INTERVIEWER EFFECTS IN MEASURING NETWORK SIZE USING A SINGLE NAME GENERATOR*

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Abstract

Name generators, used measuring egocentric networks in surveys, are complex questions that make substantial demands on respondents and interviewers alike. They are therefore vulnerable to interviewer effects, which arise when interviewers administer questions differently in ways that affect responses-in particular, the number of names elicited. Van Tilburg (1998) found significant interviewer effects on network size in a study of elderly Dutch respondents; that study included an instrument with seven name generators, the complexity of which may have accentuated interviewer effects. This article examines a simpler single-generator elicitation instrument administered in the 1998 General Social Survey (GSS). Interviewer effects on network size as measured by this instrument are smaller than those found by Van Tilburg, but only modestly so. Variations in the network size of respondents within interviewer caseloads (estimated using a single-item "global" measure of network size and an independent sample of respondents) reduce but do not explain interviewer effects on the name generator measure. Interviewer differences remain significant after controls for between-interviewer differences in the sociodemographic composition of respondent pools. Further insight into the sources of interviewer effects may be obtained via monitoring respondent-interviewer interactions for differences in how name generators are administered.

Keywords: name generators, egocentric networks, interviewer effects

1. Background

Name generator instruments are commonly used in measuring egocentric networks in social surveys. "Name generators" are survey questions that enumerate the alters deemed to be part of a respondent's social network. They ask respondents to freely list those persons to whom they have a specific type of social tie, such as discussing "important matters" or politics, being friends, or feeling "close." Name generators are usually followed by "name interpreter" questions which yield additional data on an egocentric network, including proxy reports on characteristics of alters or reports on qualities of relationships between elements of the egocentric network. Such data permit the construction of indices that tap network density, heterogeneity, or composition. This article is concerned with data elicited by the name generator alone. It focuses on one source of nonsampling error in measuring network size (the number of names elicited), that associated with differences between interviewers.

Van Tilburg (1998), in a study of elderly Dutch respondents, found substantial interviewer variation in the size of networks measured via a name generator instrument. He reported a zero-order intraclass correlation for network size within interviewers of over 0.2; this was reduced to about 0.15 after controls for a large number of sociodemographic differences between respondents, characteristics of interviewers, and features of the interview situation (Van Tilburg, 1998: p. 322).

The interviewer differences found in Van Tilburg's study are quite large by comparison with those found for most survey measures. Groves and Magilavy (1986) estimated interviewer effects for 297 indicators in nine telephone surveys addressing a wide variety of political, economic, and health issues. They report an average intraclass correlation of only 0.01, together with considerable variability across indicators and surveys; larger correlations (as high as 0.17) were found for a few items. Groves (1989: p. 365) reports similar ranges of interviewer effects for over 400 items from ten personal interview studies.

Among the rationales given for interviewer effects are question formats that leave more room for variation in responses. Billiet and Loosveldt (1988: p. 205) point to formats that leave more room for "autonomous interviewer activity." They observe that "opportunities to convey to the respondents what is expected of them by means of instructions, to probe, and to give adequate positive and negative feedback occur particularly with open questions and with the presentation of lists of items."

These considerations suggest that interviewer effects might be greater on open-ended survey items than on closed-ended ones. Groves and Magilavy (1986), however, do not find generally higher interviewer effects for closed questions than for open ones. They do suggest that one particular type of open question–that asks respondents to mention several entities that belong to a certain set–is especially prone to interviewer effects. They note that the number of different entities mentioned "is a function both of the respondent's ability to articulate [entities] and the interviewer's behavior in probing for more mentions. The number of responses to a question appears to be subject to greater interviewer differences than the substantive response category into which answers are coded" (Groves and Magilavy, 1986: p. 260). Consistent with this is the finding that interviewer effects on the number of answers given to open questions are relatively large; see Hox, de Leeuw and Kreft (1991).

Name generator questions ask respondents to list persons to whom they have a given type of social tie, and as such may be particularly susceptible to interviewer differences for the reasons given by Groves and Magilavy. The complexity of the network elicitation instrument used in Van Tilburg's (1998) study may have led to especially pronounced interviewer effects there. That instrument sought to measure both core and extended portions of a personal network.

Interviewers administered name generators for seven domains including the household, children and their partners, other relatives, neighbors, coworkers or schoolmates, co-members of voluntary groups, and other "friends and relatives." Within each domain, respondents were asked to name persons they regarded as important and saw frequently. Network size was measured as the number of distinct names given in response to the set of seven name generators. The administration of this instrument is demanding on both respondents and interviewers, and would appear to permit substantial between-interviewer differences.

