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The Measurement of Reciprocity in Ego-Centered Networks of Personal Relationships: A Comparison of Various Indices*

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This article deals with the reciprocity of social support in personal relationships and with its connection to well-being, particularly loneliness. After reviewing briefly the concept of reciprocity, we develop four methods for constructing indices of the reciprocity of social support based on data on ego-centered networks of personal relationships. The four indices showed that on the average, the respondents' relationship networks were strongly reciprocal. The results did not make it unequivocally clear whether overbenefiting (versus underbenefiting) and loneliness were linked via a U-shaped association, as suggested by the literature, or via a linear or inverse U-shaped association. The use of more specific indices is recommended for a more extensive investigation of the association between reciprocity and loneliness.

The support that people receive from their personal relationships is an important factor in their well-being. There are several reasons, however, to believe that not only the extent to which people receive support is important, but also the extent to which support exchanges are reciprocal. Giving more than one receives may lead to feelings of exploitation, unfairness, and resentment. Giving too little may lead to feelings of guilt or shame (DiMatteo and Hays 1981; Homans 1961). A lack of reciprocity also promotes power differences in relationships, which can cause feelings of dependence and can lead to the termination of a relationship (Blau 1963; Fisher and Nadler 1976; Johnson 1988). Reciprocity within a relationship is seen as an indicator of the highest level of intimacy (Levinger 1974). Thus it might be expected that a lack of balance, whether it involves more giving or more receiving of support, is associated with relatively low levels of

well-being (Walster, Walster, and Berscheid 1978).

Most research has focused on the balance in relationship dyads. Rook (1987) is one of the few researchers to have examined the association between reciprocity within ego-centered personal networks and well-being. In her study of older widows, Rook used the "Fischer Method" (Fischer 1982; McCallister and Fischer 1978) to study exchanges of support at the relationship level. In this method, respondents are asked from whom they receive support and to whom they give support. Distinctions are drawn between a number of supportive aspects, such as discussing problems and helping with household chores. Rook aggregated the exchanges at the relationship level to a measure of the reciprocity at the network level. For each exchange item, she assigned a score of 1 if the respondent mentioned at least one person and a score of 0 if no one was mentioned. A network is characterized by reciprocity if support is given for as many aspects as it is received. Rook's research showed that a pattern of asymmetrical exchanges between older widows and members of their social networks was associated weakly with greater feelings of loneliness ($r = .16, p < .05$), regardless of the direction of the asymmetry (a U-shaped association between overbenefiting as opposed to underbenefiting, in relationships and loneliness). Furthermore, Rook noted a weak correlation for the linear

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association between overbenefiting and loneliness ($r = -.08, p > .05$).

The operationalization of the reciprocity concept used by Rook (1987) is not the only option. It is unclear whether different operationalizations of reciprocity influence the conclusions concerning the association between reciprocity at the network level and well-being. The aim of this research note is to review alternative approaches briefly and to compare their validity by testing the correlation between reciprocity and loneliness. Loneliness is generally found to be linked with depression, and can be seen as an indicator of a lack of psychosocial well-being at the relationship network level (Peplau 1985). Before discussing possible ways of operationalizing reciprocity, we will outline the concept of reciprocity.

Adopted Approach to Reciprocity

Following Gouldner (1960), we define reciprocity as the degree of equality or comparability, within a certain period of time, of the supportive actions performed for and by an individual. The following observations can be made: 1) Reciprocity addresses the factual giving and receiving between two persons in one shared dyad. In principle, each of the participants in the dyad can assess the factual exchanges in the same way. In this research note we focus on only one participant and assume the veridicality of respondents' reports about the actions between the two participants. This assumption is questionable, however (Antonucci and Israel 1986). If veridicality does not exist, reciprocity must be determined from the view of both participants. 2) Reciprocity can be measured only insofar as supportive actions are directed from one person to another. Thus the degree of reciprocity cannot be measured for such behavior as the provision of companionship. Companionship is generally beneficial to both participants in a relationship; it does not involve behavior directed from one person to another. 3) In accordance with the exchange perspective, we do not adopt the conceptualization of reciprocity in which the relationship is assessed in global terms. Jones and Moore (1989) asked their respondents whether each of the members of their networks valued the relationship as much as they did. The answers to questions like this do not allow one to assess the effect on loneliness of being

underbenefited or overbenefited in personal relationships. 4) It remains unclear to what extent inputs and outputs must be comparable so that we can assess whether they are balanced. According to Gouldner (1960), comparability is not a necessary prerequisite. In our view, the inputs and outputs must be roughly the same in degree of supportiveness. We define support as factual transactions or interactions in a relationship, perceived by the provider or the recipient as intended to enhance the recipient's well-being (Shumaker and Brownell 1984; van Tilburg 1988). Rook (1987) suggested that it is useful to draw distinctions between reciprocity in the fields of emotional support, instrumental support, and social support. 5) The distinction has been drawn between direct and indirect reciprocity (Ekeh 1974). Direct reciprocity refers to an exchange between two participants in a relationship. Indirect reciprocity refers to triangular exchanges within a network of relationship participants (e.g., A gives to B, B gives to C, and C gives to A). In this research note, we are concerned with direct reciprocity.

