

# Positive and Negative Social Exchanges and Disability in Later Life: An Investigation of Trajectories of Change

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**Objectives.** Various aspects of one's social ties are thought to influence the onset, progression, and course of disability in older adulthood. Although the longitudinal course of social ties and physical disability is likely to be marked by fluctuations over time and intraindividual variation, few studies have explored how patterns of change in positive and negative social exchanges relate to patterns of change in disability across time. The current study, therefore, examined the extent to which distinct longitudinal trajectories of positive and negative exchanges were associated with patterns of physical disability.

**Methods.** We followed a sample of 482 community-dwelling older adults with little to no disability at baseline for 2 years.

**Results.** Results identified multiple, distinct trajectory groups for positive and negative exchanges and disability. Latent class growth analyses revealed that individuals with chronically high or low positive exchanges were likely to experience low and increasing levels of disability. With respect to negative exchanges, individuals with moderately increasing negative exchanges showed patterns of increasing disability and disability remission, whereas chronically low or absent negative exchanges were associated with low and increasing levels of disability.

**Discussion.** Findings highlight the importance of evaluating multiple trajectories of change in older adults' social exchanges and disability.

AGING is accompanied by an increase in the prevalence of physical and/or mental health problems that ultimately may result in physical disability, or difficulties in the performance of fundamental activities necessary for daily living (Stuck et al., 1999). Disability often serves as a catalyst for a variety of negative outcomes for older adults, including loss of independence, institutionalization, and mortality (Bruce, 1999). In an effort to curb these negative consequences and improve quality of life for those with physical disability, researchers have sought to identify psychosocial factors that may play a role in preventing or delaying the onset, and allaying the progression of, disability in older adulthood.

## *The Role of Social Support in the Onset and Progression of Disability*

One extensively studied factor that may contribute to the development and course of disability is social support. It is well accepted that supportive social ties help to buffer stress, enhance psychological well-being, and attenuate and/or delay declines in health (see reviews by Cohen, 2004; Uchino, Cacioppo, & Kiecolt-Glaser, 1996). Thus, it is understandable that both functional (e.g., perceived support) and structural (e.g., network size) aspects of social support are associated with a reduced risk of developing disability in older adulthood (Avlund, Lund, Holstein, & Due, 2004; Mendes de Leon et al., 1999).

Research has found that, in addition to predicting a lower risk of disability onset, social support influences the course of

disability in later life (Seeman et al., 1995). Individuals who are more socially embedded and/or report higher levels of social support evidence fewer declines in physical functioning over time (Mendes de Leon, Glass, & Berkman, 2003; Seeman et al., 1995; Unger, McAvay, Bruce, Berkman, & Seeman, 1999) and have a greater chance of recovering following a period of disability (Wilcox, Kasl, & Berkman, 1994). For example, in one investigation of high-functioning older men and women, more frequent emotional support at baseline predicted fewer declines in physical performance and better physical functioning 2 years later (Seeman et al., 1995). With respect to the role of social support in physical recovery following disability, research has linked greater social support to more successful recovery in activities of daily living (ADLs) among relatively healthy, community-dwelling older adults (Mendes de Leon et al., 1999); older stroke survivors (Glass, Matchar, Belyea, & Feussner, 1993); and older adults hospitalized for a variety of medical conditions (i.e., hip fracture, stroke, or myocardial infarction; Wilcox et al., 1994).

## *Negative Aspects of Social Relationships: Implications for Disability*

Other evidence indicates, however, that being in relationships with others does not automatically ensure that an individual will enjoy health-related benefits, as social relationships can give rise to negative as well as positive exchanges. For example, past work has demonstrated that, despite the best

intentions of relationship partners, older adults both with and without health problems experience negative interactions (e.g., exchanges marked by critical behavior, unwanted advice, and insensitivity from network members; see a review by Newsom, 1999; Rook, 1984). Moreover, recipients do not always perceive exchanges involving assistance as positive or helpful (Newsom & Schulz, 1998).

