Metodološki zvezki, Vol. 5, No. 2, 2008, 127-143

Measuring Ego-centered Social Networks: Do Cheaper Methods with Low Respondent Burden Provide Good Estimates of Network Composition?

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Abstract

In measuring ego-centered social networks, two general approaches can be distinguished. A very simple way to evaluate membership in a social network is to ask an ordinary survey question where response categories are types of relationships (e.g., partner, parents, children, friends, etc.). This approach is very appealing as it saves time and money. However, information obtained by this approach is very limited.

Most often, when evaluating ego-centered networks, the name generator approach is used. The list of egos (respondents) is obtained in the first step. In the second step, existing ties are identified - all alters with whom the focal ego has some sort of relationship. When all ties have been identified, the contents and the characteristics of ties are assessed. In most cases the characteristics of the alters are also measured. The name generator approach yields more data and is also of higher quality. However, it is very time and money consuming, and it requires either considerable effort from respondents, when it is applied in self-administered mode, or complex coordination between interviewer and respondent, when it is applied in personal interviews (e.g., Kogovšek et al., 2002).

In a series of studies, network composition was estimated using both approaches. Test-retest and split-ballot experiments on convenience samples of respondents were used to assess the stability of network composition. Findings are discussed with regard to survey complexity, respondent burden, costs and quality of network composition estimates.

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1 Introduction

There are a number of different approaches to measuring social networks. Social networks have been measured by the interaction approach (e.g., Bernard et al., 1982), the affective approach (e.g., Antonucci, 1986), the exchange approach (e.g., McCallister and Fischer, 1978; Burt, 1984; van der Poel, 1993), the role relation(ship) approach (International Social Survey Programme 1987 and 2001), the position generator approach (e.g., Lin et al., 2001) and similar to the latter, the resource generator approach (e.g., Van Der Gaag and Snijders, 2005). Some of these approaches are frequently combined with the name generator approach for eliciting the names of network members, for instance exchanges of social support (e.g., McCallister and Fischer, 1978; Burt, 1984) or measuring networks of important people (e.g., Antonucci, 1986). All approaches have specific advantages and disadvantages and each of them may be useful and appropriate for specific research purposes. In this paper we focus on comparing the name generator and the role relation approach (the motivation for comparing precisely these two approaches is given in Section 2).

The main advantage of the name generator approach is that it usually delivers very detailed information about concrete network members and the characteristics of ties with them. Therefore, relatively accurate estimates of network characteristics, such as network composition, are also possible. On the other hand, such network data collection may be quite burdensome for the respondents, especially in the case of rather large networks, owing to the free recall format of eliciting the names in a self-administered mode (e.g., see Lozar et al., 2004), or the need for complex coordination between interviewer and respondent when it is applied in personal interviews (e.g., Kogovšek et al., 2002). Collecting a larger amount of such data may therefore be quite expensive and time consuming, an outcome which is especially undesirable in the case of larger studies, of which network data are only one part. Additionally, it may be quite sensitive, since at least some respondents may be reluctant to give names of actual persons and provide personal data about them or relationships with them.

In contrast, the role relation approach, where network members are represented only as role relationships, only the first few important persons are obtained[3] – and that with the help of a showcard with possible role relations listed – is cheaper, simpler to administer and less burdensome for respondents. On the other hand, because of the specific response format, less precise information on network members is obtained, and estimation of different network characteristics is

[3] Typically (e.g., ISSP 1987 and 2001, our study), the two most important persons are obtained. Of course, other options (e.g., obtaining only one person or more than two persons) are possible.

therefore limited. With the role relation approach, unique identification of persons is possible only for "unique" role relationships, such as the partner. With other role relationships, multiple actual persons cannot be distinguished (e.g., friends, children or siblings). If each possible role relation is regarded functionally, this approach poses no particular limitation. However, estimation of the network composition, a frequent practice in social network analysis, is limited, since we do not possess information about the number of children, siblings and so on. Thus, the proportion of different types of relationships (e.g., whether the personal network is primarily kin- or friend-oriented) cannot be estimated directly.

2 The aim of the paper

In substantive research, one of the commonly used variables is network composition; therefore, the motivation for this paper was to evaluate to what extent network composition obtained by the role relation approach is close to the "true" network composition. We try to achieve this by comparing the role relationship to the name generator approach, which measures the network relatively thoroughly and is, for this reason, taken as a sort of "baseline" for comparison.

The motivation for comparison of these two approaches stemmed from a piece of substantive comparative research on social support networks of the elderly in Slovenia before and after the transition from the socialist, planned economy to the democratic, market economy system. In that study, two secondary data sets were available. In the 1987 (before transition) data set, social support networks were mostly measured by the role relation approach (the first two most important support providers),[4] and in the 2002 (after transition) data set, the name generator approach was used (no limitation in the number of named alters). Our first research question in this research was, to what extent these two data sets are comparable, given the differences in the methodology for measuring support networks. In the next two sections, the results are presented from two data comparability studies, that we performed to gain insights into this problem.

These two approaches were already compared from the methodological point of view within *The Groningen Social Network, Support and Health Study* (van Sonderen et al., 1990; van Groenou et al., 1990), where the exchange and affective (adapted from Kahn and Antonucci, 1980) approaches, in combination with the name generator and role relation approaches, were used.

