Perceived Reciprocity in Social Exchange and Health Functioning in Early Old Age: Prospective Findings from the GAZEL-Study

Running head: social exchange and health functioning

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Words: approx. 2950 words

Abstract

Title: Perceived Reciprocity in Social Exchange and Health Functioning in Early Old Age: Prospective Findings from the GAZEL-Study

Journal: Aging & Mental Health

Objectives: To assess prospectively the effects of perceived non-reciprocity of exchange in three different types of social engagement on health functioning in early old age.

Methods: In the frame of the prospective French Gazel cohort study, data on reciprocity in three types of role-related social engagement (principal regular activity in everyday life, marital role relationship, trusting relationships in civic life) were collected in 8679 men and 2742 women (mean age: 60.4 years) in 2005. Two years later, health functioning was assessed, using the SF-36 mental and physical component scores, as well as self perceived health. Multivariate regressions were calculated, controlling for important confounders including baseline self-perceived health.

Results: Consistent effects of perceived non-reciprocity in all three types of social exchange on mental and physical health functioning were observed. After adjustment for relevant confounders including baseline self-perceived, health effect were attenuated, but largely remained significant.

Conclusions: Findings underline the importance of the quality of social exchange (reciprocity vs. non-reciprocity) for health functioning in early old age.

Keywords: SF-36, self-perceived health, prospective cohort study, social reciprocity, social roles

Introduction

Healthy aging has repeatedly been associated with people's engagement in some type of regular social activity where skills and capabilities are used and where interpersonal exchange is experienced (Bath & Deeg, 2005; Mendes de Leon, 2005). Studies so far mainly focused on the relevance of frequency and type of social engagement for healthy aging. For instance, a curvilinear relationship between frequency of volunteering and health was documented, with poorer health among those who engage very rarely and those who engage very often (Musick, Herzog, & House, 1999; Van Willigen, 2000; Luoh & Herzog, 2002). Additional studies showed that type of activity matters, where volunteering is more often related to health improvements among older people than caring for a sick or disabled person (Everard, Lach, Fisher, & Baum, 2000, Wahrendorf, Knesebeck, & Siegrist, 2006). In this latter case, demands may overtax people's resources in the long run, thus eliciting chronic stress and exhaustion (Yee & Schulz, 2000; Lee, Colditz, Berkman, & Kawachi, 2003).

The quality of interpersonal exchange experienced during social engagement has received less attention although the socio-emotional 'gains' (e.g. perceiving recognition, experiencing esteem and gratitude) and 'costs' (experiencing conflicts or aversive reactions from other persons) may influence health and well-being quite substantially. The socio-emotional dimension of interpersonal exchange lies at the core of a theoretical model of social stress and health, effort-reward imbalance (Siegrist 1996, Siegrist, Knesebeck, & Pollack 2004).

This model is based on the norm of reciprocity in contractual social exchange. According to this norm, any action or service provided by person A to person B that has some utility to B is expected to be returned by person B to person A where the exchange expectancy concerns some agreed-upon standard of equivalence (Gouldner, 1960). If this norm is violated because a service in return is denied or fails to meet an agreed-upon level of equivalence the social relationship is threatened, or in case of its continuation, strong negative emotions of anger and frustration are elicited among those concerned, resulting in a sense of being treated unfairly

and in an unjust way. When experienced recurrently, injustice of exchange in important social role relations may result in adverse health effects due to chronic stress reactions.

High effort in combination with low reward at work was shown to adversely affect health (Tsutsumi & Kawakami, 2004; Siegrist 2005). In this contractual relationship between employers and employees, three types of reward are distinguished: money, promotion prospects and job security, and esteem. Further applications of this concept of non-reciprocity in social exchange concern close social relationships and different types of social engagement in past employment (Chandola, Marmot, & Siegrist, 2007; Knesebeck & Siegrist, 2003; Wahrendorf et al. 2006). In either case, failed reciprocity was associated with reduced health, at least in several cross-sectional investigations.