Negative exchanges lead to considerable psychological distress (see reviews by Finch, Okun, Pool, & Ruehlman, 1999; Rook, 1998) and are a well-recognized source of both acute stress and chronic strain (Krause & Rook, 2003). Accordingly, research has linked problematic social relationships to a variety of adverse health outcomes (cf. Cohen, 2004). Marriages characterized by conflicts and disagreements, for example, are related to greater depressive symptomatology and poorer immune functioning in spouses (Kiecolt-Glaser, 1999; Marsland, Bachen, Cohen, & Manuck, 2001). Furthermore, social exchanges that are overprotective or predominantly instrumental in nature may foster dependency and erode one's confidence in being able to care for oneself and to engage in physical activities that help to prevent disability (Baltes, 1996; Seeman, Bruce, & McAvay, 1996). Likewise, support that is unwanted, inappropriate, or incongruent with the goals and desires of the recipient may threaten perceptions of autonomy, competence, independence, and overall well-being, thus leading to negative affect and distress (Martire, Stephens, Druley, & Wojno, 2002; Reynolds & Perrin, 2004).

Despite the fact that negative exchanges have been implicated in processes that place older adults at greater risk for disability onset and physical decline, such as increases in depression and declines in immune functioning (Aneshensel, Frerichs, & Huba, 1984; Seeman & McEwen, 1996), the majority of research examining the health-related effects of negative social exchanges has examined relatively narrow or specific dimensions of physiological functioning (e.g., cardiovascular, neuroendocrine, and immunological functioning), often in laboratory settings. Among the few studies that have examined the potentially detrimental impact of social relationships on physical disability, the focus has been on the receipt of instrumental support rather than negative social exchanges (Avlund et al., 2004; Hays, Saunders, Flint, Kaplan, & Blazer, 1997; Mendes de Leon, Gold, Glass, Kaplan, & George, 2001). Only recently have researchers begun to examine more explicitly the relationship between negative social exchanges and disability progression and recovery among older adults (Krause & Shaw, 2002; Stephens, Druley, & Zautra, 2002), leaving many important questions unanswered. Thus, an important focus of the present article is to better explain the potential role of negative social exchanges in the progression and recovery of disability.

#### *Intraindividual and Group-Level Variation in Patterns of Change Over Time*

Previous work has provided valuable information regarding the relationship between positive and, to a lesser extent, negative exchanges and disability. However, little research has incorporated measures of both positive and negative social exchanges or examined the links between various trajectories of positive and negative exchanges and disability over time, focusing instead on baseline measures of social exchanges and

their impact on subsequent disability. This is unfortunate because much evidence suggests that neither positive and negative exchanges nor disability in old age necessarily follow a linear, predictable pattern of decline or improvement, nor do all individuals show the same patterns of change.

For example, in his nationwide study of older adults, Krause (1999) found that significant changes in social support occurred across a 3-year time period, with much of this change occurring at the individual level. Further analyses revealed that although support increased for some participants, it decreased or stayed the same for other participants. Other research has shown that both structural and functional aspects of social support undergo few significant changes over time (Martire, Schulz, Mittelmark, & Newsom, 1999). With respect to negative exchanges, the scant research that has examined change over time suggests that, among community-dwelling older adults, negative exchanges tend to be chronic in nature and to show stability over time (Krause & Rook, 2003). Despite homogeneity at the individual level, however, groups of individuals may show similarities in the number of negative exchanges they experience. For instance, whereas the frequency of negative exchanges may be chronically high for a subset of older adults, another group of older adults may experience chronically low negative exchanges. Individuals in these various groups may be more or less likely to experience different patterns of disability. Prior work has not explicitly examined this group-level variability.