Operationalizations of Direct Reciprocity

Operationalizations of reciprocity at the network level can vary greatly in their level of generality. They differ in the extent to which use is made of information about the exchanges in various relationships. We will describe a number of indices, going from those involving the most general to those involving the most specific information. In doing so, we confine ourselves to operationalizations based on data gathered by the Fischer method, whereby respondents are asked which persons receive and/or give specific kinds of support. To avoid complicating the analysis, we will devote no attention to operationalizations based on various types of relationships (e.g., communal or close versus exchange or nonclose relationships; Clark and Mills 1979).

The first operationalization is that used by Rook (1987). She determined whether specific kinds of support were given to one or more network members and whether these kinds of support were received from network members. In her view, a network is reciprocal if as many kinds of support are received as are given. Individuals overbenefit from their network if more kinds of support are received

than are given; they underbenefit if more kinds of support are given than are received. Rook's operationalization can be viewed as a form of summated or total reciprocity. It has certain advantages over an operationalization based on questions that require respondents to assess reciprocity for an entire network without considering each relationship separately. If this reciprocity approach for a global network is followed, no distinction can be drawn between direct and indirect reciprocity. It is also doubtful whether respondents are capable of generalizing the reciprocity adequately within various relationships to such an abstract concept as the reciprocity within the entire network (van Yperen and Buunk 1988). Summated reciprocity, as used by Rook, is probably a more reliable and valid measure because more information about the exchanges in the network is gathered and used in the measurement instrument.

Rook's instrument draws no distinction between cases in which one network member is named and those in which two or more network members are named. Her measure of total network reciprocity, based on the dichotomized scores of the number of relationships mentioned in answer to the exchange questions, starts from the notion of compensation in a network: the fulfillment of a certain supportive need is important for individual well-being, and it does not matter who or what number of persons contributes.

Another approach assumes additivity in relationships: each supportive action increases the social support available to a person (Cantor 1979; van Tilburg 1990). Focal to this assessment of reciprocity is the number of network members who give or receive a specific kind of support, rather than whether this kind of support is given by or to any of the network members. A measure of total reciprocity based on the raw scores of the number of persons who give or receive support is consistent with this approach. This index uses more information about the exchanges in the network than does Rook's.

The above-mentioned operationalizations measure reciprocity at the level of the total network. They do not consider the reciprocity within single relationships to be a necessary prerequisite for a reciprocal network of relationships. These operationalizations can have disadvantages: for example, they draw no distinction between networks that are reciprocal on the average but include numer-

ous nonreciprocal relationships (which thus are counterbalanced) and networks that are reciprocal on the average and include numerous reciprocal relationships.

In principle, a relationship-specific operationalization invalidates this objection; it focuses on the reciprocity within each separate relationship. Distinctions then are drawn among relationships that are to the respondent's advantage (more support is received than is given), reciprocal relationships (the same amount of support is received as given), and relationships that are to the respondent's disadvantage (more support is given than is received). At the network level, the numbers of overbenefiting, reciprocal, and underbenefiting relationships are counted.

A support-specific operationalization invalidates another objection to summated reciprocity, namely that being underbenefited as to a certain kind of support might not truly be counterbalanced by being overbenefited as to some other kind of support. For instance, being overbenefited in help with odd jobs does not necessarily offset the adverse effect of being underbenefited in talking about personal problems. A support-specific operationalization computes the degree of network reciprocity for various kinds of support: emotional, instrumental, and social. Both the relationship-specific and the support-specific operationalizations use more information than summated reciprocity and allow for finer distinctions.

We have distinguished four types of indices for reciprocity, which vary in their specificity. The first two, total reciprocity for dichotomous and for raw scores, are based on aggregate sums of the number of reciprocal relationships in any given network. The remaining two, relationship-specific and support-specific indices, incorporate considerable amounts of information about specific relationship properties. It is uncertain, however, whether they yield comparable results when used to investigate reciprocity. In order to clarify this issue, we will examine their descriptive qualities and their association with loneliness. Given their richer information content, and given the finding that a specific operationalization of support is slightly superior to a general one (van Tilburg 1987, 1990), we expect the more specific reciprocity indices to be associated with loneliness more strongly than the more general indices.