Among other results, Van Sonderen et al. (1990) found that, considering all the names obtained with the three combined approaches together, the most names were obtained by the exchange approach (78% of all names), followed by the affective

[4] With the exception of discussing important personal matters, where the the well-known Burt name generator was used. For details, see Section 3.1.

approach (49% of names) and the least by the role relation approach (34% of names). The exchange and affective approaches, compared to the role relation approach, elicited the most siblings and parents and almost all partners and children. The exchange approach is more likely to elicit mother-in-law, father-in-law, neighbors and co-workers, with whom the respondent is in frequent contact. If the authors left out the names obtained by the affective approach, the total number of alters was lower by 6%, whereas leaving out alters obtained by the exchange approach resulted in the total number of alters being 20% lower. With the exchange approach, compared to the affective approach, there is a greater probability of eliciting the most important role relations, but both are equally good in eliciting relations that last a long time. All partners and most children and parents were obtained by both approaches, whereas other role relations are elicited mostly by the exchange approach. Despite differences among approaches, the overlap is considerable: 54% of names from the role relation approach overlap with names from the affective approach, and 68% with names from the exchange approach; 73% of the affective network overlaps with the exchange network, and 46% of the exchange network overlaps with the affective network.

Van Groenou et al. (1990) studied test-retest reliability on the same data. Overlap in names between two measurements was 88% in the role relation approach, 78% in the affective approach and 74% in the exchange approach. Difference in average network size was not significant with any of the approaches. With the role relation approach, reliability is greater for fixed roles (more than 90%), whereas it is lower (but still relatively high - 76 to 82%) with flexible roles (co-workers, neighbors). Considering all network generators[5] in the exchange approach together, reliability is relatively high; on the other hand, individual network generators show relatively low reliability. In general, it seems that the type of network affects test-retest reliability. If the researcher is interested in a relatively large network with different types of role relations, the exchange approach seems to be the most suitable. The affective approach reliably elicits close kin, but less so other types of relationships. The role relation approach obtains specific parts of the network, but measures these very reliably.

One of the possible effects that one must take into account when designing methodological experiments is method order effect. Studies on attitudinal data (Scherpenzeel, 1995), as well as on network data (e.g., Ferligoj and Hlebec, 1998, 1999; Kogovšek, 2006), have shown that the data collection method presented first produces data of lower quality than data collection methods used in subsequent measurements. The explanation is that respondents become familiar with the data collection method after the first measurement and can therefore provide more reliable and more valid answers on a later occasion. In our case (Study 2, see

[5] The term *network generator* is used for any kind of a question that generates a social network. We use this term to distinguish it from the more specific term *name generator*, where

Section 4) we dealt with this problem by using a 2x2 design, where each of the two compared data collection methods was used as both the first and the second method.

Another factor affecting the characteristics of measured networks in Study 1 could be the different data collection methods used (personal interview, computer-assisted telephone interview). For instance, because of the characteristics of telephone communication, respondents might name fewer network members in a telephone interview than in person. However, some studies show that there were no large differences, either in network size or in network composition, between data obtained by computer-assisted telephone interviews or computer-assisted personal interviews (Kogovšek et al., 2002) or when computer-assisted telephone interviews and web interviews were used (Kogovšek, 2006). However, we decided to use the same data collection method (personal interviews) in Study 2 to control for the possible effects of different data collection methods.

In the next two sections, the design, data and results of our two studies on the comparability of the name generator and role relationship approaches are presented.

3 Study 1

In the first study only limited comparisons of two approaches were possible. For the name generator approach, all information was taken into account, and estimates of network composition were computed. Since detailed data were collected without any limitations placed on the respondents, it could be considered as a good estimate of the »real« network. Therefore, the name generator approach was used as baseline, a standard of comparison for the role relation approach. Details of the study are presented below.

3.1 Design and data

In Study 1 data sets from two studies were used. The first was *The Stratification and Level of Living Survey in Yugoslavia* (1987), conducted by personal interviews on a representative sample of 2241 residents of Yugoslavia (only 289 from the Slovenian subsample were used in our study). The second was *The Social Support Networks of Residents of Slovenia* (2002), conducted by computer assisted telephone interviews on a random sample of 5013 telephone users.[6]

names of concrete persons are elicited, as opposed to, for instance, the role relation approach, where persons are given only as role relations.

[6] For detailed information, see Hlebec and Kogovšek (2005).

Preliminary studies on those data (Hlebec and Kogovšek, 2005) have shown that, owing to differences in question wording, only the first listed person was measured equivalently across both approaches, and only three network generators had comparable wording to any great extent. Alternative indicators of support network composition were tested on data obtained via the name generator approach (only the first listed alter was taken into account for the role relation approach).