Longitudinal patterns of disability are also marked by heterogeneity. For some individuals, disability follows a relatively stable course of increasing disability, whereas for other individuals, disability follows a more dynamic pattern, with alternating states of low and high functioning (Anderson, James, Miller, Worley, & Longino, 1998). Still others report stability or reductions in disability levels over time (Anderson et al., 1998; Beckett et al., 1996; Branch, Katz, Knipmann, & Papsidero, 1984; Crimmins & Saito, 1993; Rudberg, Parzen, Leonard, & Cassel, 1996). Recognition that trajectories of positive and negative exchanges and physical disability exhibit variation at both the individual and group levels within the population highlights the importance of identifying not only the extent to which longitudinal patterns of positive and negative exchanges are associated with the worsening of disability, but also how they may be related to remission and improvement in physical functioning over time.

#### *The Current Study*

These findings underscore the fact that the longitudinal courses of social exchanges and disability in later life exhibit intraindividual variation. Furthermore, distinct subgroups of intraindividual trajectories exist among older adults, with each subgroup composed of older adults who share common patterns of stability or change over time. However, no studies have explored the relationship between group-level patterns of social exchanges and disability. In order to capture the various ways in which longitudinal patterns of social exchanges are associated with longitudinal patterns of disability, the current study utilized a group-based trajectory modeling approach (i.e., latent class growth analysis [LCGA]; Jones, Nagin, & Roeder, 2001; Nagin & Tremblay, 2001). A group-based approach allows for an analysis of the probability of membership in multiple

trajectory groups for disability as a function of membership in various positive and negative exchange trajectory groups. For example, older adults with consistently low levels of positive exchanges may be more likely to experience increasing disability and may find it increasingly difficult to handle the physical challenges that accompany their disabled state. Consequently, this group of individuals may be more likely to exhibit a linear increase in disability over time when compared to a group of individuals with a consistently high frequency of positive exchanges or a pattern of positive exchanges that fluctuates over time.

Modeling the relationship between multiple, discrete patterns of positive and negative exchanges and disability over time also may help integrate findings from prior work, which has found that social exchanges may be both beneficial and detrimental to physical functioning among older adults. As noted earlier, psychological responses to positive and negative exchanges are not uniform across individuals; thus, varying patterns of social exchanges may differentially be associated with patterns of disability over time. For instance, given the health protective role of social support, consistently high levels of positive exchanges may serve a health-enhancing effect for some older adults with little or no physical disability at baseline. Individuals in this group, accordingly, would demonstrate a pattern of consistently low disability over time. However, a subset of these individuals may actually experience an increase in disability should their network members consistently provide greater support than is needed or desired, as this may increase feelings of dependency and lead to a reduction of self-maintenance behaviors. The group-based modeling approach, by virtue of its design, is able to capture each of these associations and to identify the proportion of individuals in the population who share each of the different combinations of longitudinal patterns.

Thus, in order to better understand how particular patterns of social exchange are related to change in disability over time, the current study traced trajectories of social exchanges and disability using three waves of data from a study of nationally representative community-residing older adults with little to no baseline disability. First, we sought to determine the number of distinct classes (i.e., groups) and the shape of the longitudinal patterns (i.e., growth patterns) that best characterize social exchanges (positive and negative) and disability in older adulthood. Next we explored whether the longitudinal patterns for positive and negative social exchanges and disability covaried with one another. Specifically, we examined the conditional probability of belonging to various disability trajectory groups given membership in various social exchange trajectory groups in a representative sample of community-residing older adults.

## METHODS

### *Procedure*

The data for this study came from a 2-year, five-wave, longitudinal survey of older adults—the Later Life Study of Social Exchanges. Baseline data were collected during in-home interviews conducted by trained interviewers during 2000–2001. These interviews obtained information regarding various

aspects of the respondents' sociodemographic, psychosocial, and health-related characteristics, as well as their social interactions with network members. Follow-up assessments were conducted every 6 months, with hour-long, in-home interviews conducted annually and brief midyear telephone interviews. Harris Interactive, Inc., performed all data collection.

The current study used data collected during the yearly in-home interviews (i.e., data collected during baseline [Wave 1], Wave 3, and Wave 5) because these three waves included detailed assessments of respondents' social exchanges and functional status. Data spanned the course of 2 years. Furthermore, to increase the likelihood that observed changes in disability from baseline were a function of changes in social exchanges that occurred during the 2-year time span as opposed to preexisting, unmeasured levels of disability, we included in the analysis only those participants who showed little to no disability (defined below) at baseline. This selection criterion was consistent with sample selection procedures employed in previous work examining the link between social network characteristics and disability (e.g., Seeman et al., 1996).