In this study we set out to test the association of experienced or failed reciprocity of exchange in three different types of social engagement with health functioning in a prospective study. The three types are, first, the principal regular activity in everyday life in early old age (the more formalised social roles of paid or unpaid work), second, the more intimate marital role relationship, and third, a less formalized type of exchange, trusting relationships in civic life. Although these three types of social engagement vary with respect to the degree of formalization the amount of expected demands and the nature of rewards returned, they nevertheless share a common basic trait, the norm of social reciprocity. Analysing associations of failed reciprocity with health functioning prospectively is important because the effect of quality of exchange on health functioning can not be tested in cross-sectional designs, due to the risks of common methods variance and reverse causation. More specifically, we test the hypothesis that reported non-reciprocity of exchange in three main types of social engagement in early old age increases the risk of poor health functioning later on, and thus, may reduce the probability of healthy aging.

Methods

Study population

Data were obtained from the GAZEL cohort study (Goldberg et al., 2007) initiated in 1989 among employees of the French National Electricity and Gas Company (EDF-GDF). At study onset the sample included 20,625 participants, comprising 15,011 men and 5,614 women. Since then, a self-administered questionnaire has been sent yearly to the participants. A majority of the participants of the survey conducted in 2005 were retired (90% of men and 63% of women). The 2005 wave included information on our main exposure variable: reciprocity in different types of social engagement (see below). The response rate in 2005 was 75 per cent. Data on health dimensions studied were obtained from the 2007 survey (same response rate). In this analysis the sample is restricted to respondents that participated in 2005 and 2007 with complete socio-demographic information, leaving a sample of 11421 men and women. Although the GAZEL cohort represents a specific employment sector the study population was recruited from urban and rural areas throughout France, representing a wide range of occupations and a socioeconomic structure that is well-comparable to the French population, e.g. in terms of educational attainment (for a detailed cohort profile see: Goldberg et al. 2007).

Measures

Perceived reciprocity in social exchange

The quality of interpersonal exchange in terms of reported reciprocity/non-reciprocity was assessed in three different types of social engagement, using standardised questionnaire items. The first type concerns respondent's main current activity. Participants who were still employed referred to their work, whereas non-employed and retired participants were free to refer to any other type of main activity, such as volunteering or homework (1 item). The second type of engagement concerns the partnership relation, usually marital relationships,

and in particular the balance between give and take in everyday life (2 items). Third, less specified engagements in civic life were addressed where trust matters (2 items) (see appendix). The four items measuring exchange in marital life and trusting relationships were tested in three previous studies and derived on the basis of factor loadings in the respective analyses (Chandola et al., 2007; Knesebeck et al., 2003, Knesebeck et al. 2009). For example, the factor loadings for the two items measuring exchange in marital life were 0.86 and 0.72 in the British Whitehall II Study (Chandola et al., 2007), and 0.86 and 0.77 in a comparative study among older people in Germany and the United States (Knesebeck & Siegrist, 2003). Similarly, the factor loadings for the 2 items measuring unspecified trusting relationship ranged from 0.76 to 0.90 in these analyses (Chandola et al., 2007; Knesebeck et al., 2003). Moreover, using the four items, the factorial structure was replicated in our sample, with factor loadings ranging from 0.76 to 0.91. The one item assessing the main activity was adapted from the Survey of Health, Aging and Retirement in Europe (SHARE) (Wahrendorf et al., 2006). In all cases where the item content mattered for respondents, items were answered as follows: strongly agree, agree, disagree, strongly disagree. Answers were summed up for each type of social exchange. Participants scoring in the upper tertile of each of the three measures were defined as experiencing non-reciprocity of exchange in the respective social engagement.

Health functioning

In addition to self rated health, we used two measures of health functioning based on the French standard version of the Short Form 36 Health Survey (SF-36), the mental and physical composite scores (Le Plège, Ecosse, Pouchot, Coste, & Perneger, 2001). Self rated health was assessed by the following question: “How do you rate your general health status?” Response categories ranged from ‘very good’ (coded 1) to ‘very poor’ (coded 8). This item was previously shown to be strongly associated with physical disease in the GAZEL cohort (P.

