Psychology & Health

ISSN: 0887-0446 (Print) 1476-8321 (Online) Journal homepage: https://www.tandfonline.com/loi/gpsh20

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To cite this article: Johannes Siegrist, Hannah Tough, Martin W. G. Brinkhof, Christine Fekete & SwiSCI study group (2019): Failed reciprocity in social exchange and wellbeing: evidence from a longitudinal dyadic study in the disability setting, Psychology & Health, DOI: 10.1080/08870446.2019.1707826

To link to this article: https://doi.org/10.1080/08870446.2019.1707826

Published online: 31 Dec 2019.

PSYCHOLOGY & HEALTH
https://doi.org/10.1080/08870446.2019.1707826

Failed reciprocity in social exchange and wellbeing: evidence from a longitudinal dyadic study in the disability setting

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ABSTRACT

Objectives: Failed reciprocity at work and in partnerships was shown to adversely affect wellbeing in general populations, but evidence in disability settings is widely lacking. We explore the effects of failed reciprocity on wellbeing and the impact of the partners' perception of reciprocity on wellbeing in persons with a physical disability and their partners.

Design: We use longitudinal dyadic data from the pro-WELL study, a Swiss survey of persons with spinal cord injury (SCI) and their partners ($n = 246$). Two-level mixed-models with random effects for persons and repeated measures were applied.

Main outcome measures: Cognitive wellbeing was measured with the Satisfaction with Life Scale and affective wellbeing with the Positive and Negative Affect Scale short-form.

Results: Failed reciprocity at work and in the partnership was associated with all indicators of wellbeing in persons with SCI and with cognitive wellbeing and negative affect in caregiving partners. Life satisfaction of caregiving partners and positive affect of persons with SCI was lower if the partner perceived the partnership as non-reciprocal.

Conclusion: Negative associations of failed reciprocity with wellbeing are not restricted to general populations but equally apply to the disability setting and dyadic analyses reveal the importance of the partners' perception of partnership reciprocity for wellbeing.

ARTICLE HISTORY
Received 29 June 2018
Accepted 12 December 2019

KEYWORDS
Effort-reward imbalance; reciprocity; wellbeing; spinal cord injury; informal caregiving

Introduction

The norm of reciprocity is a basic principle of social exchange addressing the equality between 'give' and 'take' (Adams, 1965; Gouldner, 1960). The violation of this norm, i.e. failed reciprocity, activates the negative valence system by evoking perceptions of unfairness or injustice, and the associated strong negative emotions of anger, frustration and psychological pain (Greenberg & Cohen, 2010; Papini, Fuchs, & Torres, 2015).

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If experienced repeatedly in core social roles in adult life, such as the work role or the partnership role, failed reciprocity between high 'costs' and low 'gain' adversely affects health and wellbeing. This was first demonstrated in case of the work role, based on the model of effort-reward imbalance (Siegrist, 1996). According to this model, social reciprocity lies at the core of the work contract that defines distinct obligations in exchange for rewards (money, esteem, career opportunities in terms of promotion and job security). Violations of this principle occur rather frequently in modern working life, in particular if employees have no alternative choice in the labor market, are low-skilled or exposed to highly stressful jobs. These violations trigger intense stress reactions that increase the risk of experiencing stress-related disorders. Prospective observational studies document for example elevated risks of depression (Juvani et al., 2014; Rugulies, Aust, & Madsen, 2017), coronary heart disease (Dragano et al., 2017), and poor wellbeing (Kuper, Singh-Manoux, Siegrist, & Marmot, 2002; Stansfeld, Bosma, Hemingway, & Marmot, 1998) in employees suffering from effort-reward imbalance. More recently, effort-reward imbalance was studied in the context of a further social role in adult life, the partnership role (von dem Knesebeck & Siegrist, 2003). In line with studies derived from equity theory, lack of supportive equity in close social relationships was shown to negatively impact mood (Gleason, Iida, Bolger, & Shrout, 2003; Kuijer, Buunk, & Ybema, 2001). Clearly, the constraints of demands are less obvious in the partnership role, and reward transmitters are more often of emotional than of economic nature. Yet, due to its intimate, often long-lasting character embedded in the life course, the quality of exchange is likely to matter for the couple's wellbeing (Carr, Freedman, Cornman, & Schwarz, 2014; Kaufman & Taniguchi, 2006). Preliminary evidence supports the notion that failed reciprocity in the partnership role is strongly associated with reduced health and wellbeing (Chandola, Marmot, & Siegrist, 2007).

Current knowledge on this topic is mainly based on large-scale studies of general populations. It remains however unknown whether similar associations are observed in special population groups, such as persons with a physical disability. Studying this population group is of particular importance, given the restricted opportunities of full access to core social roles, such as paid work (Reinhardt, Post, Fekete, Trezzini, & Brinkhof, 2016) and partnerships (Tough, Siegrist, & Fekete, 2017). Moreover, in persons with access to these roles, failed reciprocity in social exchange may be more often experienced. For instance, extensive efforts have to be spent in order to compensate for functional limitations in the work role, thus increasing the likelihood of unbalanced exchange. Similarly, it may be more difficult to fully reciprocate the mutual obligations of daily life in the partnership. How do these role-based inequities in exchange affect the wellbeing of persons with physical disabilities? A further important question concerns the experience of reciprocity in social exchange among their partners. Specifically, in case of caregiving, partners are involved in time- and resource-intense informal support, and this burden can adversely affect the relationship quality (Pearlin, Mullan, Semple, & Skaff, 1990). Are associations of reciprocity in these roles with wellbeing in partners similar to the ones experienced in persons with disability?