The network generator questions used in this study were as follows:

1. 1987: Suppose you needed to borrow a large sum of money. To whom would you turn first for help? To whom would you turn second?
   2002: Suppose you found yourself in a situation when you needed a large sum of money, but did not have it yourself at the moment, for instance five average monthly wages (approximately 500.000 tolars). Whom would you ask to lend you the money (a person, not an institution, e.g. a bank)? (instrumental support).
2. 1987: Suppose you had the flu, and you had to stay in bed for a few days and needed help around the home, with shopping and such. To whom would you turn first for help? To whom would you turn second?
   2002: Suppose you become seriously ill, or you are generally very weak and could not leave home, for instance to do the shopping or to fetch medicine from the pharmacy. Who are the people you usually ask for this kind of help? (instrumental support)
3. 1987: From time to time, most people discuss important personal matters with other people. Looking back over the last six months, who are the people with whom you discussed an important personal matter? Please just tell me their first names or initials.
   2002: From time to time, most people discuss important personal matters with other people, for instance if they quarrel with someone, when they have problems at their work, family problems or similar. Who are the people with whom you usually discuss personal matters that are important to you?) (emotional support)

Next, alternative indicators of network composition for the role relation approach were defined in the following way. Only the first listed person was taken into account for the role relation approach. For example, given the three social support types together, a person can list from 0 to 3 persons, which we consider as an estimation of network size. Any person (role relation), for instance, friend, may also be selected from 0 to 3 times (n). Therefore the percentage of friends in the network may be estimated as follows:

$$\% \text{ friends} = n/\text{network size}*100.^{7} \qquad (3.1)$$

[7] The formula is valid when, as in this paper, we are dealing with egocentered networks, where the ego is not counted in the overall network size. If we dealt with network composition in complete networks, one (the ego) should be subtracted from the network size. In this case the formula would be: % friends = n/(network size-1)*100.

3.2 Results

The results in Table 1 show that limitation to the first named person gives similar estimates of network composition measures. However, the percentage of partners in the network is overestimated in the role relation approach, which could be explained by respondents' tendency to name a partner as the first alter. Also, network size in the role relation approach tends to be underestimated.

Table 1: Comparison of network composition between role relation and name generator approach (in %).

	Role relation		Name generator	
	Mean	Std. Dev.	Mean	Std. Dev.
Partners	31.6	34.8	22.1	26.0
Parents	14.6	26.4	13.8	22.6
Children	10.8	24.6	12.9	23.6
Siblings	8.6	20.7	9.2	18.4
Extended family	6.4	17.8	8.4	18.0
Friends	21.1	30.1	24.1	28.7
Co-workers	3.0	12.3	3.7	12.3
Neighbors	3.7	14.4	4.2	13.5
Network size (average)	2.6	0.7	3.4	1.8

Table 2: Pearson correlation coefficient between social composition indicators measured by role relation and name generator approach.

Composition indicator	Pearson correlation
Partners	.823
Parents	.850
Children	.797
Siblings	.831
Extended family	.811
Friends	.842
Co-workers	.823
Neighbors	.846
Average network size	.329

In addition, Pearson correlation coefficients between social composition indicators measured by both approaches in Table 2 show a relatively high correspondence, with the exception of network size.

Although the results of the first study on the comparability of the role relation and the name generator approach showed relatively promising results, there were a number of limitations:

- both role relationship and name generator data were calculated on the basis of name generator data; it is therefore possible that respondents facing the role relationship questionnaire would perceive the questions and answer them in a different way;
- a limited selection of support questions;
- limitation to the first named person in the role relation approach.

Therefore, a decision was made to design an experiment with repeated measurements on the same respondents with a larger selection of support types and the same question wording of network generators, in order to overcome at least some of the limitations of the first study. This experiment is described in the next section.

4 Study 2

4.1 Design and Data

In the study, a simple 2x2 experimental design was used, as shown in Table 3.

Table 3: Design of the study.

	N	**Wave 1**	**Wave 2**
Group 1	120	Name generator	Role relation
Group 2	112	Role relation	Name generator

Data were collected on a quota sample of 232 respondents in two waves by the students of the Social Network Analysis course at the Faculty of Social Sciences in Ljubljana in October and November 2006. Each student interviewed him/herself and five additional respondents of his own choosing. The quotas were designed so that half of the respondents had to be male and half female, and within these two groups one in each of the three age groups (20-29, 30-49 and 50+ years of age). The interval between the two measurement waves was two weeks.

Three types of social support were measured with six network generators:

1. Some tasks in the apartment or in the garden cannot be done by a person him/herself. It may happen that you need someone to hold the ladder for you or help you move furniture. Whom would you ask for help? (instrumental)