DESIGN OF THE STUDY

Respondents

The respondents were selected from three categories: pregnant women with paid jobs, people who had moved recently, and men scheduled to retire in a few months. Two interviews were held one year apart. The first measurement, from which the data for this research note were derived, took place in 1986. The selection of the samples was determined largely by the aims of the principal study (Van Sonderen forthcoming; Van Sonderen, Ormel, Brillman, and Van Linden van den Heuvell 1990), particularly the desideratum of construct validation of support measures. We selected pregnant women and men scheduled for retirement because major changes in their life circumstances were likely to occur in the interval between the two interviews. Recent movers were included in the study because major changes in network size and composition could reasonably be expected to take place.

About half of the total sample lived in Groningen, a city in the north of the Netherlands (population about 170,000). Most of the other respondents came from small towns in the rural area surrounding Groningen. A few lived in small villages.

The 82 pregnant women (mean age 28.7) with paid jobs were selected with the help of midwives and the district nursing service, where most pregnant women tend to register. The intermediaries mailed a letter of introduction, in which we outlined the study and asked the women to submit their address and some information on their current and future job status. Next we contacted the women, explained the study in greater detail, and requested their cooperation. This procedure was adopted to guarantee a maximum of privacy. The first interview took place a few months before childbirth, while the women were still on the job.

The 105 recent movers (64 women and 41 men, mean age 48.0) were selected with the help of three city housing departments, where the majority of movers tend to register. We selected only people who had moved from elsewhere in the Netherlands to Groningen in the preceding four months. The elderly (age 55 and over, $N = 55$) were overrepresented in order to provide equal samples of older and middle-aged adults. The housing department mailed a letter of introduction; we contacted

people who showed interest by sending their addresses and phone numbers. The first interview took place about three months after the move.

The 52 future male retirees (mean age 60.6) received letters of introduction from the personnel managers of their companies. Both industrial firms and local government institutions participated. The procedure was identical to that for the pregnant women. The interviews took place in the last few months before retirement.

Questionnaire

The data collection consisted of an interview and self-administered questionnaires, one of which was mailed to the subjects a week before the interview and was returned at the interview while the other was left behind at the interview and returned by mail. The interviewers were experienced and were mainly female, aged 28 to 40. The interviews took approximately three hours. Most of the interviews were tape recorded. Data were collected on the following four topics: 1) network delineation and network members' characteristics, 2) (non-)supportive interpersonal transactions, 3) loneliness, health, stress, and personality, and 4) perceived support. The fourth topic was assessed by means of self-administered questionnaires.

Network delineation by the exchange approach. The appendix contains the name-eliciting exchange questions. They covered the following topics: looking after someone's home, talking about work (problems), helping with household chores, engaging in hobbies or sports, talking about personal problems, consulting when making important decisions, borrowing a large sum of money or large items, taking care of children, social activities, having coffee or drinks at home, and birthday visiting. For all but two topics ("hobbies" and "social activities," Questions 7 and 18), the respondent was asked whether the supportive action was directed from the network member to the respondent and from the respondent to the network member. Respondents were given the opportunity to mention as many people as they wished in response to each question. The interviewer recorded only the first 10 names for each. (The responses to Question 21 will not be considered here.)

Kinds of support. Questions 3, 4, 8, 9, 10,

and 11 refer to emotional support, Questions 1, 2, 5, 6, 12, 13, 14, and 15 to instrumental support, and Questions 16, 17, 19, and 20 to social support.

The existence of a partner relationship was included in the assessment of the composition of the household.

Loneliness. A scale consisting of five positive and six negative items was used to measure the intensity of loneliness (De Jong-Gierveld 1989; De Jong-Gierveld and Kamphuis 1985). Examples of scale items are as follows: "There is always someone I can talk to about my day-to-day problems" and "I wish I had a really close friend." Answers were dichotomized to 0 and 1. The Loevingers homogeneity coefficient as computed by the Mokken program was .42, .40, and .41 respectively for the pregnant women, the recent movers, and the future male retirees. Reliability as computed by KR-20 was .82, .85, and .78. The distribution of the responses was highly skewed; therefore the scale scores, which originally ranged from 0 to 11, were recoded to a three-point scale with scores 1 (originally 0 and 1), indicating no loneliness, 2 (originally 2 through 4), indicating moderate loneliness, and 3 (originally 5 through 11), indicating a high degree of loneliness.