With this study, we address these questions in the frame of a longitudinal study of couples defined by a person with a physical disability, spinal cord injury (SCI), and a caregiving partner. SCI is a condition which markedly impacts on health and

functioning in daily life as persons with SCI sustain a complete or partial loss of sensory and motor function below the lesion level, putting considerable constraints on their social role performance (Bickenbach, Officer, Shakespeare, & Von Groote, 2013). As a consequence, engagement in paid work is often restricted (Young & Murphy, 2009) and around 60% of persons with SCI receive assistance in daily living activities from informal caregivers (Kemp, 2002). It has been shown that the romantic partner is often the major caregiver in dyadic relationships (Post, Bloemen, & de Witte, 2005), and that caregiving may adversely affect health and wellbeing of informal caregivers (Schulz & Beach, 1999; Tough et al., 2017).

Our study has three objectives. *First*, we describe the perceptions of reciprocity in two domains of social exchange (paid work, partnership) in persons with SCI and their caregiving partners. *Second,* we test the associations of failed reciprocity in paid work and the partnership with cognitive and affective components of wellbeing, again in persons with SCI and their partners. *Third,* given the dyadic nature of the couple's experience of social exchange (Pruchno, Wilson-Genderson, & Cartwright, 2009), we test whether the partners' perception of reciprocity exerts an additional effect on the actors' wellbeing. In addition to taking into account the actor effect (i.e. own perceptions of reciprocity and its effect on own wellbeing, study objective 2), we explore whether the partners' perception of reciprocity has an effect on own wellbeing (partner effect).

Methods

Design

The pro-WELL study is a longitudinal community survey which includes three measurement waves over one year (baseline; month 6; month 12). The main objective of the study is to examine associations of availability and quality of social relationships and productive activities (e.g., paid work, caregiving, dyadic relationships) with wellbeing in persons with SCI and their caregiving partners. In this study, we used longitudinal dyadic data that were collected between May 2015 and January 2017. Data collection modes included standardised telephone interviews, paper-pencil or online questionnaires (Fekete, Brinkhof, Tough, & Siegrist, 2017). The study protocol and all measurements were approved by the Ethical Committee of Northwest and Central Switzerland (document EKNZ 2014-285). Regulations concerning informed consent and data protection were strictly observed and all participants signed an informed consent form.

Sampling frame and study participants

The pro-WELL study (Fekete et al., 2017) is a nested study within the Swiss Spinal Cord Injury Cohort Study (SwiSCI) community survey. This sampling frame included a population-based sample of 1922 Swiss residents aged over 16 years with traumatic or non-traumatic SCI (Brinkhof, Fekete, Chamberlain, Post, & Gemperli, 2016; Fekete, Segerer, Gemperli, & Brinkhof, 2015). We included French and German-speaking persons with SCI aged 30–65 that indicated having a partner involved in caregiving. Only couples could be included in the study, therefore consent from both the person with SCI and their caregiving partner was needed to be obtained. Inclusion criteria for

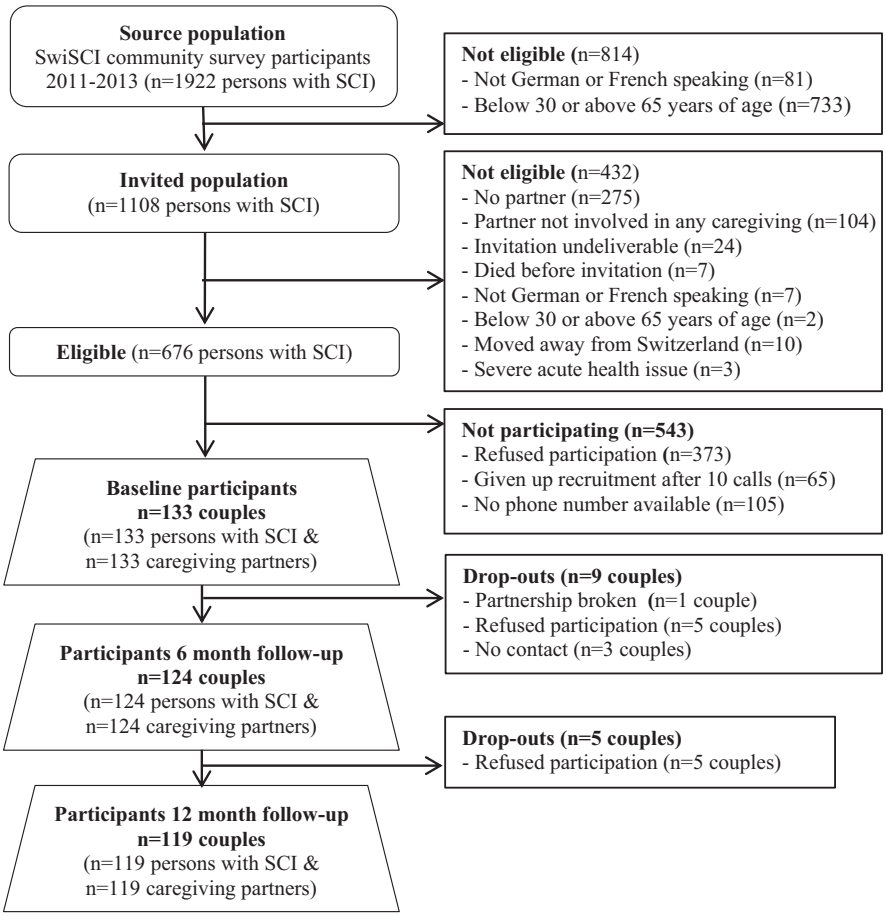

Figure 1. Source population, eligibility and participation outcomes at baseline, 6, and 12 month follow-up.

partners was only the language (German or French). Out of these 1922 SwiSCI participants, 676 were formally eligible for the pro-WELL study, but 170 could not be contacted by phone, leaving 373 refusals and 133 persons participating with SCI and their partners in the baseline assessment (response rate 19.7%; details on calculations see Fekete et al., 2017). Due to the flexibility of multi-level modelling, we included all individuals in the analysis who participated in baseline data collection ($n = 266$). Figure 1 depicts details on the sampling frame and the recruitment outcomes for all measurement waves. Further details on inclusion criteria, recruitment outcomes, participation rates, and non-response are reported in the pro-WELL cohort profile (Fekete et al., 2017). A drop-out analysis revealed no bias towards sociodemographic and lesion characteristics at wave 1 and 2.