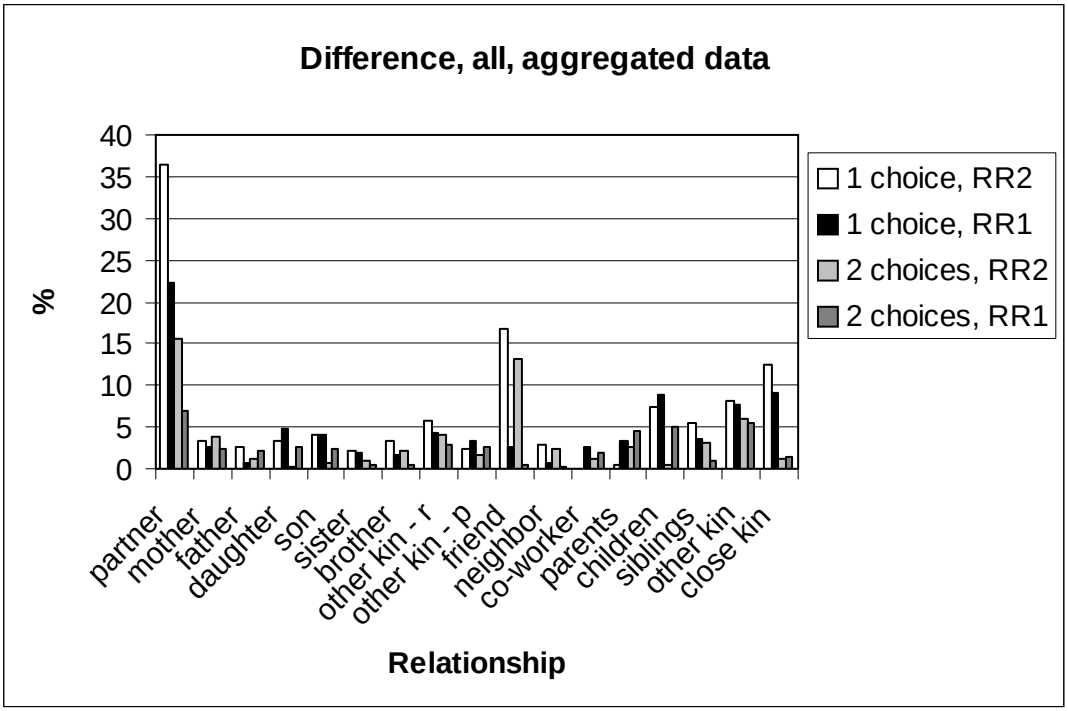
2. Say you have the flu and have to lie down for a few days. You would need help with various household tasks, shopping and so on. Whom would you ask for help? (instrumental)
3. Now imagine you needed to borrow a large sum of money. Whom would you ask for help? (instrumental)
4. Say you have problems in the relationship with your husband/wife/partner, which you cannot solve on your own. Whom would you ask for help? Even if you are not married and do not have a partner, try to answer what you would do in such a case. (emotional)
5. What about a case when you felt a little blue or depressed and would like to talk to someone about it? Whom would you ask for help? (emotional)
6. Say you need advice with regard to an important life decison, for instance getting a job or moving to another place. Whom would you ask for help? (informational)

In the case of the name generator approach, a respondent could name as many persons as he/she wanted. Additionally, information on the type of the relationship was collected for each named person (e.g., partner, friend or neighbor). In the role relation approach, respondents were asked for the two most important support providers (whom they would ask for help as the first and whom as the second). They answered with the help of showcards, where types of role relationships were provided (e.g., partner, mother, father, son or brother).

4.2 Results

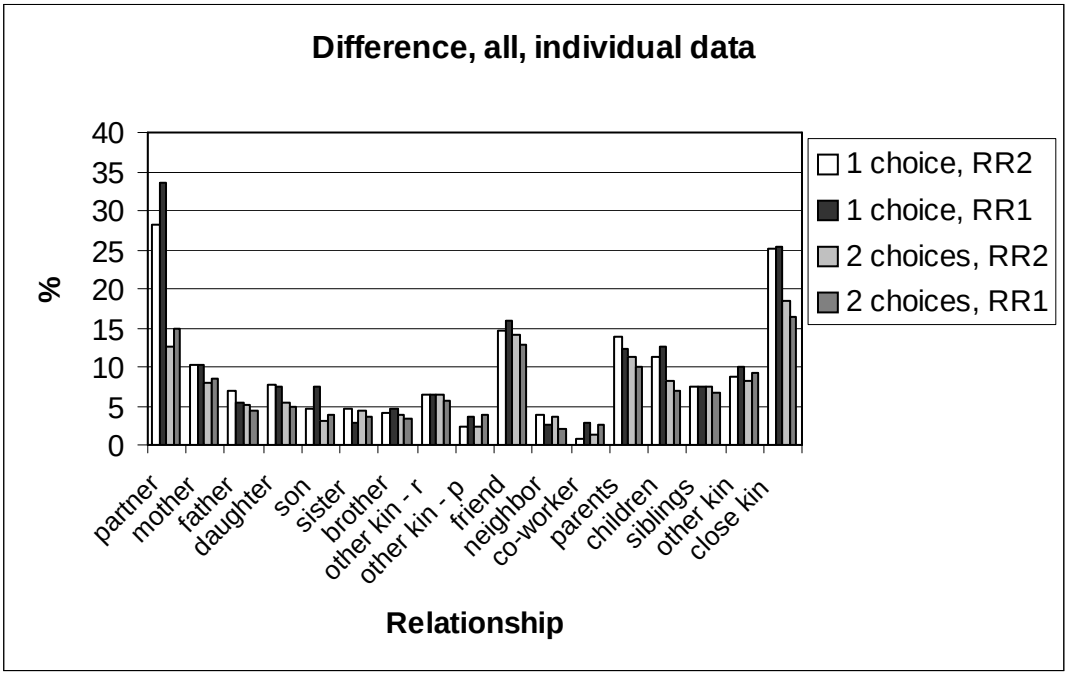
In the following graphs, differences in network composition between the two approaches are shown. Differences were calculated in two ways:

- in what we call “aggregated” data (which was also used in Study 1): first, the average percentage of each role relationship was calculated across all respondents, for each approach separately, and then differences in percentages were calculated between the approaches;
- in what we call “individual” data: first, for each respondent, differences between the two approaches were calculated for each role relationship, followed by averaging the differences across all respondents and comparing them between the two approaches.



