DOCUMENT RESUME

ED 134 594 TM 005 825

AUTHOR Creech, F. Reid
TITLE Partial- and Non-Response Bias Effects in a Nationwide Sample.
INSTITUTION Educational Testing Service, Princeton, N.J.
REPORT NO ETS-RM-75-1
PUB DATE Mar 75
NOTE 27p.

EDRS PRICE MF-$0.83 HC-$2.06 Plus Postage.
DESCRIPTORS Academic Achievement; *Bias; Grade 12; *National Surveys; Predictor Variables; *Questionnaires; *Research Problems; *Response Style (Tests); Secondary Education; Statistical Analysis; Student Characteristics

ABSTRACT

The non-response bias analysis of data from a stratified nationwide probability sample of high school seniors produced evidence in support of the hypothesis that nonrespondents tend to be of lower "educational level" than respondents. A partial-response bias analysis of the same data indicated that there were similarities between the biases of non-response and those of partial-response, but that different subsets of the partial-response data were not necessarily consistent in the kind, amount, or direction of partial-response bias. It was conjectured that similar inconsistencies might be found among nonrespondents, and that descriptors such as "educational level" might not be pervasive in characterizing differences between respondents and nonrespondents. Such terms as "educational level" probably require reification and objectification as well; when educational level is defined as the number of semesters of coursework taken in certain designated subjects, higher numbers of courses taken are not always positively associated with the tendency to respond. It was also conjectured that there might be a continuum of completeness of responding, from nonrespondent through partial-respondent to full-respondent, with bias existing between any two points on the continuum. (Author)

RESEARCH MEMORANDUM

PARTIAL- AND NON-RESPONSE BIAS EFFECTS IN A NATIONWIDE SAMPLE

F. Reid Creech

This Memorandum is for interoffice use. It is not to be cited as a published report without the specific permission of the author.

Educational Testing Service
Princeton, New Jersey
March 1975

PARTIAL- AND NON-RESPONSE BIAS EFFECTS IN A NATIONWIDE SAMPLE

During the Spring of 1972 a large-scale survey of the senior high school class (class of 1972) was conducted throughout the United States. The purpose of the survey was to gather base year data as the first stage of a 6 to 8 year longitudinal study. Instrumentation for the base year study was developed and field tested by the Research Triangle Institute; the sampling plan was designed by Westat, Incorporated; the field work and construction of the computer data files were performed by Educational Testing Service. Preliminary tabulations and results were reported by Hilton, Rhett, Creech, et al. (1973). A portion of that report dealt with characteristics of nonrespondents. In a more recent report (Creech, 1974) the problem of non-response was extended to consider partial-response bias effects, i.e., to describe the characteristics of those who completed some, but not all, of the information requested.

Such research is not new, as a review by Breland (Note 1) indicates. Suchman and McCandless (1940) indicated that higher educational levels and greater familiarity with the subject matter of the questionnaires were conducive to higher response rates. Franzen and Lazarsfeld (1945) characterized respondents as those who expressed themselves easily in writing, who were interested in the topic of the survey, who had higher income and education levels (education level was seen as underlying higher income), who had experience with or a belief in written communication, and who had a tendency toward greater activity in community affairs. They characterized respondents as being joiners who

liked to write and talk and as being articulate. Benson (1946) also found educational level to be a factor in response, as did Bachman (1967, 1971). Donald (1960) indicated that the degree of interest in the survey, the involvement of the subject, his motivation were factors.

Flanagan and Cooley (1966), in Project TALENT, described the respondent as having greater academic ability and slightly higher socioeconomic status. Nonrespondents were described as tending not to go to college and, if they did go to college, they tended to drop out and to major in nonscientific fields (especially business). Nonrespondents were also characterized as tending to marry earlier than respondents. Astin and Panos (1969) found the grade averages of nonrespondents to be lower than that of respondents. They further indicated that, compared to nonrespondents, respondents' fathers tended to have completed high school. Nonrespondents further tended to plan for education levels below the bachelor degree. They also noted that proportionally more respondents had published an original work while in high school.

Pucel, Nelson, and Wheeler (1971) indicated that females were more likely to respond than males, and that the response rates were higher from clerical/sales occupations than from professional/technical/managerial or service/skilled/miscellaneous occupations. Gannon, Nothern, and Carroll (1971) also associated the female sex with tendency to respond, and found higher educational level, being (or having ever been) married, being in the middle age group, and being in the top 4/5 of job supervisor ratings to be associated with responding.