Measures

Predictors

Reciprocity at work was measured with the psychometrically validated Effort-Reward Imbalance short form (Leineweber et al., 2010) addressing 'effort' (three items) and

'reward' (seven items). The ERI items were answered on a four-point Likert scale. In accordance with the theoretical assumption of the ERI model (Siegrist, 1996), a ratio of the two scales was constructed (ERI-ratio), defined as the sumscores of the 'effort' items (nominator) and the 'reward' items (denominator, adjusted for number of items). Cronbach's alpha of effort and reward scales was 0.77, indicating satisfactory internal consistency in our sample. Thus, a quantitative estimate of the mismatch between 'cost' and 'gain' at individual level was available, with values exceeding 1.0 indicating failed reciprocity at work (Siegrist et al., 2004). For the regression analysis, we constructed tertiles of the ratio to identify the upper tertile as a high risk group, with the lowest tertile indicating the most advantageous position of low efforts relative to rewards. In order to assess the dyadic effects of reciprocity at work, a variable was created indicating the partners' perception of reciprocity.

Reciprocity in the partnership was examined with four items used effectively in established cohort studies, i.e. GAZEL (Wahrendorf, Ribet, Zins, Goldberg, & Siegrist, 2010) and Whitehall II (Chandola et al., 2007). All items were measured on a four-point Likert scale with higher scores indicating higher reciprocity. A sumscore was built from the four items and internal consistency was tested (Cronbach's alpha = 0.70). Distribution-based tertiles were computed for regression analysis to identify the lower tertile as a high risk group experiencing low reciprocity, i.e., feelings of lack of balance between give and take in the partnership. In order to assess the dyadic effects of reciprocity in the partnership, a variable was created indicating the partners' perception of reciprocity. In both cases, reciprocity at work and in the partnership, the upper tertile of the ratio quantifying non-reciprocity was defined as predictor. This decision was based on a standard procedure in socio-epidemiologic studies which estimate the elevated health risks of this exposure. This procedure was applied in a number of studies based on the ERI model (Lunau, Wahrendorf, Dragano, & Siegrist, 2013; Siegrist, Lunau, Wahrendorf, & Dragano, 2012). Similarly, tertiles of the ratio of partnership reciprocity were previously analysed with regard to risk of depressive symptoms (von dem Knesebeck & Siegrist, 2003).

Outcomes

Based on the wellbeing concept proposed by Diener et al., we operationalised wellbeing with a cognitive and an affective component (Diener, 2012). The cognitive component measures global cognitive judgments of satisfaction with one's life, while the affective component assesses the experience of positive and negative emotions. The cognitive component, *life satisfaction,* was assessed with the five-item Satisfaction with Life Scale (SWLS) (Diener, Emmons, Larsen, & Griffin, 1985). The items were rated on a five-point Likert scale ranging from 'strongly disagree' (scored 1) to 'strongly agree' (scored 5) (Kobau, Sniezek, Zack, Lucas, & Burns, 2010). A sumscore ranging from 5 to 25 was calculated, with higher scores indicating higher life satisfaction. The affective component of wellbeing, *affective states,* were measured by the Positive and Negative Affect Scale short form (PANAS-S) (Thompson, 2007). The PANAS-S includes two subscales (five items positive, five items negative affect) assessing the strength of emotions on a five-point scale ranging from 'very slightly or not at all' (scored 1) to 'extremely' (scored 5). For both subscales, a 5–25 sumscore was generated. Higher

scores on the positive subscale indicate higher positive affect, and higher scores on the negative subscale indicate higher negative affect.

Potential confounders

The selection of confounders was based on putative causal diagrams using a directed acyclic graph (DAG) approach (Hernán, Hernández-Díaz, & Robins, 2004). The DAG was operationalised using the online dagitty software (www.dagitty.net) which visualizes the interrelationships between variables of interest, i.e. reciprocity at work and in the partnership, wellbeing and various factors that potentially affect this association (Textor, Hardt, & Knuppel, 2011). Candidate confounders and the interrelationships between variables were first drawn based on the literature and theory. Second, the DAG was validated by a bivariate exploration of assumed interrelationships between variables, whereby all non-significant interrelationships were removed from the diagram. In a third step, the minimal sufficient adjustment set was derived based on the remaining interrelationships between variables and used to estimate the total effect of reciprocity on wellbeing. Education, functional capacity of persons with SCI and caregiving hours for caregiving partners were identified as minimal sufficient adjustment set and thus introduced as confounders in multivariate models. Information on education was defined as number of years of education before retraining. Lesion characteristics were utilized as a proxy for functional capacity (para-/tetraplegia; complete/incomplete lesion; years since injury), and caregiving hours were measured as the numbers of hours per day the partner indicated being involved in caring or supporting the partner. Age and sex were also introduced into the final models as control variables.