Interviewer-related variation in network size is a source of measurement error, and we should wish for it to be minimal. This article examines interviewer effects on a simpler one-generator measure of network size targeted on the core of a respondent's social network, administered in the 1998 General Social Survey (GSS; see Davis, Smith and Marsden, 1998). The general hypothesis examined is that the simpler structure of this instrument should reduce variations in its administration across interviewers, and hence that interviewer effects on network size as measured by the GSS instrument should be more modest than those reported by Van Tilburg (1998).

The next sections of the article introduce the GSS and the name generator used to measure networks in 1998. Next, the overall extent of interviewer differences in network size is established using elementary multilevel models, following Hox et al. (1991), Hox (1994) and Van Tilburg (1998). Because the GSS does not use an experimental design in allocating respondents to interviewers, however, these interviewer differences in network size cannot necessarily be attributed to differences in interviewer behavior. We therefore attempt to account for zero-order interviewer differences in two ways. First, we seek to capture differences in the underlying network size of those in an interviewer's caseload of respondents using an independent sample and a different measure of network size that is not obviously prone to interviewer effects. Second, we control for differences in sociodemographic characteristics of respondents that are related to the name generator measure of network size. The zero-order variations in network size across interviewers are indeed somewhat smaller than those found in Van Tilburg's study. Our two approaches serve to account for only a modest portion of them, however. The article concludes with speculation on the sources of the remaining differences and suggestions for research that might lead to better understanding of their sources.

2. The General Social Survey

The General Social Survey (GSS) is an ongoing study of the social and political attitudes and behaviors of U.S. adults conducted by the National Opinion Research Center (NORC). Undertaken at least every other year since 1972, each GSS is based on a random sample of households representative of the noninstitutionalized, English-speaking U.S. population age 18 and over. Data are collected via in-person interview. An important goal of the GSS is to track aggregate social change in attitudes and behaviors by measuring attitudes and behaviors repeatedly over time. For details on the design and philosophy of the GSS, see Davis and Smith (1992); for technical information and wording of specific questionnaire items, see Davis, Smith, and Marsden (1998).

This article focuses on the 1998 GSS because information on interviewer assignments is more readily available for it than for earlier GSSs (1985, 1987, and 1988) that included name generator instruments.[1] Since 1994, the GSS has been administered every other year to two samples of approximately 1500 respondents each. Items in the replicating core of the GSS are measured for both samples. Many topical modules, however, are administered to one of the two samples. The name generator instrument used in 1998 was part of a topical module on religion; this sample had 1445 respondents. As part of an experiment on the measurement of interracial friendships (Smith, 1999), a one-item global question about personal network size was administered to the other 1998 sample (N = 1387).[2]

3. The 1998 GSS Network Instrument

The network instrument included in the 1998 GSS sought to elicit "good friends" of the respondent. Its structure is substantially the same as that of the instrument in the 1985 and 1987 GSSs incorporating the better-known "important matters" name generator (see Burt, 1984; Marsden, 1987).[3] The name generator for 1998 is worded as follows:

> **Many people have some good friends they feel close to. Who are your good friends (other than your spouse)? Just tell me their first names.**
>
> **PROBE: Is there anyone else?**

The question directs interviewers to probe one time for additional names after a respondent stops mentioning good friends. The names of up to five friends are written down, and subsequent name interpreter questions ask about each friend's race, religious affiliation and congregational membership. Interviewers make note of whether respondents named more than five friends.

Network size is measured as the number of friends given in reply to the name generator.[4] Table 1 displays the distribution of network size as measured by this instrument. Assigning a value of 6 to cases in which more than five friends were named, the mean number of friends is 3.3, with a standard deviation of 1.8. 193 interviewers administered the name generator to at least one respondent; the mean caseload per interviewer was just under 7.5.

INSERT TABLE 1 ABOUT HERE

4. Zero-order Interviewer Differences

Following Hox et al (1991), Hox (1994), and Van Tilburg (1998), we examine interviewer effects using two-level models in which respondents are nested within respondents, and infer the presence of interviewer differences when there is significant within-interviewer variance. Estimates reported in this article were obtained using Stata (StataCorp, 1999) and MLwiN software (Rasbash, Goldstein, Yang, Plewis, Healy, Woodhouse, Draper, Langford and Lewis, 2000). With the exception of estimates for ordinal logit models (see note 7), estimates are based on the maximum likelihood criterion.