Labels: RR1– role relationship used in first measurement, RR2 – role relationship used in second measurement; 1 choice – 1 choice used in role relationship, 2 choices – 2 choices used in role relationship

Figure 1: Differences in network composition for all support types, on aggregated data.



Labels: RR1 – role relationship used in first measurement, RR2 – role relationship used in second measurement; 1 choice – 1 choice used in role relationship, 2 choices – 2 choices used in role relationship

Figure 2: Differences in network composition for all support types, on individual data.

These calculations were done separately for the following:

- all types of support together and separately,[8]
- with one or both choices in the role relation approach,[9]
- both groups of respondents (to see whether there is any method order effect).

Figures 1 and 2 show differences in percentages between the two approaches, separately for one or both choices and role relation used in first or second measurement. Figure 1 shows differences on aggregated data and Figure 2 on individual data.

On the level of aggregated data, it can be seen that the differences are relatively small, except for partner, friends, children and close kin, for which they range between about 10% (close kin) to more than a third (partner). For individual data, the differences tend to be in general larger than for aggregated data for all types of relationships, but again partner, friends, children, parents and close kin emerge as the most prominent (again, ranging from 15% to about a third). In short, the largest differences are found for the most important relationships. Such a finding is to be expected, given that social support is usually provided by the people most important to us and that most roles tend to include more than one person (e.g., friends, siblings). Therefore, strong limitations (such as the limit of two persons only) may produce relatively large omissions of important persons and consequently large errors in network composition estimates. Weak relationships (e.g., neighbors, co-workers) are not very likely to be chosen in any of the approaches, therefore reducing the possible level of error.

5 Discussion and conclusions

In general, the following observations on differences can be made:

- there are larger differences on the individual level than on the aggregated level;
- there are larger differences with only one choice taken into account;
- there are larger differences for the most important relationships (especially partner and friend, but also close kin);
- there seems to be no systematic effect from the method order; the differences are much larger when comparing network composition estimated on one or two choices than comparing it with role relationship being administered in the first or in the second measurement.

[8] Figures showing results for individual support types separately are in the Appendix.

[9] With the exception of calculations for each support type separately, where calculating network composition on one choice only did not seem to be of much use; therefore, calculations were done on both choices only.

Similar conclusions also hold for different support types separately (shown in Figures 3 to 8 in the Appendix).

From the results of the studies so far, it can be seen that, to a limited degree, data from role relation and name generator approaches may be used in comparisons. Though comparing calculations on aggregated data and on both choices is advisable, great caution is still needed in interpretation.

Some ideas for further research are as follows:

- To do a study on a probability representative sample.
- Controlling for method order effect was built into the design of Study 2, and the results show no clear support of the effect in line with previous studies. However, in our study this effect was studied only on the level of simple percentage comparisons. In future, the effect could be studied more systematically and thoroughly by, for instance, using a split ballot MTMM design (e. g. Saris et al., 2004; Kogovšek, 2006). Such a design would also permit studying the reliability and validity of measurement by each of the approaches.
- Since it seems that the network composition of the role relation approach approaches that based on the name generator approach with more possible choices, we might want to test the comparability of the role relation approach to the name generator approach with more than two choices. On the other hand, one must bear in mind that by increasing the number of choices, the respondent burden also increases, therefore losing one of the comparable advantages of the role relationship approach over the name generator approach.
- One possibility is to test the two approaches with either no limit on the number of named persons or the same limit in both of them. Additionally, the difference was also that, in the role relation approach, the respondent was asked to rank the persons to whom he/she would turn *first* and to whom *second*, whereas in the name generator approach, persons could be named in any order.
- Another difference that might be interesting to test is that, in the case of the name generator approach, the free recall method was used, whereas in the role relation approach, a kind of recognition method was used (respondents' memory was assisted by providing them with showcards with role relationships listed).
- Another possibility for detecting what kind of response strategies might lie behind the two approaches and different methodological formats used therein is to use qualitative methods (e.g., different forms of cognitive interviews) to see how respondents come up with an answer. With these methods, we might also try to figure out to what extent we are tapping into the same network with these two approaches.

- In this paper results are presented for all support types together and for each support type separately. Another useful possibility would be to aggregate networks of similar support types and compare results. Additionally, since different substantive studies (with regard to their specific research goals) measure different combinations of support types, it would be useful to check the comparability of the two approaches in this sense, e.g., the size of the differences between the two approaches if one measures minor help in household, discussing important personal matters and seeking advice at times of major life changes as opposed to seeking advice or support in the case of an illness and social companionship.

Acknowledgments

The authors would like to thank the anonymous reviewers, Filip Agneessens, Anuška Ferligoj and Keming Yang for valuable comments on earlier drafts of the paper.