Indices of Reciprocity

First we used Rook's measure of reciprocity. For each exchange item, we noted a score of 1 if the respondent mentioned at least one person, and a score of 0 if nobody was mentioned. We computed the number of positive inputs received from network members by summing the number of receiver exchange items (see appendix) scored as 1. In this way we dichotomized the number of persons and made no distinction between mentioning one person and mentioning two or more. We computed the number of positive inputs given to network members by summing the number of giver exchange items (see appendix) scored as 1. A total difference score was computed by subtracting the number of aspects given from the number of aspects received. Scores on this linear reciprocity variable ranged theoretically from -9 (underbenefiting, i.e., giving more aspects of support than receiving) to $+9$ (overbenefiting, i.e., receiving more aspects of support

than giving). This index is called total reciprocity (dichotomous scores).

The second index was a variant of this operationalization of summated reciprocity. For each aspect of support, we counted the relationships mentioned. We calculated a total difference score by adding up the names mentioned in response to receiver exchange questions and subtracting those mentioned in response to giver exchange questions. This index is different from the previous one in that it is not based on dichotomous responses. The range of this variable was minimally -90 (if 10 names were mentioned in response to all the questions on support given and if no names were mentioned in response to any of the questions on support received) and maximally $+90$. This index is called total reciprocity (raw scores).

The third index measured the degree of reciprocity at the level of the separate relationships and consequently was a relationship-specific operationalization of reciprocity. The reciprocity score of each relationship ranged theoretically from -9 to $+9$ (19 values), which coincided with the number of support questions. Then we counted the number of each respondent's relationships with a reciprocity score ranging from -9 to -1 to obtain the number of underbenefiting relationships. Next we counted the numbers of reciprocal (score 0) and of overbenefiting relationships. The range of these variables was minimally 0 and maximally equal to the number of persons mentioned in response to the exchange questions.

The fourth index was support-specific reciprocity. For each kind of support, we calculated the reciprocity by subtracting the number of people who gave it to the respondent from the number of people who received it. For instance, if a respondent mentioned two network members who gave him support in "home care" (Question 1) and one network member to whom he gave "help with odd jobs" (Question 6), the support-specific reciprocity score was -1 . A maximum of 10 network members were named in response to each name-eliciting question; thus the values of this measure ranged respectively from a minimum of -30 , -40 , and -20 to a maximum of $+30$, $+40$, and $+20$ for emotional, instrumental, and social support reciprocity. Support-specific reciprocity is essentially a derivative of total reciprocity (raw scores) in that the sum of emotional,

instrumental, and social support reciprocity is equal to the raw score of total reciprocity.

Procedure

First we compared the different indices in terms of the extent to which the networks were found to be reciprocal. (Relevant descriptive data will be presented.) Next we performed correlation analyses. Finally, we performed two-step regression analyses; results will be presented for each sample separately. Loneliness was the dependent variable in these analyses.

In the first step of the regression analysis, we used characteristics of the quality of the relationship network as independent variables. Previous research (see Van Tilburg 1988 for an overview) had shown that the existence of a partner relationship, the size of the network, and the received support are important factors in the quality of the network and explain variances in loneliness. For this reason, in combination with the possible intercorrelation between network size and support received (on the one hand) and reciprocity (on the other), these data first were incorporated in the regression comparison. The sample of recent movers, however, was the only one to include a sufficient number of respondents with and without a partner relationship. The network size was the number of individuals mentioned in response to the 18 exchange questions. We calculated support received by adding up the number of relationships mentioned in response to the receiver exchange questions.

In the second step of the regression analysis, we consequently used a stepwise procedure to find out which reciprocity index increased the proportion of explained variance in loneliness. We will examine the significance of the linear as well as the U-shaped association. We distinguish between two types of reciprocity variables: 1) underbenefiting versus overbenefiting, with reciprocity in the middle of the scale, and 2) reciprocity versus either underbenefiting or overbenefiting. Technically, the second type is operationalized as the squared alternative of the first. For total reciprocity (dichotomous scores), total reciprocity (raw scores), and support-specific reciprocity, we included both types of variables in the analysis. The indices "number of underbenefiting relationships" and "number of overbenefiting relationships"

(relationship-specific reciprocity) are of the first type; the index "number of reciprocal relationships" is of the second. A positive correlation (and beta) between reciprocity variables of the type "underbenefiting versus overbenefiting" and loneliness indicates a positive linear association. Otherwise a positive correlation (and beta) between reciprocity variables of the type "reciprocity versus either underbenefiting or overbenefiting" and loneliness indicates a U-shaped association. Using a stepwise regression analysis gives insight into which combination of reciprocity indicators is the best. Because of the multicollinearity among the predictor variables, one can not conclude on the basis of the regression analysis that a nonsignificant indicator of reciprocity is worthless.