We begin with a simple variance component model that partitions the variance in network size into interviewer-related and within-respondent components:

$$y_{ij} = \mu + v_i + \varepsilon_{ij} \qquad (1)$$

where y_{ij} is the number of names given by the j^{th} respondent interviewed by the i^{th} interviewer, μ is a population mean, v_i is the effect of interviewer i, and ε_{ij} is a respondent-level disturbance. Since we wish to generalize findings beyond the particular interviewers who worked the 1998 GSS, we treat v_i as a random effect. The variance of y_{ij} is thus decomposed as follows:

$$\sigma_y^2 = \sigma_\upsilon^2 + \sigma_\varepsilon^2$$

Zero-order interviewer differences are significant to the extent that σ_υ^2 is nonnegligible. The intraclass correlation ρ_{int} measures the magnitude of interviewer differences:

$$\rho_{int} = \sigma_\upsilon^2/(\sigma_\upsilon^2 + \sigma_\varepsilon^2)$$

Estimates for model (1) appear in the first column of Table 2. For the 1998 GSS data, the estimated interviewer variance is more than five times its standard error, and the intraclass correlation is 0.502/(0.502+2.771)=0.153, somewhat smaller than the zero-order finding of

0.215 reported by Van Tilburg (1998: p. 315). It nonetheless seems clear that GSS interviewers elicited different numbers of names, on average, from the pools of respondents assigned to them.[5]

INSERT TABLE 2 ABOUT HERE

The estimates that appear in the first column of Table 2 are for linear regression models assuming normally distributed errors. This assumption is problematic for the discrete distribution of network size shown in Table 1, and the data were therefore studied in two other ways. First, the size scores shown in Table 1 were rescaled as normal equivalent deviates, and the rescaled scores were analyzed via linear regression.[6] Second, network size was treated as an ordinal variable and studied using multilevel ordinal logit regression.[7]

As seen in the second and third columns of Table 2, significant interviewer differences are found for both of these alternative treatments of network size. In each case the interviewer-level variance component is several times its estimated standard error. The intraclass correlation estimated with the normal rescaling of the scores is slightly smaller than that found when network size is in its original metric (the reverse of Van Tilburg's [1998: p. 315] finding for the same rescaling). A somewhat lower intraclass correlation of 0.112 is obtained for the ordinal logit specification, using the Snijders and Bosker (1999: p. 224) definition of ρ_{int} for this model.

4.1 How Large are the Interviewer Differences?

The findings in Table 2 establish that interviewer-related variations in network size as measured by the name generator instrument are statistically significant. To measure their magnitude, we first calculated mean network sizes within interviewers. These means cover the entire range of network size: three interviewers did not elicit any alters from any of those they interviewed, while all respondents assigned to one other interviewer gave more than five "good friends." The interquartile range for the within-interviewer means runs from 2.75 to 4.

Though the within-interviewer means provide unbiased estimates of the extent of interviewer effects in model (1), they are subject to considerable sampling fluctuation. Many interviewers conducted a small number of interviews using the name generator instrument (the caseload [number of respondents per interviewer] ranges from 1 to 38 with an interquartile range of 3 to 10). There is a low negative correlation (-0.17) between the number of interviews conducted and the absolute deviation of the within-interviewer mean from the overall mean. Due to the instability of the within-interviewer means, "shrunken" estimates may yield better indications of the magnitude of the interviewer effects. Shrunken estimates mix the within-interviewer mean with the overall mean, giving more weight to the former when the intraclass correlation is high and when an interviewer has a large caseload (see Bryk and Raudenbush, 1992: pp. 39-40). The shrunken estimates are biased toward the grand mean but have smaller mean square errors than do the within-interviewer means.

The shrunken estimates of within-interviewer means cover a considerably smaller range than do the raw means. They range from a low of 1.8 names elicited to a high of 4.5, with an interquartile range that is only half as large as that found for the raw within-interviewer means, running from 3.0 to 3.7. This difference between an interviewer at the 25^{th} percentile and one at the 75th percentile is nonetheless substantial: it is roughly 20% of the mean network size. The interviewer differences seen in Table 2, then, are substantively as well as statistically significant.

5. Should Interviewer Differences be Attributed to Interviewers?

The GSS is a national survey of the U.S. that gathers data via in-person interview. In order to control travel costs for interviewing while maintaining its representativeness, the GSS (like other large scale surveys) uses a multistage area probability sampling design. Most–though not all–interviewers usually work cases within a single primary sampling unit (PSU), and often within a single segment within a PSU. In addition, NORC seeks to match the race of interviewers to the racial composition of the areas sampled–it does not race-match at the respondent level, however.