Data analysis

Analyses were conducted using STATA version 14.2 for Windows (College Station, TX, USA). We first described the distribution of study variables. Comparative analysis on baseline data was performed in order to identify differences between persons with SCI and their caregiving partners. We also include the longitudinal distribution of key study variables, and have compared their values between persons with SCI and their caregiving partners at subsequent time points. The longitudinal characteristics of study variables were examined using repeated measures ANOVA to identify stability over time, where a significant p value indicates that the means from at least two time points are different, signifying variability in the study variable. To describe and compare the perception of reciprocity in persons with SCI and caregiving partners (objective 1), a t-test was used in the analysis of the effort-reward ratio and a Mann-Whitney test was conducted to test differences in the perception of reciprocity in the partnership.

To assess the link between own perceptions of reciprocity and wellbeing (actor effects; objective 2), and to assess the link between the partners' perception of reciprocity on own wellbeing (partner effect; objective 3), dyadic analyses were performed based on the Actor Partner Interdependence Model (APIM) (Kenny, Kashy, Cook, & Simpson, 2006; Reinhardt et al., 2016). As suggested by the APIM model, information

on own and the partners' perception of reciprocity (actor and partner information) were included in one model. We run separate models for persons with SCI and caregiving partners, i.e., stratified the analysis for persons with SCI and partners.

Given the longitudinal nature of data, we used a person-period dataset, in which each row of data represented the measurement time points in which the particular person was observed. We used a two-level mixed model with random effects for persons (level 2) and repeated measures (level 1), which allowed to detect within- and between-person variation in wellbeing. More specifically, the level 1 sub-model specifies how each person changes in wellbeing over the three measurement time points and the level 2 sub-model specifies how these changes in wellbeing differ across persons (Singer & Willett, 2003). Level 2 random effects included both a random intercept and a random slope. Although including dyad as level 3 variable is suggested by the APIM model, we were unable to run a 3-level model given the restricted sample size. The variables reciprocity at work or in the partnership, time, confounders, and the interactions between reciprocity and time (results not shown) were entered into the model as fixed effects and can be interpreted as population-average effects. An unstructured variance components structure was utilized for all models. Models were adjusted for age, sex, education, lesion characteristics (SCI only) and hours of caregiving (caregiving partners only). Separate models for reciprocity at work and for reciprocity in the partnership were run, given that it is assumed that reciprocity in one domain does not confound the association of the other domain to wellbeing. Only those who identified themselves as in paid work were included in the analysis of reciprocity at work. Likelihood ratio tests were performed on models with and without random effects to establish whether random effects should be included in the model.

Multilevel analysis has been shown to be robust to the issue of missing data, therefore no missing data was imputed to account for item non-response and full information maximum likelihood estimation was applied (Twisk, 2013; Twisk & de Vente, 2002). We report regression coefficients and 95% confidence intervals. Selection bias due to unit non-response has been shown to be negligible and thus not accounted for in data analysis (Fekete et al., 2017). To further assess the effect of drop out on study results, we performed a sensitivity analysis, including only individuals who participated at all waves, the results remained substantially unchanged.

Results

Basic characteristics of the pro-WELL sample are displayed in Table 1. The majority of persons with SCI were male and the majority of caregiving partners were female. Mean age was 51.5 years in persons with SCI and 50.2 years in caregiving partners. 62.4% of persons with SCI ($n = 83$) and 72.2% of partners ($n = 96$) were in paid employment. The majority of couples had formed their relationship after SCI had occurred. On average, the partners provided 1.8 hours of care per day for their partner. Persons with SCI reported lower life satisfaction, lower positive affect, and a higher level of negative affect than their caregiving partners across all time points ($p \leq 0.05$ for all wellbeing outcomes). Results of the ANOVA revealed positive and negative

Table 1. Characteristics of the pro-WELL study participants.

Total [missing values: SCI; partner]	Persons with SCI 133 (100)	Caregiving partners 133 (100)	Difference *p* value[a]
Baseline parameters			
Categorical variables	*N* (%, 95% CI)	*N* (%, 95% CI)	
Sociodemographic characteristics			
Male [0;0]	98 (74.0, 65.4–80.5)	35 (26.0, 19.4–34.6)	<0.001
Paid employment [0;0]	83 (62.4, 53.8–70.3)	96 (72.2, 63.9–79.2)	<0.01
In a partnership before SCI [7;7]	56 (44.4, 35.9–53.3)	56 (44.4, 35.9–53.3)	N/A
Lesion characteristics			
Lesion severity [2]			N/A
Complete paraplegia	45 (34.4, 26.6–43.0)	N/A	
Incomplete paraplegia	49 (37.4, 29.5–46.1)	N/A	
Complete tetraplegia	24 (18.3, 12.5–26.0)	N/A	
Incomplete tetraplegia	13 (9.9, 5.7–12.8)	N/A	
Continuous variables	Mean (*SD*)	Mean (*SD*)	
Age in years [0;0]	51.5 (9.4)	50.2 (10.1)	0.10
Years of education [2;7]	13.9 (3.3)	14.0 (3.1)	0.55
Household income [19;17]	4584.0 (1470.9)	4376.8 (1525.7)	0.37
Years since injury [5]	24.2 (11.5)	N/A	N/A
Hours of caregiving [12]	N/A	1.8 (3.3)	N/A
Effort-reward imbalance ratio [2;3]	0.88 (0.29)	0.91 (0.41)	0.28
Reciprocity in partnership, range 0–12 [3;3]	9.4 (2.1)	9.0 (2.4)	<0.01
Life satisfaction, range 5–25 [3;2]	17.2 (4.0)	18.7 (4.1)	<0.001
Positive affect, range 5–25 [3;4]	17.1 (3.9)	17.8 (3.6)	0.05
Negative affect, range 5–25 [3;3]	8.9 (3.7)	8.1 (3.7)	0.01
Key variables at follow-up 6; 12 months			
Effort-reward imbalance ratio [10;10]	0.80 (0.30); 0.86 (0.33)	0.84 (0.49); 0.90 (0.39)	0.53; 0.58
Reciprocity in partnership, range 0–12 [0;0]	9.84 (2.18); 9.33 (2.26)	9.13 (2.19); 9.22 (2.40)	<0.01; 0.70
Life satisfaction, range 5–25 [0;0]	18.2 (4.1); 18.0 (4.2)	19.47 (3.6); 19.9 (3.1)	0.01; <0.001
Positive affect, range 5–25 [0,0]	17.4 (4.2); 17.1 (3.8)	17.8 (3.5); 17.8 (3.5)	0.53; 0.14
Negative affect, range 5–25 [0;0]	8.5 (3.3); 8.6 (3.5)	7.9 (3.0); 7.8 (2.7)	0.15, 0.06