The current study differs from many of the earlier ones in two respects. First, the sample is nationwide in scope and the sample size is large. Second, the variables available for comparing partial-, non-, and full-respondents are diversified and numerous. The sampling was conducted from a frame which listed both public and nonpublic schools having students at grade 12. The schools were stratified by type of control (public, nonpublic), geographic region, enrollment at grade 12, proximity to higher education centers, minority composition, income class, and degree of urbanization. The stratification resulted in 600 final strata, organized into two main types--low income or high minority schools and others. The former were selected at approximately twice the rate of the latter.

Schools were selected from the stratified frame list with probabilities proportional to a measure of size. Subsequent to school selection a roster of students at grade 12 was prepared, carefully checked and counted, and a simple random sample of 18 students selected within the school. The response rates obtained for schools was 76% before replacements and 85% after replacements, representing 1,044 of the targeted 1,200 schools. Of the targeted 21,600 high school seniors a total of 17,726 participated in the study. Evaluations of the quality of sampling procedures indicated that the frame listing of schools was approximately 6% too small, with the greatest area of undercoverage located in Catholic nonpublic schools. A check of the student listing operations indicated that an error was made in approximately one of every six selected schools (the per-student error rate in listing was estimated to be .00096); none of these errors were suggestive of improper selection procedures.

The instrumentation for the study included a Student Questionnaire, a Student School Record Information Form, and a Student Test Battery. The Student Questionnaire consisted of 11 separate sections, some of which were to be answered by all students, others which were to be answered only by certain students. The instructions in the questionnaire provided 18 correct combinations of sections. The combination of sections selected by a given student became known as his "path" through the questionnaire. Since various paths designate various alternative plans concerning the students' projected activities for the year following high school the path, to some degree, typifies the student. Four percent of the students failed to follow a valid path and were omitted from the analyses below. Differing numbers of students followed the various paths and certain paths had too few students to warrant analysis. As a result, only 11 of the 18 paths could be used in the analyses presented below. In the 11 usable paths the number of responses required of the students ranged from 220 to 282.

The SRIF was completed by a survey administrator (an employee of the school) rather than the student. Information gathered on the SRIF dealt largely with the student's academic performance, the coursework he had taken, and related matters, and were found in school records.

The Student Test Battery consisted of a vocabulary test, a reading test, a mathematics test, a picture-number test (of associative memory), and a mosaic comparisons test (a highly speeded test of perceptual speed and accuracy). These tests were taken by the student.

Non-Response Bias Effects

The SRIF was the basis for evaluating the effect of non-response bias since this document was taken from the school regardless of the student's

completion of the Student Questionnaire or the Student's Test Battery. A total of 21,531 SRIFs were collected and divided into two groups according to whether the student was a respondent or a nonrespondent. Corresponding items on the SRIF were then statistically compared between the groups. The statistical tests were computed on weighted estimates of population means or proportions, aggregated across strata so as to reflect expected differences between respondents and nonrespondents at the population level.

The results are summarized in Table 1. Tests between means were conducted by Student's t-test (indicated by T); differences between proportions were tested by the normal distribution (N) provided the proportions were both between .30 and .80. Proportions outside this interval were tested by Chi-square (C) with 1 degree of freedom.

Insert Table 1 about here

Sample sizes in Table 1 vary slightly from row to row, depending on the completion rate of individual SRIF items provided by the survey administrators; however, since the number of nonrespondents was in excess of 3,000 and the number of respondents in excess of 15,000 the results may be considered to be large sample results.

Students' high school grade averages were obtained on the SRIF, and were strongly related to student class rank, but variations in grading systems and procedures made comparison of grades impracticable. The students's class rank, or class standing, was free of such problems and could be readily standardized by dividing by the class enrollment. Table 1 indicates that nonrespondents stand about 11 percent lower in their classes than do respondents. Scholastic Aptitude Test scores,

verbal and quantitative (SAT-V and SAT-Q), were available on many students from their high school records, but too few nonrespondents had such scores to attempt a comparison.