Respondents are not, then, assigned at random to GSS interviewers. It is thus possible that the interviewer differences in network size seen in Table 2 are attributable to underlying differences in average network size within the respondent pools assigned to interviewers, rather than to differences in the ways in which interviewers administer the name generator. This section takes two different approaches to examining this possibility. The first obtains estimates of the interviewer effects using a different instrument for measuring network size and an independent sample. The second follows the approach taken by Van Tilburg (1998) of controlling for differences in respondent attributes associated with the name generator measure of network size. Later, we consider the extent to which interviewer differences in network size are linked to characteristics of interviewers and to aspects of respondent-interviewer interaction.

5.1. Interviewer Differences for a "Global" Measure of Network Size

As noted in section 2, a one-item "global" measure of network size was administered to two-thirds of the respondents in the other 1998 GSS sample (see Smith, 1999). Both samples are random, so respondents were randomly allocated to the two instruments for measuring network size. Most GSS interviewers worked cases in both samples.

The global measure is as follows:

About how many good friends do you have?

This question was posed only if a respondent had answered affirmatively to a filter question asking if s/he has "any good friends that you feel close to."

This single-item measure of size does not provide as many openings for "autonomous interviewer activity" as does the name generator measure; substantial interviewer effects on responses to the global measure seem unlikely. We should therefore anticipate that interviewer differences will be smaller for the global measure than for the name generator measure.

Table 3 presents parameter estimates for model (1) using the global indicator of network size. For three different scalings of the global measure–its original metric, its logarithm, and a normal-equivalent deviate rescaling (see note 6)–we see intraclass correlations that are much smaller than those of Table 2, all lying between 0.04 and 0.05. Interviewer differences in the global measure are substantially smaller than those for the name generator measure, suggesting that the additional intraclass correlation for the latter may be attributable to differences in interviewer behavior.

INSERT TABLE 3 ABOUT HERE

Because it seems unlikely that interviewers substantially influence responses to the global question about network size, interviewer differences in this measure can be taken as indicators of the extent to which network size differs across the pools of respondents assigned to GSS interviewers. Shrunken estimates of the interviewer effects v_i in model (1) for the global measure indicate the degree to which the respondent caseload for interviewer i has network size greater or less than average.

Shrunken estimates of interviewer effects based on the second, independent GSS sample were obtained for the variance component model in Table 3. These were then included as a covariate in a bivariate regression model for the size of networks elicited by the name generator measure in the other sample:

$$y_{ij} = \beta_0 + \beta_1 X_i + \nu_i + \varepsilon_{ij} \qquad (2)$$

where X_i is the estimated interviewer effect on the global measure.[8] If the interviewer differences in the name generator measure are attributable to between-interviewer differences in the respondent pool, inclusion of this control should reduce the interviewer-level variance in the name generator measure seen in Table 2. Estimates for model (2) are presented in Table 4.

INSERT TABLE 4 ABOUT HERE

Some of the interviewer differences from Table 2 do appear to be linked to network size differences in respondent pools, as indicated by the estimated interviewer differences for the global measure of size. The regression coefficient for the estimated interviewer effect from the other GSS sample is positive and more than twice its standard error for all three scalings of network size. The estimated interviewer-level variance in the name generator measure of network size is reduced by about 10 percent (from 0.50 to 0.46, for the original size scores).

Some zero-order interviewer variations in the name generator measure are attributable, then, to the fact that interviewers are assigned to sets of respondents that differ systematically in network size. Substantial interviewer differences remain after adjusting for this, however. In an effort to account for these, the next set of analyses introduces further respondent-level controls.

5.2. Respondent-level Differences Linked to the Name Generator Measure

The zero-order interviewer differences of Table 2 may be spurious for a second reason, if the respondents assigned to interviewers differ systematically in attributes linked to their responses to the name generator measure itself. This part expands the control variables included in regression model (2) to include controls for the sociodemographic composition of the respondent pools worked by interviewers, estimating the multiple regression

$$y_{ij} = \beta_0 + \Sigma\beta_k X_{kij} + \nu_i + \varepsilon_{ij} \qquad (3)$$

where X_{kij} is the k^{th} covariate for respondent j interviewed by interviewer i and β_k is the corresponding regression parameter. Covariates may include characteristics of respondents and characteristics of interviewers. Respondent-level covariates included in estimating model (3) were identified through an overtly empirical approach, drawing on findings from the extant literature on predictors of network size (e.g. Fischer, 1982a; Marsden, 1987; Marsden and Hurlbert, 1987). Such covariates (described in the Appendix) were considered if they had statistically significant zero-order associations with the name generator measure of network size. Estimates for a regression including ten such covariates appear in the first column of Table 5.[9]