Notes: CI, confidence interval; SCI, spinal cord injury; *SD*, standard deviation; N/A, not applicable.
[a]*p* values derived from *t* tests for normally distributed variables, Wilcoxon tests for non-normally distributed variables and chi-square tests for dichotomous variables.

affect to be relatively stable over time, while reciprocity (in both work and partnership) and life satisfaction significantly varied over time.

Objective 1: describing perceptions of reciprocity

The average baseline effort-reward ratio was below 1.0, equally so for persons with SCI (0.88) and for caregiving partners (0.91). On average, persons with SCI perceived reciprocity in their partnership higher than their partners (SCI = 9.4, caregiving partners = 9.0, $p < 0.01$), this remained stable at all subsequent time points.

Objective 2: actor effects of reciprocity on wellbeing

Failed reciprocity at work was consistently linked to cognitive and affective wellbeing in persons with SCI and to lower levels of life satisfaction and higher levels of negative affect in caregiving partners (Table 2). Persons with SCI who reported low partnership reciprocity had significantly lower life satisfaction, lower positive affect and higher levels of negative affect. Caregiving partners who reported low partnership reciprocity indicated lower life satisfaction and higher negative affect. Overall, the strength of associations was comparable between the two groups (all post hoc analysis, $p > 0.05$).

Table 2. Actor effects of reciprocity at work and in the partnership on cognitive and affective wellbeing: adjusted coefficients and their 95% confidence intervals (CI) from multi-level regressions for persons with spinal cord injury (SCI) and caregiving partners.

	Life satisfaction		Positive affect		Negative affect	
	Model 1a	Model 2a	Model 1b	Model 2b	Model 1c	Model 2c
Persons with SCI						
Reciprocity at work						
Highest tertile	Reference	Reference	Reference	Reference	Reference	Reference
Middle tertile	−1.25	−1.27	−0.84	−1.05	0.64	0.68
	(−2.41, −0.10)	(−2.43, −0.11)	(−2.16, 0.47)	(−2.37, 0.27)	(−0.57, 1.85)	(−0.55, 1.90)
Lowest tertile	−1.83	−1.90	−2.28	−2.42	2.09	2.29
	(−3.19, −0.47)	(−3.26, −0.55)	(−3.75, −0.82)	(−3.88, −0.95)	(0.75, 3.44)	(0.95, 3.64)
p value	0.027	0.020	0.007	0.004	0.005	0.002
Variance components						
Level 1	−0.38	−0.79	0.00	0.08	0.00	0.42
(within-person)	(−2.28, 1.52)	(−2.74, 1.17)	(0.00, 0.00)	(−1.13, 1.28)	(0.00, 0.00)	(0.04, 4.17)
Level 2(time	10.58	10.62	5.06	4.44 (2.03,9.69)	4.22	3.64
effect) intercept	(6.34, 17.64)	(6.36, 17.72)	(2.93, 8.72)		(2.22, 8.00)	(1.76, 7.56)
Level 2 slope	0.62	0.63	0.00	0.00	0.00	−1.02
	(0.10, 3.72)	(0.11, 3.71)	(0.00, 0.00)	(0.00, 0.00)	(0.00, 0.00)	(−2.38, 0.35)
Reciprocity in partnership						
Highest tertile	Reference	Reference	Reference	Reference	Reference	Reference
Middle tertile	−1.05	−1.05	−1.07	−1.00	0.95	0.96
	(−1.76, −0.35)	(−1.76, −0.33)	(−1.87, −0.28)	(−1.80, −0.20)	(0.30, 1.60)	(0.30, 1.62)
Lowest tertile	−3.04	−3.02	−1.80	−1.77	2.48	2.51
	(−4.38, −1.69)	(−4.37, −1.66)	(−3.26, −0.34)	(−3.22, −0.31)	(1.29, 3.67)	(1.31, 3.71)
p value	<0.001	<0.001	0.007	0.012	<0.001	<0.001
Variance components						
Level 1	−0.19	4.76	0.20	0.12	−0.84	4.08
(within-person)	(−1.61, 1.22)	(3.68, 6.15)	(−1.53, 1.92)	(−1.62, 1.86)	(−2.08, 0.41)	(3.15, 5.29)
Level 2 (time	8.70	9.89	5.66	5.49	5.96	8.18
effect) intercept	(5.83, 12.98)	(6.80, 14.39)	(3.07, 10.44)	(2.92, 10.30)	(3.81, 9.33)	(5.58, 12.00)
Level 2 slope	0.61	0.56	0.30	0.31	0.89	0.91
	(0.12−3.25)	(0.10, 3.23)	(0.00, 33.16)	(0.00, 31.77)	(0.31, 2.56)	(0.32, 2.56)
Caregiving partners						
Reciprocity at work						
Highest tertile	Reference	Reference	Reference	Reference	Reference	Reference
Middle tertile	0.18	0.30	−0.03	−0.35	0.50	0.60
	(−0.93, 1.29)	(−0.91, 1.51)	(−1.35, 1.28)	(−1.70, 1.00)	(−0.43, 1.42)	(−0.34, 1.54)
Lowest tertile	−1.40	−1.65	0.05	−0.51	1.62	1.69
	(−2.59, −0.21)	(−2.88, −0.43)	(−1.38, 1.48)	(−1.92, 0.89)	(0.65, 2.59)	(0.74, 2.64)
p value	0.021	0.004	0.993	0.699	0.004	0.002
Variance components						
Level 1	3.79	0.00	−2.14	−2.47	−0.75	−1.02
(within-person)	(2.79, 5.17)	(0.00, 0.00)	(−4.76, 0.48)	(−5.18, 0.23)	(−2.06, 0.55)	(−2.38, 0.35)
Level 2 (time	5.72	5.65	11.54	9.48	3.81	3.64
effect) intercept	(3.47, 9.43)	(3.41, 9.38)	(6.91, 19.25)	(5.32, 16.90)	(1.92, 7.56)	(1.76, 7.56)
Level 2 slope	0.00	0.00	1.21	1.42	0.24	0.42
	(0.00, 0.01)	(0.00, 0.00)	(0.28, 5.23)	(0.36, 5.54)	(0.00, 13.16)	(0.04, 4.17)
Reciprocity in partnership						
Highest tertile	Reference	Reference	Reference	Reference	Reference	Reference
Middle tertile	−0.74	−0.90	−0.66	−0.54	1.08	1.12
	(−1.37, −0.10)	(−1.58, −0.21)	(−1.43, 0.16)	(−1.35, 0.28)	(0.47, 1.69)	(0.49, 1.75)
Lowest tertile	−2.28	−2.20	−1.03	−0.96	2.02	1.94
	(−3.31, −1.25)	(−3.27, −1.13)	(−2.25, 0.18)	(−2.21, 0.29)	(1.06, 2.98)	(0.96, 2.92)
p value	<0.001	<0.001	0.133	0.243	<0.001	<0.001
Variance components						
Level 1	−1.98	−2.20	−1.10	−1.47	−1.00	−1.44
(within-person)	(−3.33, −0.64)	(−3.66, −0.75)	(−2.75, 0.56)	(−3.27, 0.34)	(−2.96, 0.13)	(−2.66, −0.22)
Level 2 (time	9.63	9.00	6.39	6.22	4.93	5.18
effect) intercept	(6.82, 13.60)	(6.21, 13.04)	(3.84, 10.63)	(3.57, 10.83)	(3.08, 7.87)	(3.24, 8.30)