A number of questions asked for the number of semesters of schooling which students had received during the last three years of high school in various subjects. With the sole exception of industrial arts, whose students did not show a statistically significant difference, respondents tended to have taken more semesters of coursework in the subject areas indicated. The number of semesters of coursework in agriculture, distributive education, health, and trade or industrial courses did not differentiate the two groups. The number of semesters of business courses was greater for respondents than nonrespondents, however, as was the number of semesters of home economics courses. One might anticipate that home economics courses are attended primarily by girls. If so, the significant difference observed may represent a tendency for females to respond. The student's sex was not obtained on the SRIF so that a direct sex effect cannot be obtained from the data.

The SRIF also recorded whether the students had taken courses in four subject areas within the previous year. The subject areas were (a) science or mathematics, (b) English or other language courses, (c) social studies, and (d) vocational-technical or job-training courses. The proportion of students who had taken courses in science or mathematics were more likely to have been respondents, but the reverse was true of students who had taken vocational-technical or job-training courses. Differences in academic ability have been found to distinguish students in such curricula (Echternacht, 1975), and may be an explanation of this result. The languages and social studies incidence did not discriminate the two groups.

The SRIF also disclosed that respondents were less likely than nonrespondents to have taken remedial instruction to correct deficits in reading and mathematics, and less likely to have been classified as handicapped. Fifty-one percent of the handicapped nonrespondents had been classified as either trainable or educable mental retardates, compared to 31 percent of the handicapped respondents; 11 percent more nonrespondents than respondents were classified as emotionally disturbed. Nonrespondents were also more likely to have transferred into the school than were respondents.

Partial-Response Bias Effects

In the study of partial-response bias effects the quantity of variables available for study is larger since not only is the SRIF available, but the Student Test Battery and the Student Questionnaire tend to be available as well. A student was defined to be a partial-respondent if he omitted one or more items along his chosen path through the Student Questionnaire. About 4 percent of the students followed invalid routes through the questionnaire and were removed from the sample prior to analysis.

Since students on different paths would answer different questions, comparisons of full- and partial-respondents depend upon having reasonable numbers of students in each of these two categories within any path under consideration. Paths where the number of students in either category was less than 50 were dropped from the analysis; thereby leaving 11 paths for consideration.

A frequency distribution of the number of omitted items per student was computed separately for each of these 11 paths. All distributions were strongly right skew, as would be expected, and in 6 paths there was distinct evidence of bimodality. One of the more dramatic cases is illustrated in Figure 1. This presents a strong suggestion of having two populations under study, one of students who tend to complete every item and another of students with a propensity to omit items. Unfortunately, subsample sizes were too small to allow the finding to be pursued.

Insert Figure 1 about here

A Chi-square test for similarity of the proportion of partial-respondents among paths was quite significant (Chi-square = 221.01, df = 10). The paths having the most complete responses were those selected by students who (a) had no academic, work, or training plans for the year following high school, or (b) were planning to enter the military, or (c) were planning to go to college. Students planning work and vocational-technical training, students planning full-time work and college, and students planning vocational-technical training tended to have higher than average partial-response rates.

Students within each path were further divided into three primary curriculum groups (general, academic, vocational-technical) and the vocational-technical group was subdivided into agriculture, distributive education, health, home economics, and trade areas. Using the partial-response rate of the path as a standard, the corresponding rates of each curriculum group were compared, again by a Chi-square test. In many cases

subgroup sizes were too small to permit analysis; they were then combined and the analysis conducted on the subgroups resulting. Four of the paths produced significantly different partial-response rates by curriculum. Students without educational, work, or training plans (Chi-square = 10.07, $p < .05$, df = 4), students planning to work full time (Chi-square = 26.84, $p < .001$, df = 7), students planning trade or business school courses (Chi-square = 15.95, $p < .005$, df = 4), and students planning to pursue an academic education (Chi-square = 45.62, $p < .001$, df = 6) represented these paths. In all four significant paths students in academic high school curricula had appreciably lower partial-response rates than the path rate would indicate, and there was a tendency for students in other curricula to have higher partial-response rates. There seemed to be no relationship between the significance or non-significance of the partial-response rate for the path and the significance or non-significance of the curriculum rates within the path.

SRIF comparisons. The variates of the SRIF were also compared for full- and partial-respondents within each path. These results are summarized in Table 3, where significant results are coded to facilitate interpretation.