INSERT TABLE 5 ABOUT HERE

For the purposes of this article, the most important finding from model (a) in Table 5 is that the estimated interviewer-level variance of 0.423 is more than four times as large as its standard error, and only about 20 percent smaller than the zero-order estimate of 0.502 in Table 2. Estimates of regression parameters show that more "good friends" are mentioned by respondents who are white, live in the western U.S., are better educated, have better health, often attend religious services, and are neither retired nor keeping house. No significant differences by age, sex, or number of children are evident. Within-interviewer differences in these respondent-level correlates of network size, however, can account for only a fraction of the zero-order interviewer differences in network size.

5.3. Differences by Interviewer Characteristics

Van Tilburg's (1998) analysis found certain characteristics of interviewers to be associated with the name generator measure of network size. Better educated interviewers tended to elicit more names, while more experienced interviewers obtained fewer. Interviewers obtained more names in their later interviews, as they grew more experienced in administering the questionnaire.

We examined interviewer differences using data on an interviewer's NORC experience, age, sex, and race. Data on interview date were used to construct a rank-order of interview sequence. Model (b) in Table 5 considers these five interviewer properties alone, while model (c) examines them in conjunction with the 10 respondent-level attributes of model (a).

None of the five interviewer characteristics has a statistically significant association with network size in either of these models. There is a very weak suggestion in model (b) that nonwhite interviewers might obtain fewer names from respondents. Estimates for model (c), however, indicate that this is attributable to the fact that nonwhite interviewers are apt to be assigned to interview nonwhite respondents, who tend to give about half a name fewer than do white respondents. There is likewise a weak suggestion, counter to Van Tilburg's (1998) finding, that experienced interviewers tend to elicit more names.

5.4. Respondent-Interviewer Interaction

The data on interviewers permit us to explore the question of whether the matching of respondents to interviewers by sex, race, or age affects responses to the name generator. It is reasonable to anticipate that matching in these respects might heighten a respondent's comfort level and prompt her or him to offer more names when asked for "good friends." We therefore created interaction terms crossing the respective respondent and interviewer variables. The analyses were exploratory and have very limited power to detect these interaction effects, since the vast majority (90 percent) of GSS respondents are interviewed by women, and because NORC's practice of race-matching at the area level limits the number of cross-race interviews.

None of the three interaction effects examined proves statistically significant when added to a regression including the underlying main effects; to conserve space, the estimates are not presented in Table 5.[10] The only one of the three estimates to exceed its standard error is for race; this suggests that nonwhite respondents interviewed by nonwhite interviewers may be especially unlikely to cite "good friends" in response to the name generator. In light of limitations of these data, however, this finding must be regarded as highly tentative.

A different aspect of the quality of respondent-interviewer interaction is measured by the interviewer's post-interview rating of the respondent's cooperativeness on a scale from "hostile" (1) to "friendly and interested" (4). This rating has been shown to be associated with network size in previous studies (Fischer, 1982; Marsden and Hurlbert, 1987). It is included in model (d) of Table 5, together with all respondent- and interviewer-level covariates and the estimated interviewer effects from the analysis of the global measure of network size reported in Table 3.

Cooperativeness has a substantial association with the number of names elicited by the name generator. Its regression coefficient is more than five times its standard error, and a "friendly and interested" respondent is estimated to name about 1.2 friends more than does a "hostile" one. Inclusion of cooperativeness and the estimated interviewer effect reduce the estimated interviewer-level variance in network size to 0.371, about 75% the size of the overall interviewer variance seen in Table 2.

Shrunken estimates of the interviewer effects υ_i for model (d) in Table 5 provide an indication of the magnitude of the interviewer differences that remain after the entire set of controls has been introduced. These cover a range from -1.16 to 1.12 (compared to the zero-order range in υ_i of -1.53 to 1.17) with an interquartile range of -0.22 to 0.25 (compared to the zero-order interquartile range in estimated υ_i of -0.35 to 0.33). Substantively appreciable variation in the average number of names elicited by different interviewers remains, after taking account of differences in the respondents assigned to interviewers in the ways possible within this nonexperimental study.