(*continued*)

Table 2. Continued.

	Life satisfaction		Positive affect		Negative affect	
	Model 1a	Model 2a	Model 1b	Model 2b	Model 1c	Model 2c
Level 2 slope	1.08 (0.50, 2.34)	1.19 (0.55, 2.58)	0.99 (0.27, 3.70)	1.14 (0.34, 3.87)	0.57 (0.13, 2.49)	0.67 (0.18, 2.49)

Model 1: Unadjusted, 1a for life satisfaction, 1b for positive affect, 1c for negative affect; Model 2: Adjusted for age, sex, education, lesion level (only for SCI), hours of caregiving (only for caregiving partners); 2a for life satisfaction, 2b for positive affect, 2c for negative affect.
Note: Fixed effects are shown as main results, random effects are shown in italics (level 1, level 2 intercept, level 2 slope). Level 1 random effects refer to within-person variance in wellbeing and level 2 random effects refer to between-person variance in the intercept and the slope. Ranges of all wellbeing scales 5–25.

Adjusted coefficients for the associations of reciprocity with the three wellbeing outcomes are displayed in Figure 2 (for reciprocity at work) and Figure 3 (for reciprocity in the partnership).

Objective 3: partner effects of reciprocity on wellbeing

As evidenced in Table 3, the partners' perception of reciprocity in the partnership was related to life satisfaction (in caregiving partners) and positive affect (in persons with SCI), indicating that having a partner who reported low partnership reciprocity was associated with lower life satisfaction and lower positive affect. We did not observe significant associations between the partners' perception of reciprocity at work or in the partnership and negative affect. Associations between the partners' perception of reciprocity at work and wellbeing were inconsistent and weak in both groups.

Discussion

This study investigated the association of reciprocity at work and in the partnership with cognitive and affective wellbeing in couples defined by a person with physical disability (SCI) and a caregiving partner. While the perception of reciprocity at work did not differ substantially between persons with SCI and their caregiving partners, we observed a difference in the perception of partnership reciprocity, with persons with SCI experiencing higher reciprocity than their caregiving partners. Caregiving partners might rate their partnership as less reciprocal because they feel responsible for the partners' wellbeing and provide support that is not recognized as caregiving, which commonly includes assisting in routine daily activities and providing both emotional and tangible daily support (Torgé, 2014). If provided constantly, this 'hidden' support or feeling of responsibility may lead to perceptions of imbalance in the partnership. Failed reciprocity at work was associated with all indicators of wellbeing in persons with SCI and with poorer cognitive wellbeing and higher negative affect in caregiving partners.