Goldberg, Gueguen, Schmaus, Nakache, & M. Goldberg, 2001). For our analyses, participants with answers ranging from 5 to 8 were classified to exhibit poor health (Goldberg, et al. 2001). The SF-36 questionnaire is an internationally validated measure of health functioning that is based on 36 questions assessing specific domains of physical and mental health (Ware & Sherbourne, 1992). The domains are physical functioning, social functioning, role limitations due to physical problems, role limitations due to emotional problems, mental health, vitality, bodily pain and general health perception. The internal consistency of the single domains proved satisfactory in our sample (respective Cronbachs alpha vary between 0.73 and 0.94) and two composite scores are derived, a mental composite score (SF-36 MCS) and a physical composite score (SF-36 PCS), both ranging from 0 – 100 with higher scores indicating better health. The psychometric properties of the French SF-36 and the construction of the two scores are fully described elsewhere (Plège et al. 2001). In order to include maximum information on health functioning in the analyses, continuous data of the two scores were used.

Additional Measures

We included a number of additional socio-demographic measures that mainly served as confounders in multivariate models: age, gender, three indicators of socioeconomic position (educational level, income and occupational category). Educational level was assessed by the highest educational degree categorized into four groups (University, Vocational training, Upper secondary education, Lower Secondary education). Income information was based on the total monthly household income using six income classes (adjusted for household size). Occupational category was coded in four categories (senior executive and professional, middle executive, employee, and worker) according to INSEE (French national institute of economic and statistical information) (Desrosières & Thévenot, 2002).

Statistical Analysis

First, descriptive analyses were used to explore sample characteristics (Table 1), as well as bivariate inter-correlations of the main variables were studied (Table 2). Next, to test our main hypothesis, linear and logistic regression models were calculated to predict the two composite scores, as well as poor self-perceived health status (Table 3). For each of the three outcome measures, two consecutive models were estimated. In addition to the main predicting variable of non-reciprocity in social exchange, model 1 included age, gender and three different indicators of socio-economic position (included as categorical variable broken down in dummy variables). In model 2, we added self-rated health at baseline, in order to adjust for its effect on prospective health functioning. The decision to enter all three indicators of socio-economic position simultaneously is based on evidence that they cannot be used interchangeably in social epidemiological studies (Geyer, Hemström, Peter & Vagerö, 2006). All multivariate models were calculated for the total sample and separately for women and men.

Results

[Table 1 about here]

Descriptive findings

79.2 per cent of the participants were men (Table 1). The age range was 52 to 66 years with a mean age of 60.17 years. According to our definition, 33.2 per cent, 18.9 per cent and 24.8 per cent of men and women were considered experiencing lack of reciprocity in their principal activity, or with their partner, or in general trust relationship. The number of respondents was relatively small in case of general trust relationship, indicating that in many cases the respondents did not at all experience such a failed trusting relationship. With respect to socioeconomic position a majority of men and women had a vocational training diploma

(50.2 per cent) and were either senior executives or middle executives. 5.3 per cent were in the lowest and 15.6 per cent in the highest income category.

[Table 2 about here]

Table 2 displays all the correlation coefficients between the main variables. We observe that the three dimensions of non-reciprocity are significantly correlated, with strongest associations between main activity and trusting relationships. In addition, findings indicate that a lack of reciprocity is more prevalent among women and among people with low socioeconomic position. According to our main hypothesis, all types of non-reciprocity are associated with health functioning and self-rated health (strongest associations for SF-36 MCS). However, in view of the large sample size, the statistical significance must be interpreted with some caution. Next, we calculated multivariate regressions models and adjusted for important confounders (table 3). Specifically, the influence of self-perceived health at baseline and of socio-economic position was considered.

[Table 3 about here]

Multivariate findings

To test the main hypothesis, multivariate models with the three prospective health outcomes were estimated (see table 3). In Model 1 each type of non-reciprocity in social exchange was significantly associated with all prospective health measures (controlling for gender, age and socio-economic position). Compared with people who were satisfied with their social exchange (reciprocity), those experiencing an imbalance between give and take were found to have lower scores on both composite scores of health functioning. Moreover, they were more likely to report poor self-rated health. For mental health (MCS), the association was somewhat stronger for partnership than for the remaining two categories, but this was not the case for physical health (PCS) and self-rated health. With regard to the gender specific analyses, no systematic differences were found between men and women. Thus non-reciprocity exerts similar effects for men and women in this dataset. Importantly, after further

adjustment for baseline self-rated health (model 2) all associations were attenuated, but in a majority of cases remained statistically significant.