6. Conclusions

This article examined interviewer effects on the number of names elicited by a single-name-generator instrument for measuring personal networks. As hypothesized, those effects appear more modest than those for the more complex instrument studied by Van Tilburg (1998). They are nonetheless substantial by comparison with the interviewer effects reported elsewhere in the literature on survey research, and nontrivial in substantive terms. Differences in the number of names elicited by different interviewers remain clearly significant despite controls for a number of characteristics of respondents and interviewers, and for a measure indicative of variations in the underlying network size within an interviewer's caseload.

Addditional controls or more precise estimates of the interviewer effects (the average interviewer caseload in the GSS sample that received the global size measure is only about 5 respondents) certainly might help to account for the remaining interviewer differences; that possibility cannot be excluded given the nonexperimental design of the GSS. Since, however, these differences remain evident despite the controls we have been able to apply, and since the previous survey research literature suggests that list-elicitation questions with a structure like that of a name generator are susceptible to large interviewer effects, it is reasonable to speculate on sources of interviewer behavior that might give rise to them.

The GSS "good friends" name generator imposes an affective criterion for friendship in asking respondents to name people they "feel close to." No interviewer specifications are provided as to what is meant by "good friend" or "feel close," so standard practice is to leave these definitions to respondents who understand them in varying ways (see Fischer, 1982b). Interviewer effects could arise, however, if respondents request clarification from interviewers on these terms, and interviewers supply more or less expansive definitions.

A second possibility is that interviewers vary in the extent of probing, as suggested by Groves and Magilavy (1986). The GSS name generator instrument studied here directs interviewers to make one probe after posing the main question. This probe might be omitted by some interviewers (especially if–without probing–a respondent produces the maximum number of names [5] to be used for the subsequent name interpreter questions), or additional unscripted probes might be added. Qualitative studies of transcripts of respondent-interviewer interaction would appear to be useful means of exploring whether these conjectures about sources of interviewer differences in name generators are correct.

Interviewer effects of the magnitude suggested by the analyses here are a nontrivial source of error in egocentric network measurement. Instruments should be administered such that differences in network size reflect respondent-level variations in network size rather than variations in how data are gathered. Assuming that sources of interviewer effects on such questions can be isolated, the question of how to limit them is important. Interviewer training is often recommended for accomplishing this (Billiet and Loosveldt, 1998); it is notable that the effects are evident here despite the extensive training of NORC interviewers and the high quality standards to which they are held. Groves and Magilavy (1986: p. 261) suggest interviewer guidelines specifying controlled feedback, limiting the verbal interaction of interviewers with respondents to a well-specified repertoire of probes and responses. They also suggest that computer-assisted interviewing to control the flow of questioning sequences may serve to limit interviewer effects.

An alternative approach, implemented in an organizational survey of networks involving name generators by Podolny and Baron (1997), is to eliminate interviewer variations entirely by using a fully computerized, self-administered instrument for measuring networks. Such an instrument could be part of an in-person interview administered via computer-assisted personal interviewing (CAPI). Whether it is possible to design a self-administered network elicitation instrument involving complex name generator questions that is workable for the diverse respondents in a household survey remains to be seen. In view of the evident variations in how interviewers administer name generators, however, it merits serious attention.

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Appendix: Measures of Explanatory Variables in Table 5

Descriptive statistics presented below refer to the set of 1445 respondents in the 1998 GSS sample to which the name generator instrument was administered. Units of analysis for statistics given for interviewer variables are therefore interviews rather than interviewers.

Respondent-level variables

Age. In years (mean, 45.64, standard deviation, 17.06).

Education. In years (mean, 13.23, standard deviation, 2.95).

Female. Dummy variable identifying the 54.7% of respondents who are women.

Health. Self-evaluated health status ranging from 1 ("poor") to 4 ("excellent"; mean 3.04, standard deviation, 0.83).

Retired. Dummy variable identifying the 14.5% of respondents who describe their working status as "retired."

Keeping house. Dummy variable identifying the 11.9% of respondents who describe their working status as "keeping house."

West. Dummy variable identifying the 19.1% of respondents living in the Mountain or Pacific regions.

Children. Square root transformation of respondent's number of children (mean, 1.11, standard deviation 0.79).

Nonwhite. Dummy variable identifying the 20.9% of respondents whose race is described as either "black" or "other."

Church attendance. Reported frequency of attending religious services, on a scale from 0 ("never") to 8 ("several times per week"; mean 3.63, standard deviation, 2.77).

Cooperativeness. Interviewer's rating of respondent on a scale from 1 ("hostile") to 4 ("friendly and interested"; mean 3.62, standard deviation 0.63).

Interviewer-level variables

Years experience. Interviewer's years of employment at NORC (mean, 3.47, standard deviation, 2.99).