Furthermore, consistent links of failed reciprocity in the partnership with lower life satisfaction and higher negative affect were observed in both groups, and additionally with positive affect in persons with SCI. Moreover, based on dyadic analysis assessing partner effects, we found that life satisfaction of caregiving partners and positive affect of persons with SCI was lower if the partner perceived their partnership as non-

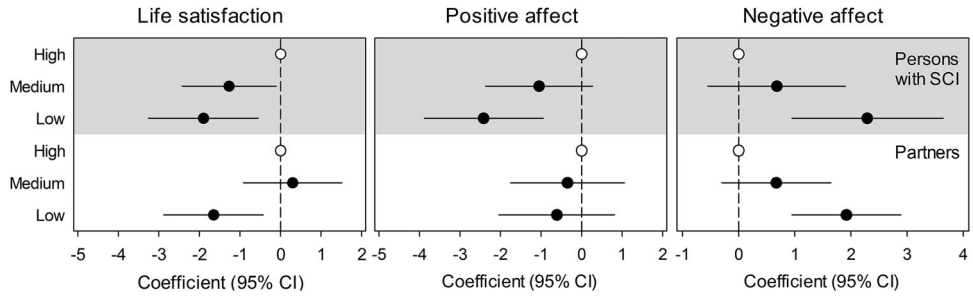

Figure 2. Actor effects of reciprocity at work with wellbeing in persons with spinal cord injury (SCI; area in grey) and caregiving partners (area in white). Open circles indicate the reference group, i.e. the group with the highest perception of reciprocity. Circles indicate adjusted coefficients (with 95% confidence intervals, CI).

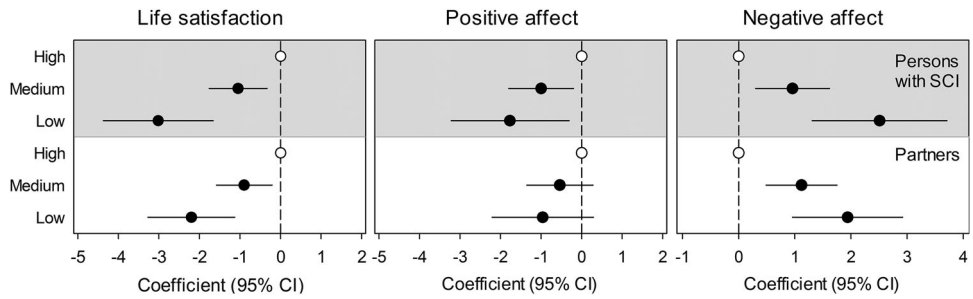

Figure 3. Actor effects of reciprocity in the partnership with wellbeing in persons with spinal cord injury (SCI; area in grey) and caregiving partners (area in white). Open circles indicate the reference group, i.e. the group with the highest perception of reciprocity. Circles indicate adjusted coefficients (with 95% confidence intervals, CI).

reciprocal. It is highly likely that both members of a couple recognize if one partner perceives the relationship as non-reciprocal and that this feeling of imbalance leads to tensions which impact on wellbeing. Obviously, our standardized quantitative measurement approach does not allow to unravel more subtle psychodynamic aspects possibly underlying this association.

This study provides evidence that reciprocity at work and in the partnership was linked to both cognitive and affective wellbeing. Our results from the context of disability are therefore in line with findings from general populations observing failed reciprocity in social exchange as risk factor for reduced health and wellbeing (Chandola et al., 2007; de Jonge, Bosma, Peter, & Siegrist, 2000; Wahrendorf et al., 2010). Moreover, they complement results derived from equity theory as applied to couples with a cancer patient (Kuijer et al. 2001; Kuijer, Buunk, De Jong, Ybema, & Sanderman, 2004), where failed supportive equity was associated with reduced mental health. This effect was further supported by findings from an experimental investigation on supportive equity in close relationships (Gleason et al. 2003). Our findings do not support the notion that persons with increased dependency, as indicated by the physical disability of SCI, are more susceptible to the negative effects of non-reciprocal social exchange. Rather, it seems that this violation of an evolutionary norm of

Table 3. Partner effects of reciprocity at work and in the partnership on cognitive and affective wellbeing: adjusted coefficients and their 95% confidence intervals (CI) from multi-level regressions for persons with spinal cord injury (SCI) and caregiving partners.

	Life satisfaction		Positive affect		Negative affect	
	Model 1a	Model 2a	Model 1b	Model 2b	Model 1c	Model 2c
Persons with SCI						
Reciprocity at work						
Highest tertile	Reference	Reference	Reference	Reference	Reference	Reference
Middle tertile	1.61	1.59	1.10	1.19	0.29	0.31
	(0.46, 2.76)	(0.43, 2.74)	(−0.22, 2.42)	(−0.14, 2.52)	(−0.93, 1.51)	(−0.92, 1.53)
Lowest tertile	0.25	0.18	1.03	1.01	−0.41	−0.51
	(−0.95, 1.45)	(−1.02, 1.38)	(−0.32, 2.38)	(−0.33, 2.35)	(−1.65, 0.83)	(−1.75, 0.73)
*p*value	0.012	0.012	0.193	0.167	0.544	0.440
Reciprocity in partnership						
Highest tertile	Reference	Reference	Reference	Reference	Reference	Reference
Middle tertile	−0.57	−0.56	−1.08	−1.12	0.71	0.72
	(−1.33, 0.18)	(−1.31, 0.19)	(−1.92, −0.25)	(−1.96, −0.29)	(0.03, 1.39)	(0.04, 1.41)
Lowest tertile	−0.40	−0.37	−1.03	−1.00	0.43	0.47
	(−1.59, 0.79)	(−1.57, 0.84)	(−2.33, 0.26)	(−2.31, 0.31)	(−0.63, 1.49)	(−0.62, 1.55)
*p*value	0.329	0.346	0.033	0.027	0.125	0.117
Caregiving partners						
Reciprocity at work						
Highest tertile	Reference	Reference	Reference	Reference	Reference	Reference
Middle tertile	−0.40	−0.20	−0.22	0.27	−0.15	−0.49
	(−1.52, 0.72)	(−1.36, 0.95)	(−1.56, 1.13)	(−1.08, 1.63)	(−1.08, 0.78)	(−1.41, 0.43)
Lowest tertile	−0.77	−0.60	0.48	0.90	−0.43	−0.66
	(−2.06, 0.53)	(−1.92, 0.72)	(−1.03, 1.98)	(−0.61, 2.41)	(−1.47, 0.60)	(−1.67, 0.35)
*p*value	0.507	0.645	0.524	0.460	0.695	0.403
Reciprocity in partnership						
Highest tertile	Reference	Reference	Reference	Reference	Reference	Reference
Middle tertile	−0.51	−0.44	−0.74	−0.76	0.31	0.31
	(−1.11, 0.09)	(−1.08, 0.20)	(−1.48, −0.00)	(−1.54, 0.02)	(−0.28, 0.89)	(−0.30, 0.91)
Lowest tertile	−1.73	−1.49	−0.35	−0.72	0.04	0.12
	(−2.90, −0.56)	(−2.70, −0.27)	(−1.71, 1.00)	(−2.14, 0.69)	(−1.05, 1.12)	(−0.99, 1.22)
p value	0.011	0.047	0.144	0.141	0.571	0.605