In addition to the gender-specific findings displayed in table 3, we tested whether interaction effects between non-reciprocity and the three indicators of socio-economic positions were significant, but found no evidence for effect modification of non-reciprocity by socio-economic position.

Discussion

This paper uses data from the Gazel cohort to test associations between perceived non-reciprocity in three different types of role-related social exchange and health functioning in early old age. The main finding demonstrates consistent effects of these types of exchange on mental and physical health functioning. In addition, effects on self-reported health are observed. Effects on mental health are relatively stronger, but their magnitude does not vary according to type of exchange. Findings remain significant after adjustment for age, gender, socio-economic position and baseline self-rated health, although the latter variable attenuates the size of effects.

These results support the notions of active and productive ageing, but add a new element by highlighting the importance of the quality of exchange, and specifically to the experience of reciprocity in terms of recognition, reward or symmetry of give and take. To our knowledge, this is the first study documenting the predictive role of perceived non-reciprocity for reduced health functioning in early old age across three different types of role-related social exchange. Results support the general significance of the norm of social reciprocity for cooperative exchange in main social roles (Gintis, Bowles, Boyd, & Fehr, 2005).

Previous prospective investigations documented strong effects of non-reciprocal exchange in case of the work role on reduced health functioning (Kuper, Singh-Manoux, Siegrist & Marmot, 2002; Stansfeld, Bosma, Hemingway, & Marmot, 1998). Associations of non-

reciprocal exchange in marital roles and in trusting relationships with reduced health functioning and poor self-reported health were reported cross-sectionally but not prospectively (Chandola et al., 2007; Knesebeck & Siegrist, 2003; Knesebeck, Dragano, Moebus, Jöckel, Erbel, & Siegrist, 2009). Importantly, in two of these studies (Chandola et al., 2007; Knesebeck & Siegrist 2003) the observed effect of non-reciprocity on health persisted after adjustment for relevant components of negative social support, thus indicating independent effects of these two constructs.

While experienced or failed reciprocity in social exchange is relevant for emotional well-being and health functioning in all stages of life, its significance may be particularly pronounced in early old age. This is due to the fact that this period is marked by social transition and associated potential socio-emotional vulnerability (Mein, Martikainen, Hemingway, Stansfeld, & Marmot, 2003). For instance, with transition from regular employment to retirement, engagement in more proximate types of social exchange usually becomes more prevalent and more important (Rotolo, 2000). As it is less likely that continued exposure to non-reciprocal transactions in these more proximate relationships can be compensated by alternative types of rewarding social exchange, negative effects on wellbeing are more likely to occur.

In this study, we were not able to elucidate the pathways between perceived non-reciprocity in social exchange and reduced physical and mental health functioning. Whereas a reporting bias cannot be ruled out, leaving those with experienced non-reciprocity at baseline at higher susceptibility of reporting reduced health functioning two years later, it is probable that psychobiological effects of strong negative emotions resulting from reward frustration to some extent contribute to this explanation. Experimental research demonstrates pronounced stress reactions resulting from unfair social exchange, in particular in case of investments made in anticipation of some equivalence of return (Kiecolt-Glaser, 1997; Kiecolt-Glaser, 2005; Abler, Walter, Erk, 2005).

Although the prospective design and theoretical basis of this study must be considered particular strengths, this study suffers from several limitations. First, we were not able to rule out a reporting bias of non-reciprocity caused by some unobserved personality characteristics, such as neuroticism, negative affectivity or depression. Yet, previous studies testing adverse health-effects of non-reciprocity demonstrated that these effect remain statistically significant after adjusting for negative affectivity (Bosma, Peter, Siegrist, & Marmot, 1998; Buddeberg-Fischer, Klaghofer, Stamm, Siegrist, & Buddeberg, 2008; Knesebeck et al. 2009) a main possible confounder in this respect (Spector, Zapf, Chen & Frese, 2000). Second, the measurement of non-reciprocity was restricted to participants' appraisal, thus excluding potential external validation and exploration of causation. Further studies are needed to improve the measurement of reciprocal exchange, specifically in less formalized roles, to extent the number of measurement waves and the time frame of analyses. An additional limitation points to the fact that, despite a fairly generalizable population and a comparable low attrition rate of the initial sample (Goldberg et al. 2007), important segments of the general population (e.g. non-working women, manual occupations) are underrepresented. Finally, baseline values of SF-36 in 2005 were not collected, and we therefore introduced self-reported health as a proxy measure for respective adjustment in multivariate analysis.