Age. In years (52.18, standard deviation, 10.66).

Female. Dummy variable identifying the 89.6% of interviews conducted by female interviewers.

Nonwhite. Dummy variable identifying the 13.6% of interviews conducted by nonwhite interviewers.

Rank of interview. Ranking of interviews including name generator instrument conducted by interviewer, based on date of interview; interviews conducted on the same date have tied ranks (mean, 6.51, standard deviation, 5.89).

Table 1. Percentage Distribution of Network Size as Measured by the "Good Friends" Name Generator

Network Size	Percent
0	8.6%
1	11.6%
2	16.1%
3	13.3%
4	11.6%
5	32.7%
6 or more	6.2%
Total (N=1445)	100.0%

Source: 1998 General Social Survey

Table 2. Variance Component Models for Zero-order Interviewer Differences on Name Generator Measure of Network Size

Estimated parameter	Linear Regression estimates for original size scores	Linear regression estimates for rescaled size scores	Logit regression estimates with size as ordinal variable
Mean network size (μ)	3.339 (0.072)	0.006 (0.359)	[a]
Interviewer-level variance (σ_{υ}^2)	0.502 (0.097)	0.120 (0.024)	0.417 (0.091)
Respondent-level variance (σ_e^2)	2.771 (0.111)	0.724 (0.029)	3.29[b]
Intraclass correlation (ρ_{int})	0.153	0.142	0.112
(N)	(1424)	(1424)	(1424)

Note: Standard errors in parentheses.
Source: 1998 General Social Survey
[a] 6 constants/thresholds omitted to conserve space; available from author upon request.
[b] Respondent-level variance fixed at $\pi^2/3$ in ordinal logit regression model; see Snijders and Bosker (1999: p. 224).

Table 3. Variance Component Models for Zero-order Interviewer Differences on Global Measure of Network Size

Estimated parameter	Original Size Scores	Logarithm of Size Scores	Normally rescaled size scores
Mean network size (μ)	7.87 (0.563)	1.499 (0.039)	0.020 (0.036)
Interviewer-level variance (σ_{υ}^2)	10.08 (5.52)	0.047 (0.027)	0.046 (0.023)
Respondent-level variance (σ_{ε}^2)	217.5 (11.02)	1.058 (0.054)	0.889 (0.045)
Intraclass correlation (ρ_{int})	0.044	0.043	0.049
(N)	(917)	(917)	(917)

Note: all estimates are for linear regression models. Standard errors in parentheses.
Source: 1998 General Social Survey

Table 4. Multilevel Regression Estimates for Name Generator Measure of Network Size, Including Estimated Interviewer Effects on Global Measure

Estimated parameter	Linear Regression Estimates for original size scores	Linear regression estimates for rescaled size scores	Logit regression estimates with size as ordinal variable
Coefficient for estimated interviewer effect (β_1)	1.661 (0.712)	0.854 (0.353)	1.497 (0.701)
constant (β_0)	3.347 (0.071)	0.012 (0.353)	[a]
Interviewer-level variance (σ_u^2)	0.458 (0.093)	0.108 (0.023)	0.397 (0.089)
Respondent-level variance (σ_e^2)	2.769 (0.111)	0.724 (0.029)	3.29[b]
Intraclass correlation (ρ_{int})	0.142	0.130	0.108
(N)	(1399)	(1399)	(1399)

Note: Standard errors in parentheses.
Source: 1998 General Social Survey
[a] 6 constants/thresholds omitted to conserve space; available from author upon request.
[b] Respondent-level variance fixed at $\pi^2/3$ in ordinal logit regression model; see Snijders and Bosker (1999: p. 224).

Table 5. Multilevel Regression Estimates for Name Generator Measure of Network Size, Including Respondent- and Interviewer-level Covariates