RESULTS

In response to the 18 exchange questions, respondents mentioned a total of two to 39 names. The mean number in the three samples was about 20 (see Table 1). This is a substantial number, due mainly to the question about "coffee drinking" and "birthday visiting" (Questions 16, 17, 19, 20). On the average, each individual was mentioned two or three times, virtually to the same extent in response to the questions on support received as to the questions on support given.

The scores for total reciprocity (dichotomous scores) showed that to a large extent, the average relationship network was reciprocal (see Table 1). On the average, the pregnant women, the recent movers, and, to a lesser extent, the future male retirees mentioned one or more names in response to approximately as many questions on support received as on support given.

The results for total reciprocity (raw scores) were similar in that respect. Within a possible range of -90 to $+90$, the deviations from 0 in each of the samples were negligible.

The results of the indices for support-specific reciprocity revealed that for each separate kind of support, on the average approximately the same intensity of support was received as was given. Relatively small deviations among the samples pertained to instrumental support ($F_{(2)} = 6.5, p < .01$): the pregnant women and the recent movers reported receiving somewhat more instrumental support than they gave, whereas the

Table 1. Means, Standard Deviations, and Correlation Matrices of the Variables Involved in the Regression Analysis

Pregnant Women (N= 82)																	
	M	SD	1	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 Loneliness	1.6	.7															
3 Network size	20.8	5.1	-.12														
4 Support	33.5	8.7	-.16	.35***													
5 Total (dich)	.1	1.5	.13	-.06	.09												
6 Total (dich) sq	2.1	3.0	-.04	-.03	-.05	.30***											
7 Total (raw)	.6	8.6	.27**	-.15	.25**	.65***	.07										
8 Total (raw) sq	72.8	102.5	-.06	.01	.08	.01	.51***	-.00									
9 #Overbenefiting	8.3	3.6	.16	.58***	.52***	.45***	.07	.61***	.08								
10 #Reciprocal	4.9	2.2	-.21*	.26**	-.25**	-.12	-.05	-.23	-.21*	-.28**							
11 #Underbenefiting	7.7	3.5	-.20*	.69***	.13	-.48***	-.09	-.70***	.07	-.00	.01						
12 Emotional	-1.5	4.6	.11	-.17	.13	.31***	.08	.66***	.02	.33***	-.17	-.49***					
13 Emotional sq	22.7	34.0	-.09	.20	.05	-.14	.02	-.32***	.31***	-.02	-.11	.39***	-.57***				
14 Instrumental	.7	4.6	.18	.01	.28***	.58***	.02	.66***	-.10	.46***	-.15	-.37***	.07	-.03			
15 Instrumental sq	21.4	32.1	.05	.09	.30***	-.04	.18	.08	.24**	.16	-.15	.07	-.06	.04	.32***		
16 Social	1.3	3.8	.26**	-.15	.06	.40***	.03	.66***	.08	.41***	-.14	-.55***	.20*	-.01	.19	-.14	
17 Social sq	16.2	33.9	.09	-.17	-.11	.29***	.39***	.30***	.61***	.15	-.16	-.30***	.16	-.07	-.02	-.09	.50***

Table 1. (Continued)