### *Participants*

We drew the full sample of participants ( $N = 916$ ) randomly from a representative sample of older adults living in the United States. Inclusion criteria required that participants be non-institutionalized, English speaking, at least 65 years of age, and cognitively functional. More detail regarding the derivation of the sampling frame is available elsewhere (Sorkin & Rook, 2004).

Because we were interested in better understanding the factors associated with the development of disability among older adults, we selected only those participants who demonstrated little to no disability at baseline for further analysis, yielding a subsample of 482 participants. Participants had an average age of 72.67 years ( $SD = 5.98$ ) and were primarily female (59%). A little more than half (57%) reported being married, whereas 30%, 8%, and 4% were widowed, divorced/separated, or never married, respectively. Finally, the majority (87%) were Caucasian, whereas the remaining participants identified with African American/Black and Hispanic ethnicities.

A total of 361 participants had complete data on all study variables at the last measurement point (i.e., W5). Those who completed W5 did not differ statistically from those who did not complete W5 on any of the following variables at baseline: disability level, frequency of positive or negative exchanges, age, perceived health status, gender, marital status, or ethnicity. Participants who completed W5, however, did report being significantly more educated,  $\chi^2(8, N = 482) = 15.61, p < .05$ .

### *Measures*

*Positive and negative social exchanges.*—A total of 24 items assessed participants' positive and negative exchanges with their social network members (described in Newsom, Nishishiba, Morgan, & Rook, 2003). This measure was designed to examine four common domains of positive social exchanges (three items per domain): emotional support, companionship, instrumental support, and informational support.

Table 1. Means, Standard Deviations, and Ranges of Study Variables ( $N = 482$ )

Variable	<i>M</i>	<i>SD</i>	Min	Max
Positive exchanges (W1)	2.25	0.92	0.00	4.00
Positive exchanges (W3)	2.42	0.78	0.00	4.00
Positive exchanges (W5)	2.44	0.83	0.00	4.00
Negative exchanges (W1)	0.36	0.53	0.00	3.75
Negative exchanges (W3)	0.38	0.53	0.00	4.00
Negative exchanges (W5)	0.38	0.55	0.00	3.00
Disability (W1)	0.38	0.81	0.00	7.00
Disability (W3)	0.95	1.87	0.00	13.00
Disability (W5)	1.17	2.18	0.00	15.00

Note: W = wave; *SD* = standard deviation.

Four corresponding domains of negative social exchanges also were assessed (three items per domain). These included insensitive or critical behavior by others, rejection or neglect by others, failure by others to provide tangible support in times of need, and unwanted or unsound advice provided by others.

Ratings made on a 5-point scale (0 = never, 4 = very often) assessed the frequency with which the social exchanges had occurred within the past month. We computed mean totals for the overall frequency of both positive and negative exchanges.

The decision to model trajectories of the frequency of positive and negative exchanges, as opposed to perceived availability of support, paralleled prior work examining the association between positive and negative aspects of social interactions and the onset or course of disability (e.g., Krause & Shaw, 2002; Seeman et al., 1996; Unger et al., 1999). Furthermore, employing a measure of the frequency of social exchanges that has demonstrated parallel content and equivalent validity across positive and negative subscales (Newsom et al., 2003) facilitated the interpretation of results and avoided potential methodological artifacts arising from the use of noncomparable measures of positive and negative aspects of social relationships (Finch et al., 1999; Rook, 1998).