In conclusion, despite the reported limitations, this study supports the notion, that perceived non-reciprocity in three different types of social exchange in early old age is prospectively linked to reduced health functioning, in particular mental health functioning. Conversely, experienced reciprocity in social engagement contributes to emotional well-being and health functioning. By recognizing the importance of balanced exchange between efforts and rewards in cooperative social exchange for health and well being, policy programs can be developed and implemented accordingly.

Acknowledgements

The Gazel cohort is funded by grants from EDF-GDF (Electricité de France-Gaz de France) in association with INSERM (Institut National de la Santé de de la Recherche Médicale).

We would like to thank all the staff of the Équipe Risques Postprofessionnels – Cohortes de l'Unité mixte 687 INSERM -CNAMTS. Very special thanks to the participants of the GAZEL cohort.

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Appendix

Items for measuring perceived reciprocity in social exchange

Principal regular activity in everyday life (Activity)

- When I think about my major activity (job, looking after home, voluntary work…), I have always received the recognition I deserve.

Marital role relationship (Partner)

- I have always been satisfied with the balance between what I have given my partner and what I have received in return.
- I often had to put the relationship with my partner ahead of my own needs in order to maintain a good relationship.

Trusting relationships in civic life (Trust)

- I have been seriously disappointed or hurt by someone to whom I gave my trust.
- Someone has committed an injustice against me or betrayed me without me being compensated for it.

Tables and figures

Table 1. Description of measures and sample (N max = 11421)

Variable (Year of measurement)	Categories or range	% or mean	N
Gender (2005)	Male	76.0	8679
	Female	24.0	2742
Age (2005)	52 – 66 years	60.4	11421
Educational level (1989)	University	21.1	2410
	Vocational training	52.7	6022
	Upper secondary education	7.4	846
	Lower Secondary education	18.8	2143
Household income classes (2002)	< 1601 €	6.3	715
	1601-1981 €	18.4	2104
	1982-2591 €	14.3	1634
	2592-3810 €	38.1	4357
	3811-4573 €	9.6	1095
	>= 4574 €	13.3	1516
Household size (2002)	1 – 15	2.3	11421
Occupational category (2002)	Senior executive	33.7	3854
	Middle executive	55.1	6292
	Employee	5.8	657
	Worker	5.4	616
Retired	No	18.6	2127
	yes	81.4	9288
Non-Reciprocity: Activity (2005)	No	68.8	6915
	yes	31.2	3139
Non-Reciprocity: Trust (2005)	No	73.2	4487
	Yes	26.8	1643
Non-Reciprocity: Partner (2005)	No	81.5	7865
	Yes	18.5	1790
SF-36 MCS (2007)	6.1 – 71.3	48.4	10189
SF-36 PCS (2007)	13.6 – 69.0	50.0	10189
Self-reported health (2005)	Good (1-4)	66.4	7589
	Poor (5-8)	33.6	3832
Self-reported health (2007)	Good (1-4)	65.4	7007
	Poor (5-8)	34.6	3699

Table 2. Intercorrelations between main variables

	1	2	3	4	5	6	7	8	9	10	11	12
1. Non reciprocity Activity												
2. Non reciprocity Trust	0.23***											
3. Non reciprocity Partner	0.17***	0.20***										
4. SF-36 MCS	-0.17***	-0.19***	-0.21***									
5. SF-36 PCS	-0.08***	-0.10***	-0.04***	0.06***								
6. Poor self-perceived health 2005	0.13***	0.12***	0.11***	-0.30***	-0.34***							
7. Poor self-perceived health 2007	0.11***	0.11***	0.11***	-0.38***	-0.42***	0.54***						
8. Gender [a]	-0.09***	-0.09***	-0.19***	0.18***	0.04***	-0.06***	-0.04***					
9. Age	-0.09***	0.01	-0.06***	0.07***	-0.10***	0.02***	0.05***	0.33***				
10. Education [b]	-0.05***	-0.07***	-0.00	0.04***	0.07***	-0.07***	-0.08***	0.07***	-0.06***			
11. Income [c]	-0.10***	-0.13***	-0.05***	0.06***	0.12***	-0.13***	-0.13***	-0.03***	-0.08***	0.40***		
12. Occupational category [d]	0.10***	0.09***	0.03***	-0.07***	-0.09***	0.10***	0.11***	-0.15***	-0.07***	-0.40***	-0.43***	