	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Recent Movers (N = 105)																		
1 Loneliness	2.1	.8																
2 Partner	.6	.5	-.16															
3 Network size	20.3	7.6	-.24**	.31***														
4 Support	27.5	11.0	-.17*	.07	.52***													
5 Total (dich)	-.2	1.9	.08	-.06	.04	.21**												
6 Total (dich) sq	3.5	6.3	.11	-.01	-.02	-.30***	-.43***											
7 Total (raw)	1.1	8.7	.23**	-.25**	.05	.37***	.63***	-.33***										
8 Total (raw) sq	76.8	101.5	.11	-.08	.28***	.14	-.18*	.46***	-.05									
9 #Overbenefiting	8.6	4.7	-.06	.00	.75***	.51***	.35***	-.19	.61***	.18*								
10 #Reciprocal	4.4	2.8	-.08	.34***	.48***	.33***	.01	.01	-.07	.12	.08							
11 #Underbenefiting	7.3	4.0	-.32***	.35***	.70***	.16	-.34***	.17*	-.57***	.24**	.20**	.13						
12 Emotional	-1.7	4.8	.19*	-.35***	-.14	.12	.49***	-.17*	.68***	-.09	.27***	-.14	-.48***					
13 Emotional sq	25.5	52.0	-.07	.09	.12	.08	-.29***	.21**	-.38***	.52***	-.12	.05	.33***	-.62***				
14 Instrumental	1.5	4.4	.08	.08	.23**	.47***	.59***	-.33***	.73***	-.05	.55***	.09	-.26***	.30***	-.16			
15 Instrumental sq	21.2	32.6	.04	.15	.53***	.50***	.07	.21**	.22**	.47***	.45***	.40***	.21**	.05	.09	.44***		
16 Social	1.2	4.3	.18*	-.20*	.02	.16	.14	-.14	.54***	.05	.39***	-.08	-.36***	-.04	.07	.12	-.00	
17 Social sq	19.9	30.0	.09	-.13	-.18*	-.20**	-.07	-.11	.15	.08	.05	-.28***	-.22**	.00	-.07	-.04	-.23***	.35***
Future Male Retirees (N = 52)																		
1 Loneliness	2.0	.8																
3 Network size	19.5	6.4	-.20															
4 Support	21.8	7.4	-.33**	.59***														
5 Total (dich)	-.5	1.4	.27*	-.23	-.13													
6 Total (dich) sq	2.1	3.2	-.27*	.15	.11	-.33**												
7 Total (raw)	-1.7	7.1	-.03	-.25*	.15	.55***	-.06											
8 Total (raw) sq	51.7	85.8	-.14	.37***	.10	.10	.25*	-.29**										
9 #Overbenefiting	6.8	3.8	-.22	.62***	.52***	.15	.15	.47***	.24*									
10 #Reciprocal	5.1	2.8	-.07	.23*	.23*	.23*	-.18	-.00	-.18	-.14	-.29**							
11 #Underbenefiting	7.5	4.3	-.06	.79***	.27*	-.35***	.10	-.66***	.42***	.23	-.05							
12 Emotional	-1.3	4.2	.01	-.16	.14	.35***	-.06	.71***	-.06	-.15	-.44***							
13 Emotional sq	19.1	39.2	-.10	.32**	.21	.13	.06	-.03	.45***	.24*	-.17	.37***	-.05					
14 Instrumental	-1.0	2.7	.12	-.20	-.12	.56***	-.33**	.46***	-.09	.10	-.09	-.33**	.12	.23				
15 Instrumental sq	8.0	16.3	-.17	.28**	.28**	-.37***	.50***	-.25*	.23*	.07	.04	.33**	.06	.09	-.68***			
16 Social	.6	4.3	-.14	-.13	.19	.21	.17	.50***	-.37***	-.37***	-.09	-.44***	.11	-.14	.01	-.04		
17 Social sq	18.2	35.1	-.17	.15	.02	.16	.20	-.01	.66***	.33**	-.22	.07	-.03	-.09	-.06	-.11	.05	

* p < .10. ** p < .05. *** p < .01.

reverse was true of the future male retirees. The specific situation of the respondents in the three samples would appear to account for this nonreciprocity.

The results of the index for relationship-specific reciprocity showed that about one-quarter of the relationships were reciprocal, and that about half of the remaining relationships were slightly overbenefiting and half were slightly underbenefiting. (Extremely nonreciprocal relationships were found rarely, if at all. Relationships with a score of +7 or more (extremely overbenefiting) and with a score of -7 or less (extremely underbenefiting) were not found; relationships with a score of +6 to +2 or -6 to -2 were rare. For this reason we did not draw any distinction regarding the scores below -1 or above +1.)

The correlation matrices of reciprocity scores (Table 1) showed strong associations between the dichotomous and the raw total reciprocity scores (.65, .63, and .55 for the nonsquared scores in the three samples, and .51, .46, and .25 for the squared scores). The number of either overbenefiting or underbenefiting relationships, as well as the scores for the support-specific reciprocity indices, were correlated strongly and positively with both of the total scores, most strongly with the raw scores. As a result of the procedure followed, the reciprocity indices, with the exception of the dichotomous scores of network reciprocity, were correlated with network size and with support received. Therefore it is questionable whether in the regression analyses, variations in reciprocity could increase the proportion of explained variance in loneliness after network size and support received have been taken into account.

Pregnant Women

Table 1 shows that among the pregnant women, the highest correlation (.27) with loneliness was found for the raw total scores. This finding, together with $r = .26$ for social support reciprocity and $r = -.20$ for the number of underbenefiting relationships, suggests a linear positive association between overbenefiting and loneliness. The exception to this pattern is $r = -.21$ between loneliness and the number of reciprocal relationships, indicating a U-shaped association between overbenefiting and loneliness or a positive linear association between reciproc-

ity and loneliness. The results of the regression analysis showed that in addition to support received ($\beta = -.28, p < .05$), the raw total scores ($\beta = .29, p < .01$) and the number of reciprocal relationships ($\beta = -.21, p < .10$) were the variables that predicted loneliness most accurately ($F_{(3, 78)} = 5.3, p < .01, R^2 = .17$).