Insert Table 2 about here

A plus sign ("+") indicates that full-respondents had the greater quantity; a minus sign ("-") indicates the reverse. The sign is followed by the p-value (probability that a greater deviation could be obtained by chance), which, in turn, is followed by T, N, or C to designate the statistical test applied to the data. As before, the sample sizes of various rows of

Table 3 differ somewhat from each other. The Path legend (Table 3) provides approximate sample sizes for the various paths.

Insert Table 3 about here

It is clear from Table 3 that the partial-response bias effect is not uniform from path to path. Path 3, having fewer than 300 students, produces positive biases in the number of semesters of English and Distributive Education courses taken; Path 2, having approximately 3,000 students, fails to develop a significant bias on these variates, but produces significant differences on others. More striking is the fact that the same variate may produce differently directed bias effects from students in different paths. The number of semesters of social science courses taken by partial-respondents on Path 2 was significantly greater than that of full-respondents, while Paths 7 and 11 produced significant differences in the opposite direction. Thus the direction of bias need not be the same for different subgroups of a sample.

The number of significant biases varies from one path to another, from a minimum of zero detections in Path 10 to a maximum of 12 in Path 11. While this result may be a function of the number of students on a given path, there seemed to be no association between the number of significant biases detected and the number of students on the path. Similarly, the number of paths on which a given variate was significantly biased by partial responding varied from zero to 5.

Student Test Battery comparisons. The nine scales and subscales of the Student Test Battery were compared for full- and partial-respondents on

each of the 11 paths with results which are presented in Table 4. All tests were conducted by Student's t. All significant results suggested that full-respondents had higher test scores than did partial-respondents. A factor analysis of these variates, together with the student's class rank and self-reported grade average produced an "ability" factor which was scored for both full- and partial-respondents. The ability variate is also displayed in Table 4.

Insert Table 4 about here

Apart from the fact that differing directions of bias were not found in Table 4 the results look much like those of Table 2. No single test was biased in all paths, although the letter groups test, the ability factor, and the mathematics test came close. The second and more difficult portion of the picture-number test was biased in only 4 paths, and the first part of this test as well as the first (easiest) mosaic comparisons subscale were significantly biased in only 5 of the 11 paths. Path 6, which produced only one significant bias in Table 2, produced no significant bias effects in Table 4. By contrast, Path 10, which produced no significant biases in Table 2, produced significant biases in all but two variates on Table 4.

Other comparisons. Sex of student was available from the Student Questionnaire. In Path 8 there were too few males to effect a comparison, but a test was conducted in all other paths. No significant results were obtained. A factor-score measure of socioeconomic status was also developed,

having a modest degree of internal consistency, and tested across the paths. The results were significant only in Paths 2, 4, and 11.

Students were also asked to indicate their racial/ethnic identification in the Student Questionnaire. Partial-response rates were computed for each classification and the homogeneity of rate across classifications tested by Chi-square. The result was highly significant (Chi-square = 206.50, $p < .005$, df = 7), and suggests that Blacks were most apt to be partial-respondents, followed by Mexican Americans and other Latin groups (but not Puerto Ricans). These groups were followed by American Indians. Whites had the lowest partial-response rate. Orientals and other classifications showed little deviation from the overall rate of partial-response. The observed subcultural deviations may, however, be a manifestation of other educational effects; the partial-response rates of the racial/cultural subgroups were correlated with the subgroup mean test scores of the Student Test Battery by the Spearman-rho correlation coefficient. Strong indications of an association were found, between a subgroup's test scores and its partial-response rate. The Spearman coefficients were significant at the .01 level for the vocabulary, reading, and mosaic comparisons (subscales 2 and 3) tests; at the .05 level for the letter groups and mathematics tests; at the .06 level for the first subscale of the mosaic comparisons test, and at the .10 level for the two picture-number tests.

Discussion

Other authors have repeatedly emphasized the role which educational level and its concomitants play in the non-response bias problem. Sex,

occupational level, and socioeconomic status have also been mentioned. SRIF data do not measure the last variables mentioned, but the role of educational level seems to be strongly supported. In every school subject for which significant non-response bias effects were found, nonrespondents had taken fewer courses than had respondents. Respondents were also more likely to have taken coursework in science or mathematics within the last year than were nonrespondents. Nonrespondents were, however, more likely than respondents to have taken a course in the vocational-technical area in the last year, and the number of semesters of coursework in industrial arts, distributive education, and the trades were higher for nonrespondents than for respondents, although the differences were not statistically significant. One may speculate on the possibility that students in such curricula do not follow the typical pattern or, alternatively, that the cirteria by which educational level is measured need somewhat more careful definition.