[a] 0 = female, 1 = male
[b] 1 = University, 2 = Vocational training, 3 = Upper secondary education, 4 = Lower secondary education
[c] 1 = < 1601 €, 2 = 1601-1981 €, 3 = 1982-2591 €, 4 = 2592-3810 €, 5 = 3811-4573 €, 6 = >= 4574 €
[d] 1 = Senior executive, 2 = Middle executive, 3 = Employee, 4 = Worker
* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table 3. Associations of non-reciprocity in social exchange and health functioning: Results of linear and logistic regression models (estimates and standard errors)

	Model 1		Model 2		N
SF-36 MCS [a]					
All					
Non-reciprocity: Activity	-3.19***	(0.21)	-2.57***	(0.21)	9042
Non-reciprocity: Trust	-3.80***	(0.29)	-3.22***	(0.28)	5503
Non-reciprocity: Partner	-4.62***	(0.26)	-3.97***	(0.25)	8690
Men					
Non-reciprocity: Activity	-2.79***	(0.23)	-2.21***	(0.23)	6929
Non-reciprocity: Trust	-3.15***	(0.32)	-2.65***	(0.31)	4310
Non-reciprocity: Partner	-4.68***	(0.30)	-4.06***	(0.29)	6748
Women					
Non-reciprocity: Activity	-4.31***	(0.49)	-3.51***	(0.47)	2113
Non-reciprocity: Trust	-5.77***	(0.67)	-4.91***	(0.65)	1193
Non-reciprocity: Partner	-4.46***	(0.53)	-3.73***	(0.52)	1942
SF-36 PCS [a]					
All					
Non-reciprocity: Activity	-1.06***	(0.16)	-0.51***	(0.15)	9042
Non-reciprocity: Trust	-1.28***	(0.22)	-0.82***	(0.21)	5503
Non-reciprocity: Partner	-0.53**	(0.20)	0.04	(0.19)	8690
Men					
Non-reciprocity: Activity	-1.15***	(0.18)	-0.63***	(0.17)	6929
Non-reciprocity: Trust	-1.16***	(0.24)	-0.76***	(0.23)	4310
Non-reciprocity: Partner	-0.26	(0.23)	0.30	(0.22)	6748
Women					
Non-reciprocity: Activity	-0.80*	(0.36)	-0.15	(0.35)	2113
Non-reciprocity: Trust	-1.63**	(0.50)	-0.97*	(0.48)	1193
Non-reciprocity: Partner	-0.99*	(0.39)	-0.40	(0.37)	1942
Poor self-perceived health [b]					
All					
Non-reciprocity: Activity	1.58***	(0.07)	1.31***	(0.07)	9455
Non-reciprocity: Trust	1.49***	(0.09)	1.25**	(0.09)	5742
Non-reciprocity: Partner	1.72***	(0.10)	1.46***	(0.10)	9087
Men					
Non-reciprocity: Activity	1.55***	(0.09)	1.29***	(0.08)	7240
Non-reciprocity: Trust	1.48***	(0.11)	1.26**	(0.11)	4487
Non-reciprocity: Partner	1.60***	(0.11)	1.31**	(0.11)	7048
Women					
Non-reciprocity: Activity	1.66***	(0.15)	1.37**	(0.15)	2215
Non-reciprocity: Trust	1.52***	(0.19)	1.21	(0.19)	1255
Non-reciprocity: Partner	1.99***	(0.20)	1.81***	(0.22)	2039

Model 1: adjusted for age, socio-economic position and gender (for the total sample only)
Model 2: M1 + baseline self-perceived health
[a]: unstand. regression coefficients
[b]: odds ratios
* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$