Recent Movers

The data for the sample of recent movers corresponded in part with the data for the pregnant women. Significant correlations with loneliness were found for the raw total scores ($r = .23$), the number of underbenefiting relationships ($r = -.32$), and emotional ($r = .19$) and social ($r = .18$) support reciprocity. These findings suggest a positive linear association between overbenefiting and loneliness. The results of the regression analysis showed that in addition to network size ($\beta = -.20, p < .10$) and support received ($\beta = -.22, p < .10$), not only the raw reciprocity scores ($\beta = .33, p < .01$) but also the squared raw scores ($\beta = .21, p < .05$) were related significantly to loneliness. In this analysis $R^2 = .18 (F_{4, 100} = 5.6, p < .001)$. As was the case for the sample of the pregnant women, the results suggested a positive linear association as well as a U-shaped association between overbenefiting and loneliness.

Future Male Retirees

The associations found among the future male retirees differed from those found among the pregnant women and the recent movers. Only the dichotomous total reciprocity scores, nonsquared as well as squared, were associated significantly with loneliness ($r = .27$ and $-.27$). The first correlation indicated a positive linear association, the second an *inverse* U-shaped association between overbenefiting and loneliness. The results of the regression analysis showed that in addition to the support received within the relationships ($\beta = -.30, p < .05$), only the squared dichotomous total scores were significant ($\beta = -.24, p < .10$). In this analysis $R^2 = .17 (F_{(2, 49)} = 4.9, p < .05)$.

It is clear that reciprocity scores contribute to the explanation of loneliness, above and beyond network size and support received. In subsequent regression analyses in which

network size and support received were excluded, we found the same patterns for the association between reciprocity and loneliness, but a much lower explained variance for all the samples.

To reduce the unfavorable ratio of the number of predictor variables to the number of participants in the separated samples, we combined the three samples in another regression analysis. The search procedure resulted in four significant predictor variables: support received ($\beta = -.38, p < .001$), the existence of a partner relationship ($\beta = -.17, p < .01$), the raw total reciprocity scores ($\beta = .25, p < .001$), and the squared instrumental support reciprocity scores ($\beta = .14, p < .05$). Total $R^2 = .18$ ($N = 239, F_{4, 234} = 13.1, p < .001$). The pattern of the association between overbenefiting and loneliness (a mixture of a U-shaped and a positive linear association) in the combined sample was approximately equal to the patterns in the samples of pregnant women and recent movers.

DISCUSSION

Though reciprocity in the network of personal relationships is generally viewed as an important determinant of well-being, very little research has been conducted on this topic. There are doubts about how to aggregate from exchanges within relationships to reciprocity at the network level. In this study we used four indices, all of which were based on a set of 18 exchange questions pertaining to nine supportive aspects comparable to those developed by Fischer (1982).

Two indices based on total scores of network reciprocity showed that on the average, the relationship networks of 82 pregnant women, 105 recent movers, and 52 future male retirees were strongly reciprocal. Two more specific indices also showed that the networks were characterized predominantly by reciprocity, both as to separate relationships and as to various kinds of support.

We examined the predictive validity of the indices by measuring the correlation with the intensity of loneliness. In general, the correlations and the explained variances were low or moderate (comparable to those in the studies by Rook 1987 and Ingersoll-Dayton and Antonucci 1988. The latter, however, did not first investigate the roles of the network

size and support received.) That such a small percentage of the variance was explained can be attributed to the negligible variance in either the dependent or the independent variables. For example, virtually all the pregnant women and future male retirees were living with a partner. In general there are relatively few lonely people in this category (De Jong-Gierveld and van Tilburg 1987). Furthermore, most of the networks were reciprocal.

The use of an index incorporating more information was expected to lead to a more accurate prediction of loneliness—a higher explained variance and correlations that were theoretically more interpretable. Results fluctuated on the first point and were not satisfying on the second.

The dichotomous scores of total reciprocity, the index using the least amount of information on the exchanges in various relationships, led to an increase of R^2 only in the sample of future male retirees; the raw scores in this sample did not lead to any increase of R^2 . For both of the other samples, an increase was noted only when we used the raw scores, which incorporated more information than did the dichotomous scores. Only for the sample of pregnant women did we find that a more specific index, the relationship-specific index, contributed significantly to the explanation of loneliness. The results did not make it unequivocally clear that indices using more information about the exchanges in various relationships account for more variance in loneliness. The index based on the raw total scores appeared to be preferable to that based on the dichotomized total scores, and to the support- and relationship-specific indices.