Apart from this perturbation, the educational level hypothesis seems tenable. Nonrespondents tended to stand lower in their classes, to have transferred into the school (suggestive of interruptive schooling and high-mobility households), to have needed remedial instruction to correct educational deficits, and were more likely to have been handicapped. Since the handicapped classifications consist largely of mental or psychological difficulties one might reasonably expect poor academic performance.

Partial-response bias effects seem to be more complicated in structure than non-response bias effects. This could be due to variations in path complexity but, on the other hand, there are some marked similarities. For example, the preponderance of partial-response bias effects are in the

same direction as non-response effects. This gives rise to the interesting possibility that a continuum exists, ranging from full responding on the one extreme, through degrees of partial responding, to complete non-response on the other.

We are unable to know what path a nonrespondent might have taken through the Student Questionnaire, of course, and therefore cannot make direct comparisons of nonrespondent and partial-respondents on the same path. We can, however, consider that the nonrespondents would contain students who could be classified into these paths, and would have been had they responded; the lack of their responding causing them to be lumped into a single category--nonrespondent. If we could combine respondents across paths so as to produce a single group of full-respondents and another of partial-respondents it might be possible to compare full-, partial-, and non-respondents on the same variate. This would be difficult to do for the variates listed at the top of Table 2, but has been done for the last nine variables. Table 5 presents the mean proportions and results of statistical tests which were applied.

Insert Table 5 about here

In Table 5 it will be noted that, in every variate, there is a trend from full-respondent, through partial-respondent, to nonrespondent. While the statistical tests were not wholly satisfactory it will be noted that whenever the full-to-partial difference was significant so was the response-to-nonresponse difference and the direction of bias was the same. Where the response-to-nonresponse difference was not significant neither was the

full-to-partial difference, and when the former was significant but the latter was not, the direction of deviation was the same. All these conditions would support the notion of a continuum. Should a continuum exist in fact it would suggest that the direction of non-response bias might be determined from partial-respondents.

The partial-response bias data provide additional food for thought in the inconsistent directions of bias developed by students on different paths. The college-bound group of Path 11 produces negative partial-response biases in the number of semesters of coursework taken in industrial arts, business, and distributive education. Each of these variates produces a positive bias effect on some other path. One wonders whether differing directions of bias similarly exist within the nonrespondent group; an inconsistency which goes unmeasured because of our inability to place non-respondents into paths. If so, one would have sound reason to question the pervasiveness of "educational level" as the primary variate associated with non-response, since nonrespondents on one path might produce an upward bias in "educational level," those on another might produce a downward bias, and those on still another might not produce a bias at all. It is possible that the repeated discovery of educational level, or of other descriptors of bias, merely represents the whole-group measure of a large or strongly biased subgroup effect.

Summary and Conclusions

The non-response bias analysis of data from a stratified nationwide probability sample of high school seniors produced evidence in support of

the hypothesis that nonrespondents tend to be of lower "educational level" than respondents. A partial-response bias analysis of the same data indicated that there were similarities between the biases of non-response and those of partial-response, but that different subsets of the partial-response data were not necessarily consistent in the kind, amount, or direction of partial-response bias. It was conjectured that similar inconsistencies might be found among nonrespondents, and that descriptors such as "educational level" might not be pervasive in characterizing differences between respondents and nonrespondents. Such terms as "educational level" probably require reification and objectification as well; when educational level is defined as the number of semesters of coursework taken in certain designated subjects, higher numbers of courses taken are not always positively associated with the tendency to respond. It was also conjectured that there might be a continuum of completeness of responding, from nonrespondent through partial-respondent to full-respondent, with bias existing between any two points on the continuum.

Reference Notes

Breland, H. M. A note on response rates in survey research. Unpublished Manuscript, 1973. (Available from Educational Testing Service, Princeton, New Jersey 08540).

References

Astin, A. W., & Panos, R. J. The educational and vocational development of college students. Washington, D. C., American Council on Education, 1969.

Bachman, J. G., et al. Youth in transition: Blueprint for a longitudinal study of adolescent boys. Volume 1. Ann Arbor, Michigan: University of Michigan, Institute for Social Research, 1967.

