A) .35 B) -.42 C) .01 D) .53 E) -1.48
- 44) Industrial HS
A) .61 B) -.18 C) .18 D) .56 E) -1.68