*Physical disability.*—Ten items were drawn from measures that have been used in previous work to assess both instrumental ADL (IADL; Lawton & Brody, 1969) and ADL (Katz, Ford, & Moskowitz, 1963) difficulty. One's ability to participate in activities was evaluated on a 4-point scale (0 = not at all difficult, 3 = very difficult). To ensure that participants initially had little to no disability, we selected for further analysis those who responded with a 0 or 1 on all of the 10 items at baseline. Due to the fact that only three items were used to assess ADL difficulty and totals for the items tended to be low, it was difficult to model ADL disability separately over time. Thus, the analyses modeled only trajectories of IADL disability, which we derived from the sum of seven items used to assess IADL difficulty.

*Covariates.*—In all models, we treated as covariates baseline variables including gender (0 = male, 1 = female), age (which was centered at the grand mean), ethnicity (0 = ethnic minority, 1 = White), marital status (0 = unmarried, 1 = married), education level (0 = high school/vocational school or less, 1 =

at least some college), total number of 12 possible health conditions (e.g., arthritis or rheumatism, hypertension, diabetes), weight, and level of engagement in light or moderate physical activities (e.g., walking, light gardening; 0 = never, 6 = daily).

### Overview of Data Analyses

Univariate and bivariate analyses yielded means and standard deviations for continuous outcomes and zero-order correlations among key study variables. Next, given our interest in identifying various classes of individual trajectories of change in disability and social exchanges over time, we used LCGA. This statistical technique allows for the analysis of unbalanced, hierarchically nested, repeated measures data (Nagin & Tremblay, 2001). Most important, LCGA enables the evaluation of multiple clusters of developmental (i.e., longitudinal) trajectories over time (Jones et al., 2001; Jones & Nagin, 2005). We analyzed all LCGA models by using the SAS TRAJ macro in SAS Version 9.0 (SAS Institute, Cary, NC).

The first step in the LCGA procedure involved comparing various nested and unnested models sequentially and systematically in order to determine the optimal number of classes (i.e., clusters) and the shape (e.g., linear, quadratic, cubic) of the growth trajectories for each variable (D'Unger, Land, McCall, & Nagin, 1998; Jones et al., 2001; Nagin & Tremblay, 2001). We ultimately chose the model with the maximum (i.e., least negative) Bayesian information criterion for each of the three variables. To check for the distinctiveness of each of the trajectory classes, we contrasted confidence intervals about each trajectory group for degree of overlap, and we conducted a series of Wald tests to ensure that the identified groups were not parallel (Jones & Nagin, 2005). We adjusted individual trajectories for each of the three models for the following baseline covariates in order to control for potential confounding effects: gender, age, marital status, education level, ethnicity, number of health conditions, weight, and frequency of engagement in light or moderate physical activities. The trajectory groups discussed here are based on these adjusted, individual-level trajectories. Once we had identified the best fitting models, we estimated the probability of membership in each of the classes for disability conditional on membership in a given trajectory for positive and negative exchanges (Nagin & Tremblay, 2001).

### RESULTS

Although our ultimate interest was to identify distinct patterns of change over time and the association of such patterns for social exchanges and disability, we first conducted univariate analyses. Tables 1 and 2 present descriptive statistics and correlations among the study variables. When considering values averaged across all participants, a greater frequency of positive relative to negative exchanges was reported at each time point, a finding consistent with past research (Rook & Pietromonaco, 1987). Also in accordance with prior studies that found weak or nonsignificant correlations between positive and negative interactions (see review by Rook, 1994), despite a significant correlation at baseline, positive and negative exchanges were not related to one another across time.



Table 2. Zero-Order Correlations Among Study Variables

Variable	1	2	3	4	5	6	7	8	9
1. Positive exchanges (W1)	—	.42**	.43**	.14**	.07	.04	-.01	-.00	-.08
2. Positive exchanges (W3)		—	.56**	.02	.00	-.01	-.08	.03	-.06
3. Positive exchanges (W5)			—	-.02	-.02	-.05	.04	-.01	-.01
4. Negative exchanges (W1)				—	.55**	.49**	.13**	.13*	.04
5. Negative exchanges (W3)					—	.65**	.08	.08	.01
6. Negative exchanges (W5)						—	.05	.09	.04
7. Disability (W1)							—	.27**	.21**
8. Disability (W3)								—	.36**
9. Disability (W5)									—

Notes: W = wave.  
\**p* < .05; \*\**p* < .01.