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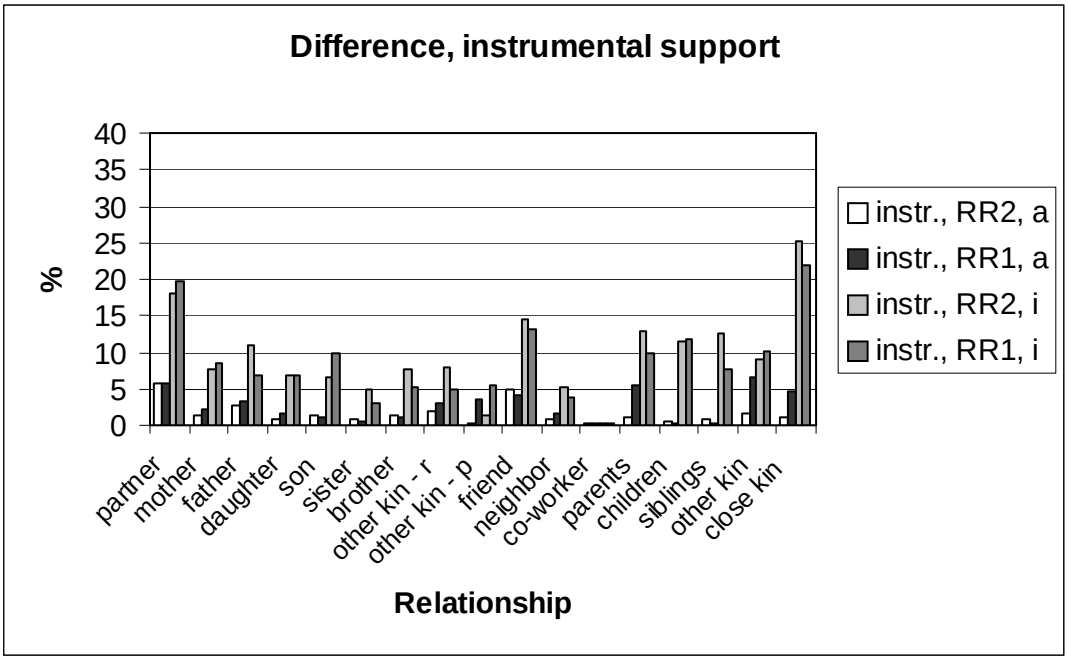
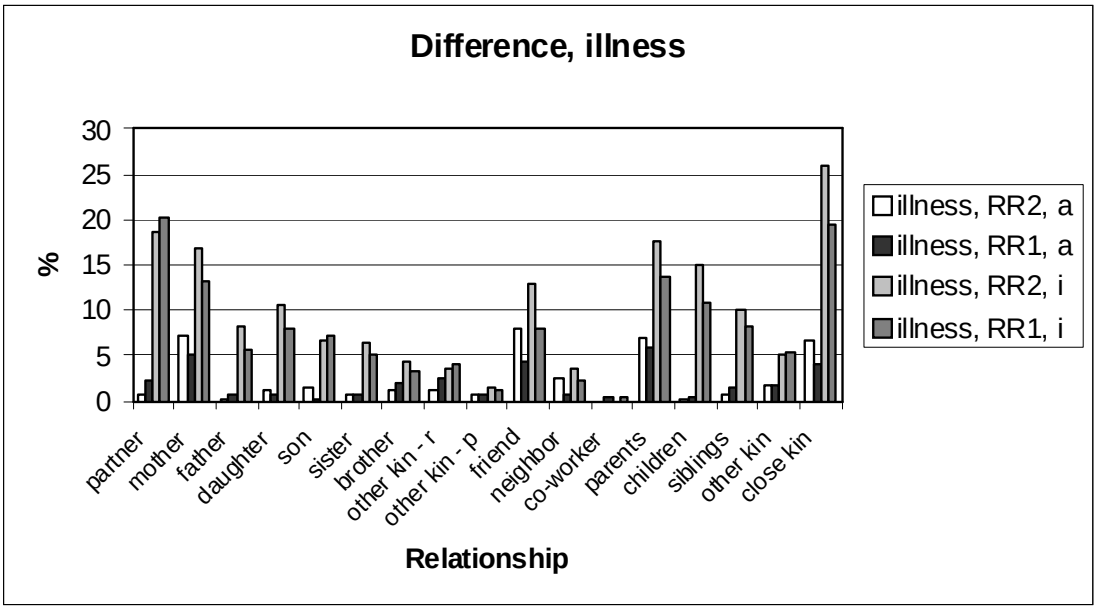
Appendix: Differences in network composition for different support types separately