In general, both underbenefiting and overbenefiting in relationships have been found to be related to a lack of satisfaction or well-being, and underbenefiting was related more closely to distressing emotions than was overbenefiting (Sprecher 1986; Traupmann, Petersen, Utne, and Hatfield 1981). It is difficult to interpret the results of our study on reciprocity at the network level. In general, being *overbenefited* contributed to greater loneliness. Being *underbenefited* contributed sometimes to more and sometimes to less loneliness. Contrary to the theoretical expectations, having a *reciprocal* relationship network sometimes contributed to greater

loneliness. Our results are in no way comparable to Rook's.

The mixed results suggest that a great deal of work has yet to be done. More attention should be focused on developing a theory about the meaning of reciprocity for psychosocial well-being. Perhaps reciprocity is not a relevant characteristic of the entire network, but only of network segments. Specific indices pertaining to distinctions among the partner, children, other relatives, and friends can provide greater insight. Yet the results of the studies by Rook (1987) and by Inersoll-Dayton and Antonucci (1988), in which these distinctions were made, did not significantly explain more of the variance and therefore were not very encouraging. Further, it is possible that the impact of nonreciprocity on well-being differs for males and for females, and for individuals in different circumstances and different stages of the life course (Antonucci and Jackson 1989; Finch 1987). It is also possible that a lack of reciprocity leads to one type of loneliness (e.g., social loneliness; Weiss 1973) but not to another. In addition, it is questionable whether reciprocity must be defined as a perfect match between giving and receiving. Another approach might be to accept a somewhat less stringent definition by adding a margin. Furthermore, there is no evidence for a causal direction as stated, and there are no arguments against a reversed causal priority, in which lonely people attempt to maintain reciprocal relationships but do so in a rigid way. We recommend longitudinal research into the meaning of reciprocity in several samples, such as young, middle-aged, and older adults before and after positive and negative life events.

One point related to recommending a more theoretical approach is that the concept and the measurement of reciprocity remain to be developed further—theoretically, methodologically, and empirically. To date this has hardly been done. Subjective evaluations of the extent of balance can depend on the previous investments in the relationship (Antonucci and Jackson 1989; Flap 1987). We suggest gaining greater insight into the long-term investments as well as into the inputs in ongoing exchange relationships. Normative views also can influence the assessment of reciprocity (Leventhal 1980; Miller and Berg 1984; Roberto 1989). If receiving and giving social support are

measured by means of subsequent questions, as in this research note, the answers to the preceding questions about receiving support might evoke or reinforce a norm that influences the respondents' answers to the questions about giving support (Molenaar 1982). According to the norm of reciprocity (Gouldner 1960), there is a culturally defined tendency to value reciprocal above nonreciprocal relationships. As a result, the names mentioned in response to equivalent questions on received and given support might overlap more extensively than in actuality. Attention also should be focused on the point of view of *both* participants in the dyads (Antonucci and Israel 1986), either by questioning both about what they give and receive or by questioning one about what he or she gives and receives and what he or she thinks the other participant gives and receives (see, for example, the type of questions proposed by Sprecher 1986). Finally, it is wise to measure the frequency of the support exchanges and to weight the importance of the various exchanges. The first author presently is conducting a study with a more elaborate design.

APPENDIX: EXCHANGE APPROACH

1. Who looks after your home, plants, or pets when you are away?
2. Whose home, plants, or pets do you look after when they are away?
3. With whom have you discussed your work or your problems at work in the last few months: Do not mention your colleagues at work.
4. Who has discussed his/her work with you in the last few months? Again, do not mention your colleagues at work.
5. Who has helped you with household chores, for example cleaning, cooking, carpentry work, in the last few months? (Only unpaid work.)
6. Whom have you helped with household chores in the past few months?
7. With whom have you shared a hobby or sport in the past year?
8. With whom do you discuss your personal problems?
9. Who discusses his/her personal problems with you?
10. Whom do you ask for advice in making important decisions?
11. Who asks you for advice in making important decisions?
12. From whom did you borrow a large sum of money or large items for a longer period of time in the past few years?
13. To whom did you lend a large sum of money or large items for a longer period of time in the past few years?
14. Who has on occasion taken care of your children in the past year? (Unpaid.)

15. Whose children have you on occasion taken care of in the past year? (Unpaid.)
16. Who came to visit you for a drink or a cup of coffee in the last few months?
17. Whom did you visit for a drink or a cup of coffee in the last few months?
18. With whom did you engage in social activities, for example, shopping, going out for dinner, going to the movies or spending a day away from home in the past three months?
19. Who came to visit you on your last birthday? If your birthday is coming soon, who will visit you on your birthday?
20. Whom did you visit on his/her birthday in the last year?
21. Are there any other persons who are important to you who have not been mentioned yet?

Receiver exchange questions: 1, 3, 5, 8, 10, 12, 14, 16, and 19

Giver exchange questions: 2, 4, 6, 9, 11, 13, 15, 17, and 20

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