Estimated Parameter	(a) Respondent-level covariates	(b) Interviewer-level covariates	(c) Respondent and Interviewer covariates	(d) All covariates, global measure, cooperativeness
Regression Coefficients:				
Age (R)	0.001 (0.004)		0.000 (0.004)	0.001 (0.004)
Education (R)	0.035 (0.017)		0.034 (0.017)	0.021 (0.017)
Female (R)	0.118 (0.095)		0.114 (0.095)	0.094 (0.096)
Health (R)	0.094 (0.059)		0.090 (0.059)	0.110 (0.059)
Retired (R)	-0.357 (0.170)		-0.353 (0.170)	-0.343 (0.171)
Keeping house (R)	-0.458 (0.154)		-0.460 (0.156)	-0.349 (0.156)
West region (R)	0.463 (0.159)		0.448 (0.161)	0.408 (0.159)
Square root # Children (R)	-0.098 (0.068)		-0.094 (0.068)	-0.123 (0.069)
Nonwhite (R)	-0.557 (0.123)		-0.571 (0.126)	-0.484 (0.126)
Church Attendance (R)	0.058 (0.017)		0.058 (0.017)	0.051 (0.017)
Years Experience (I)		0.031 (0.025)	0.038 (0.024)	0.048 (0.024)
Age (I)		-0.004 (0.007)	-0.004 (0.007)	-0.004 (0.007)
Female (I)		0.081 (0.243)	0.018 (0.235)	0.053 (0.234)
Nonwhite (I)		-0.274 (0.225)	-0.087 (0.220)	-0.145 (0.222)
Rank of Interview (R)		-0.006 (0.010)	-0.005 (0.009)	-0.000 (0.009)
Cooperativeness (R)				0.403 (0.080)
Estimated I effect				1.143 (0.678)
Constant	2.541 (0.328)	3.408 (0.454)	2.753 (0.593)	1.259 (0.606)
Variance Components:				
Interviewer-level variance	0.423 (0.086)	0.476 (0.094)	0.407 (0.085)	0.371 (0.080)
Respondent-level variance	2.591 (0.105)	2.771 (0.111)	2.591 (0.105)	2.539 (0.104)
Intraclass correlation	0.140	0.147	0.136	0.127
(N)	(1386)	(1413)	(1375)	(1339)

Note: Standard errors in parentheses. "(R)" indicates respondent-level variable, "(I)" indicates interviewer-level variable.
Source: 1998 General Social Survey.

NOTES

1. Data on interviewer assignments are not part of the cumulative GSS data files. These data were obtained directly from NORC. Because interviewer assignments are not routinely maintained as part of the GSS, there were some missing data on interviewer assignments and some evident recording errors (involving transpositions of digits in interviewer identification numbers). Cases with missing interviewer data were excluded from the analyses reported here, while reasonable imputations were made for recording errors. Data on interviewer characteristics were obtained from NORC personnel records. I am indebted to Tom W. Smith and Xiaoxi Tong for aid in acquiring these data.

2. A randomly selected two thirds of respondents in the second sample were asked to answer the global network size instrument.

3. The "good friends" name generator was also used in the 1988 GSS topical module on religion. In 1998, however, respondents were probed for as many as five friends; the 1988 module had an upper limit of three. Straits (2000: p. 129) reports an intraclass correlation of 0.17 for the "important matters" name generator, as administered by student interviewers to a sample of undergraduate students.

4. The public release file for the 1998 GSS does not include an indication of the number of friends named (like the variable "NUMGIVEN" in the 1985 GSS), nor did the questionnaire ask interviewers to tally the number. Hence network size was measured as the number of persons about whom a respondent provided any valid name interpreter data (about race, religion, or congregational membership)–assigning a value of "6+" when the interviewer noted that a respondent had provided more than five names.

5. A likelihood ratio test of the null hypothesis that $\sigma_\upsilon^2=0$ rejects it decisively ($X^2= 90.4$, 1 d.f.).

6. The transformation is based on the ranks of the scores; see Rasbash, Goldstein, Browne, Yang and Woodhouse (2000: pp. 24-25). The score of rank i is assigned the normally equivalent deviate of $\Phi^{-1}([i-0.5]/n)$, where Φ^{-1} is the inverse cumulative normal distribution function and n is the sample size. Ranks for tied scores are averaged, so that–for example–the 124 scores of 0 in Table 1 are assigned rank 62.5 (=[1+124]/2) and normally equivalent deviate -1.72.

7. Ordinal logit regression estimates were obtained using a marginal quasilikelihood criterion and a first-order Taylor expansion.

8. The number of cases in Table 4 is smaller than that in Table 2 because some interviewers who conducted interviews using the name generator measure of network size did not conduct any using the global measure. The estimated interviewer effect included as a covariate in regression (2) is based on the normal-equivalent deviate rescaling of the global measure, since those estimates were more highly correlated with the name generator than the estimates based on the original or logarithmic scales for the global measure. These estimates were therefore the most likely of the three possibilities to account for interviewer differences in the name generator measure of size.

9. The regression analyses of Table 5 were also conducted using a normal-equivalent deviate rescaling of network size, and via ordinal logit regression. Those analyses lead to the same conclusions as those drawn from Table 5, and to conserve space they are not reported here.

10. The estimates are available upon request.