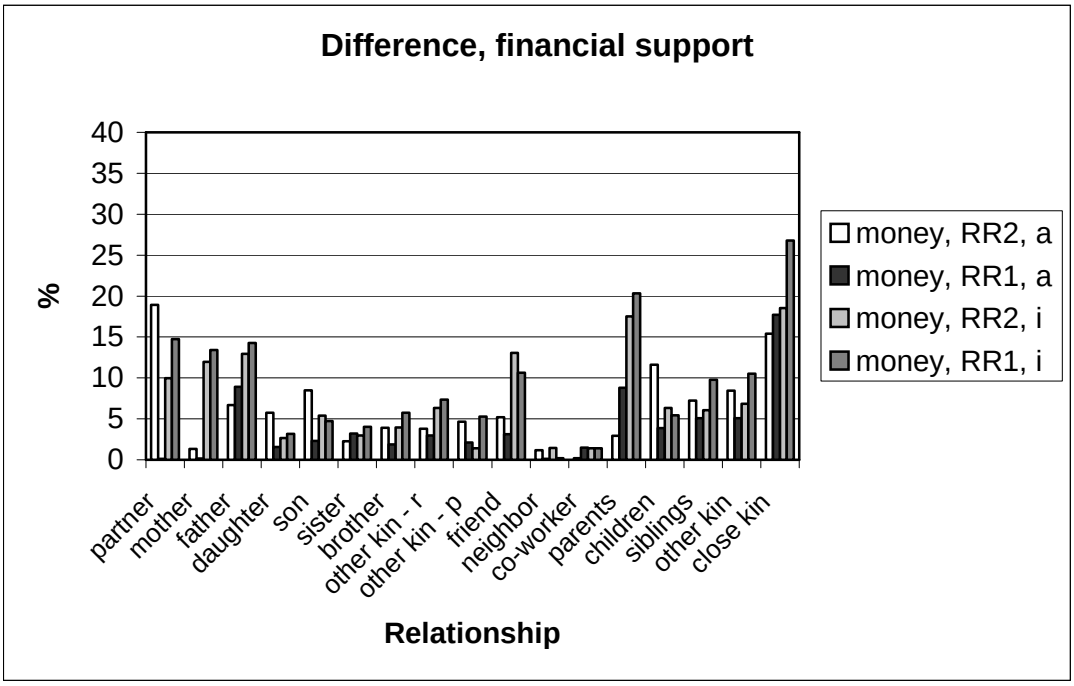
Labels: RR1 – role relationship used in first measurement, RR2 – role relationship used in second measurement; a – aggregated data, i – individual data

Figure 3: Differences in network composition for instrumental support (minor help in household).



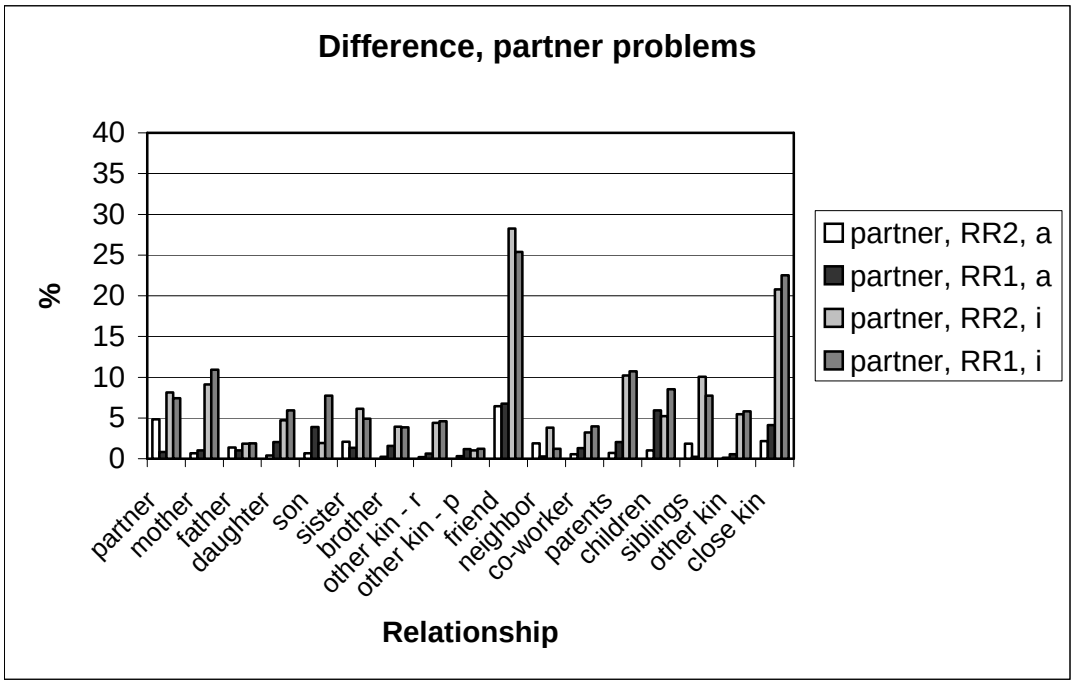
Labels: RR1 – role relationship used in first measurement, RR2 – role relationship used in second measurement; a – aggregated data, i – individual data

Figure 4: Differences in network composition for support in the case of an illness.