Bachman, J. G., Green, S., & Wirtanen, I. D. Youth in transition: Dropping out--problem or symptom? Volume 3. Ann Arbor, Michigan: University of Michigan, Institute for Social Research, 1971.

Benson, L. E. Mail surveys can be valuable. Public Opinion Quarterly, 1946, 1, 234-241.

Creech, F. R. A vocational re-evaluation of the base-year survey of the high school class of 1972: Selected characteristics of the class of 1972. Part I. Final Report, PR-74-23. Princeton, New Jersey: Educational Testing Service, 1974.

Donald, M. Implications of nonresponse for the interpretation of mail questionnaire data. Public Opinion Quarterly, 1960, 24, 99-114.

Echternacht, Gary J. A Vocational Re-Evaluation of the Base Year Survey of The High School Class of 1972. Part II. Final Report, PR-75-3, Princeton, New Jersey: Educational Testing Service, 1975.

Flanagan, J. C., & Cooley, W. W. Project TALENT one-year follow-up studies. Cooperative Research Project Number 2333, University of Pittsburgh, 1966.

Franzen, R., & Lazarsfeld, P. F. Mail questionnaire as a research problem. Journal of Psychology, 1945, 20, 293-320.

Gannon, M. J., Nothern, J. C., & Carroll, S. J., Jr. Characteristics of non-respondents among workers. Journal of Applied Psychology, 1971, 55, 586-588.

Hilton, T. L., Rhett, H., Creech, F. R., et al. The base-year survey of the national longitudinal study of the high school class of 1972. Final Report. Princeton, New Jersey: Educational Testing Service, 1973, 4-53, 4-74.

Pucel, D. J., Nelson, H. F., & Wheeler, D. N. Questionnaire follow-up returns as a function of incentives and responder characteristics. Vocational Guidance Quarterly, 1971, 188-193.

Suchman, E. A., & McCandless, B. Who answers questionnaires? Journal of Applied Psychology, 1940, 24, 758-769.

Table 1

SRIF Tests for Non-Response Bias

Variate	Respondent	Nonrespondent	Statistic	p<
No. of Semesters in:				
Science	3.61	3.08	T = 6.83	.001
For. Language	2.73	1.80	T = 8.07	.001
Soc. Studies	5.41	5.24	T = 2.54	.05
English	6.27	6.00	T = 4.19	.001
Mathematics	3.93	3.36	T = 7.30	.001
Ind. Arts	2.20	2.47	T = -1.43	NS
Commerce	3.60	3.07	T = 3.54	.001
Fine Arts	2.91	2.24	T = 4.31	.001
Agriculture	.80	.59	T = .88	NS
Business	3.58	2.78	T = 5.23	.001
Dist. Ed.	.48	.62	T = -.77	NS
Health	.45	.24	T = 1.88	NS
Home Ec.	1.99	1.22	T = 5.43	.001
Trade	2.50	2.61	T = -.41	NS
Within Last Year:				
Sci. or Math.	.52	.41	N = 5.80	.001
Eng. or Lang.	.87	.84	C = 3.78	NS
Soc. Studies	.82	.79	C = 2.36	NS
Voc.-Tech.	.37	.43	N = 3.12	.01
Centile Class Rank	.52	.41	N =10.51	.001
Transfer	.17	.26	C=108.51	.001
Remedial Math.	.04	.09	C=127.80	.001
Remedial Reading	.07	.13	C=106.59	.001
Handicapped	.02	.04	C= 63.22	.001

Table 2

Path Descriptions and Sample Sizes

Path No.	Description	n Full	n Partial
1	Students with no plans for work, school or training	631	62
2	Students planning to work full time	2549	611
3	Students planning full-time work and trade or business school courses	187	78
4	Students planning to work part or full time and trade or business school courses	177	93
5	Students planning full-time work and to pursue academic education	198	94
6	Students planning on-the-job training or apprenticeship programs	187	51
7	Students planning to enter the military	486	73
8	Students planning to be homemakers	315	69
9	Students planning trade or business school courses	459	170
10	Students planning part-time work and trade or business school courses	631	190
11	Students planning to pursue academic education	6008	1102