Model 1: Unadjusted; Model 2: Adjusted for age, sex, education, lesion level (only for SCI), hours of caregiving (only for caregiving partners).
Note: Fixed effects are shown as main results. Information on variance components for the respective models (1a, 1b; 2a, 2b; 3a, 3b) can be found in Table 2, given that actor and partner effects are tested in the same model. Ranges of all wellbeing scales 5–25.

reciprocity in social exchange evokes strong negative emotions in both groups and exerts negative effects on wellbeing, irrespective of differences in functional capacity or caregiving obligations (Buunk & Schaufeli, 1999; Fehr & Fischbacher, 2003). While failed reciprocity at work has already been linked to reduced wellbeing in an observational study including persons with SCI from four European countries (Fekete, Wahrendorf, Reinhardt, Post, & Siegrist, 2014), this is the first study to explore the link between reciprocity as a component of partnership quality and wellbeing in couples with a disabled and a non-disabled partner. To date, only three studies investigated the impact of partnership quality in persons with disabilities, pointing at the importance of the relationship quality for mental health. Lack of understanding and criticism in the partnership were linked to poor mental health in persons with rheumatic diseases (Kool, van Middendorp, Lumley, Bijlsma, & Geenen, 2013; Kraaimaat, Van Dam-Baggen, & Bijlsma, 1995), and low relationship quality was associated with increased depressive symptoms in persons with multiple sclerosis (McPheters & Sandberg, 2010).

Strengths and limitations

Our study has several strengths. First, the longitudinal design enabled us to minimise the risk of reverse causation as we documented associations of previously assessed predictors on outcomes assessed later on. Second, we used psychometrically validated measures for most of the constructs under study, and data were collected and analyzed in accordance with high quality standards. Third, by using dyadic analysis, we were able to investigate assessments of reciprocity from the perspective of both partners of the dyad. This is particularly relevant in case of a partnership that shares the experience of coping with disability (Reed, Butler, & Kenny, 2013). Although our sample is relatively small, the main findings of this study may be generalized to couples of persons with a pronounced physical disability and a caregiving partner, provided that mental capability and communication skills are not severely restricted. Finally, our analyses were guided by a theoretical construct, the model of effort-reward imbalance at work and thus provided new knowledge on the model's ability to explain variations in wellbeing.

A first limitation of this study was its small sample size which prevented more complex data analyses and may lead to power issues. We were for example unable to follow the recommendations of the APIM framework to run a 3-level model including the dyad as third level in multi-level models. Therefore, potential differences between persons with SCI and caregiving partners in the associations between reciprocity and wellbeing could not be statistically tested. Furthermore, our findings should be interpreted with caution, given a limited time frame of follow-up (12 months), the restriction to three waves of data collection, and the absence of objective measures (e.g. biological markers) validating the self-reported information. Moreover, although the pro-WELL sample reflects the composition of the source population well, we cannot exclude a potential recruitment bias and reasons for non-participation were not assessed. For instance, it might be that couples with good relationship quality were overrepresented, thus underestimating the reported effects on wellbeing, or that couples with financial hardship were underrepresented (e.g. due to difficulties to establish contact). Finally, this study was undertaken in a country with a highly developed health care and social security system that provides extensive support to persons with disabilities and their caregiving partners. We cannot exclude that reported wellbeing effects are more pronounced in countries with a less developed social and medical context and a higher risk of discrimination of persons with disabilities.

Conclusions

Failed reciprocity at work and in the partnership in persons with physical disabilities and their caregiving partners were associated with lower wellbeing. Moreover, life satisfaction of caregiving partners and positive affect of persons with SCI was reduced if the partner perceived the partnership as non-reciprocal. Our results support the notion that the quality of exchange in terms of reciprocity between 'give' and 'take' matters for wellbeing. Findings can inform programs of prevention and rehabilitation that aim at improving wellbeing in the context of productive activities and social relationships.

Disclosure statement

No potential conflict of interest was reported by the authors.

Data deposition

[The DOI for data repository will be provided upon acceptance of the article]Data may be obtained upon request from the corresponding author.

Funding

This work was supported by the Swiss National Science Foundation under Grant 100017_153256.

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