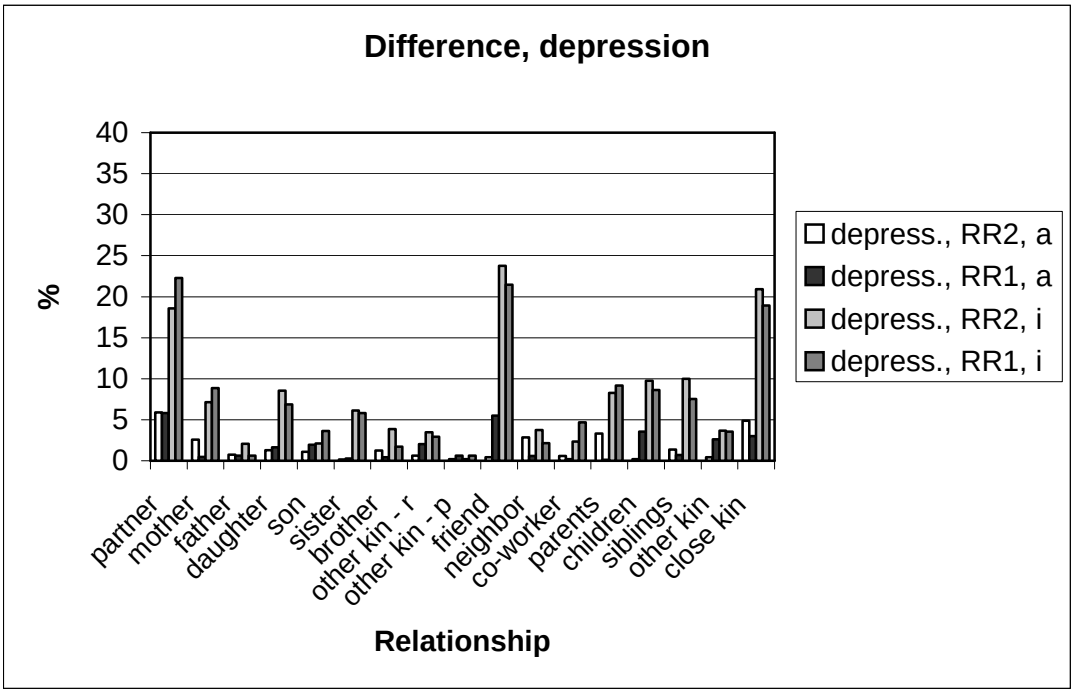
Labels: RR1 – role relationship used in first measurement, RR2 – role relationship used in second measurement; a – aggregated data, i – individual data

Figure 5: Differences in network composition for financial support (borrowing a large sum of money).



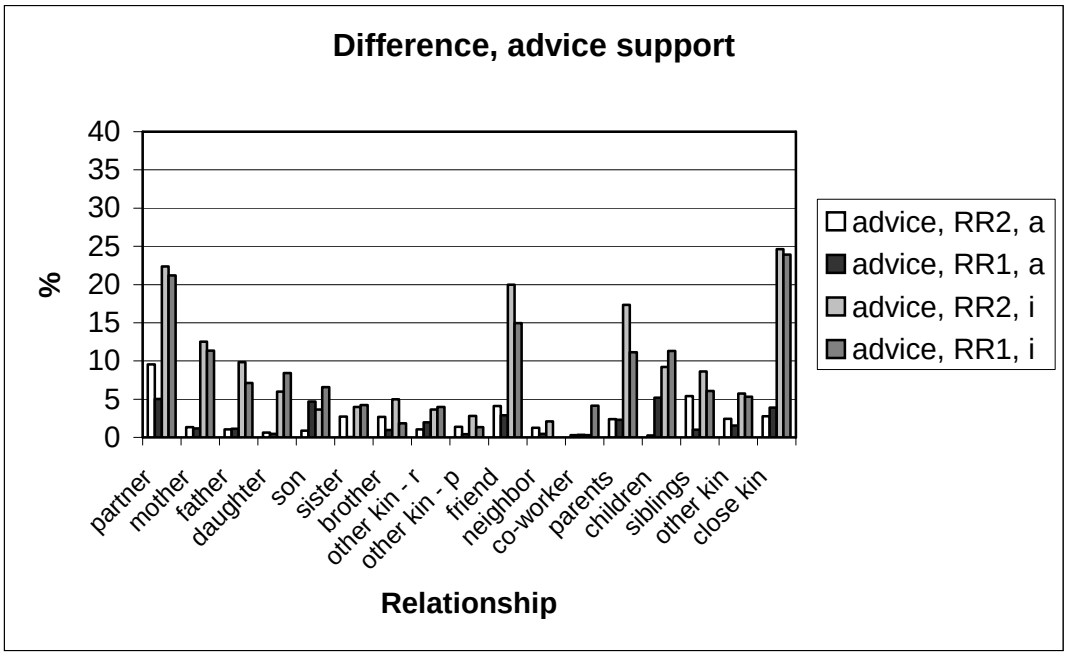
Labels: RR1 – role relationship used in first measurement, RR2 – role relationship used in second measurement; a – aggregated data, i – individual data

Figure 6: Differences in network composition for support in the case of problems with partner.



Labels: RR1 – role relationship used in first measurement, RR2 – role relationship used in second measurement; a – aggregated data, i – individual data

Figure 7: Differences in network composition for support in the case of depression.



Labels: RR1 – role relationship used in first measurement, RR2 – role relationship used in second measurement; a – aggregated data, i – individual data

Figure 8: Differences in network composition for informational support (job seeking, moving to another place).