Table 3

SRIF Tests for Partial-Response Bias

Variate	Path										
	1	2	3	4	5	6	7	8	9	10	11
SAT-V	+.01T	NS	NS	+.05T	NS	NS	NS	NS	NS	NS	+.001T
SAT-Q	+.01T	NS	NS	+.01T	NS	NS	+.05T	NS	NS	NS	+.01T
No. of Semesters in:											
Science	NS	+.05T	NS	-.05T	NS	NS	NS	NS	NS	NS	+.001T
For. Lang.	+.05T	+.001T	NS	NS	NS	NS	NS	NS	NS	NS	NS
Soc. Studies	NS	-.05T	NS	NS	NS	NS	+.05T	NS	NS	NS	+.05T
English	NS	NS	+.05T	NS	NS	NS	NS	NS	NS	NS	NS
Mathematics	NS	NS	NS	NS	NS	NS	NS	+.05T	NS	NS	+.001T
Ind. Arts	NS	NS	NS	+.01T	NS	NS	NS	NS	NS	NS	-.05T
Commerce	NS	NS	NS	NS	NS	NS	NS	+.05T	NS	NS	NS
Fine Arts	NS	NS	NS	NS	NS	NS	+.05T	NS	+.01T	NS	NS
Agriculture	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Business	NS	+.05T	NS	NS	NS	NS	NS	+.01T	NS	NS	-.05T
Dist. Ed.	NS	NS	+.05T	NS	NS	NS	NS	NS	NS	NS	-.001T
Health	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Home Ec.	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Trade	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Within Last Year:											
Sci. or Math.	NS	NS	NS	NS	NS	NS	+.05N	NS	NS	NS	+.01N
Eng. or Lang.	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Soc. Studies	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Voc.-Tech.	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Centile Class Rank	NS	+.001N	NS	NS	+.05N	NS	+.01N	+.05N	NS	NS	+.001N
Transfer	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Remedial Math.	NS	-.05C	NS	NS	NS	NS	NS	-.01C	-.05C	NS	-.05C
Remedial Reading	NS	-.001C	NS	NS	NS	-.05C	NS	NS	NS	NS	-.01C
Handicapped	NS	-.001C	NS	NS	NS	NS	-.05C	NS	-.01C	NS	NS

Table 4

Student Test Battery Tests for Partial-Response Bias

Variate	Path 1	2	3	4	5	6	7	8	9	10	11
1. Vocab.	.01	.01	NS	.05	.02	NS	.01	NS	.01	NS	.01
2. Pic. num. 1	NS	.01	NS	.02	NS	NS	NS	NS	.01	.01	.01
3. Pic. num. 2	.05	.01	NS	NS	NS	NS	NS	NS	.01	NS	.01
4. Reading	.01	.01	.02	.05	NS	NS	.01	NS	NS	.01	.01
5. Letter	.02	.01	.02	.01	.01	NS	.01	.05	.01	.01	.01
6. Math.	.01	.01	.05	.05	NS	NS	.01	.05	.02	.01	.01
7. Mos. com. 1	.01	.01	.01	NS	NS	NS	NS	.05	NS	.01	NS
8. Mos. com. 2	.05	.01	NS	NS	.02	NS	.02	.02	NS	.01	.01
9. Mos. com. 3	.02	.01	NS	NS	.01	NS	.01	.01	.01	.01	.01
Abil.	.01	.01	.05	.01	.05	NS	.01	.05	.01	.01	.01

Table 5

Comparisons of Full-, Partial-, and Non-Respondents

Variate	Mean Proportions			Statistical Tests	
	Full	Partial	Nonrespondent[1]	Full-Partial	Respondent-Nonrespondent[1]
Within Last Year:					
Sci. or Math.	.53	.48	.41	NS(+)	+.001N
Eng. or Lang.	.87	.86	.84	NS(+)	NS(+)
Soc. Studies	.82	.81	.79	NS(+)	NS(+)
Voc.-Tech.	.37	.41	.43	-.01C	-.01N
Centile Class Rank	.54	.47	.41	+.001C	+.001N
Transfer	.17	.19	.26	NS(-)	-.001C
Remedial Math.	.04	.06	.09	-.001C	-.001C
Remedial Reading	.06	.10	.13	-.001C	-.001C
Handicapped	.02	.03	.04	-.001C	-.001C

[1]From Table 2.

Figure 1

Percent Frequency Distribution for Number of Omitted Items (Path 3)