*Selection of Longitudinal Trajectory Models for Positive and Negative Exchanges and Disability: LCGA*

A three-group model best fit the data for positive exchanges. Figure 1 presents the trajectories of the selected three-group model, with each trajectory representing the mean frequency of positive exchanges experienced by participants assigned to that class, controlling for covariates. One group of participants (17.5% of the sample) experienced consistently low levels of positive exchanges (“chronically low positive exchange” group), whereas 20.6% exhibited consistently high levels (“chronically high positive exchange”). Finally, a third group (61.9%) showed a slight linear increase in positive exchanges across waves (“moderate increaser positive exchange”).

As shown in Figure 2, a three-group model fit the data best for negative exchanges. Whereas one group consistently experienced little to no negative exchanges (“absent negative exchange”), another experienced relatively moderate negative exchanges that slightly increased in frequency over time (“moderate increaser negative exchange”). A third class, referred to as “chronically low negative exchange,” included 43.9% of the sample and displayed stable, low frequencies of

negative exchanges. Subsequent analyses (i.e., Wald tests and confidence intervals) supported the inclusion of all three groups in further analyses.

Figure 3 presents the best fitting three-group model for disability. Forty-two percent of the sample followed a pattern whereby little to no disability was present over the 2-year period (“absent disability”). A second trajectory group (50.0%) showed increases in disability at Wave 3 but showed improved functioning at Wave 5 (“low remitter disability”). The remaining 7.7% of the sample demonstrated a linear increase in disability over time (“increaser disability”).

*Examining Membership in Disability Trajectory Groups as a Function of Social Exchange Trajectory Group Membership*

*Which patterns of positive exchanges are associated with disability patterns?*—Table 3 presents results from analyses

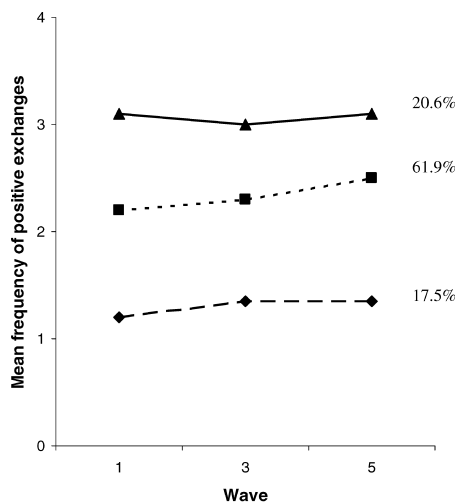


Figure 1. Trajectory groups of frequency of positive exchanges (PE).

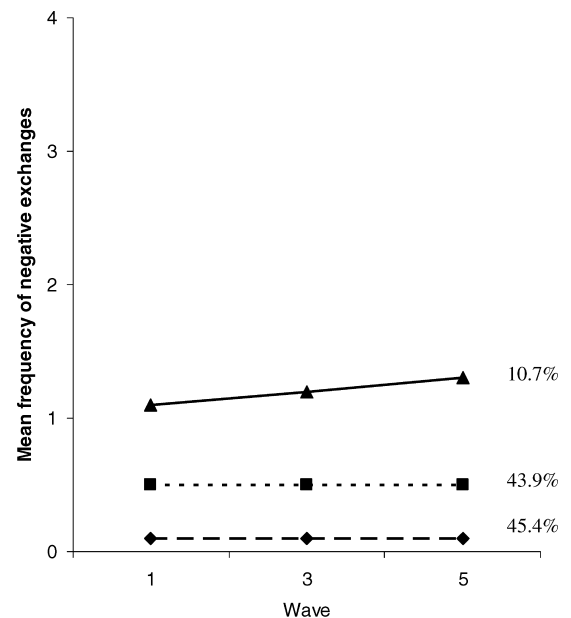


Figure 2. Trajectory groups of frequency of negative exchanges (NE).

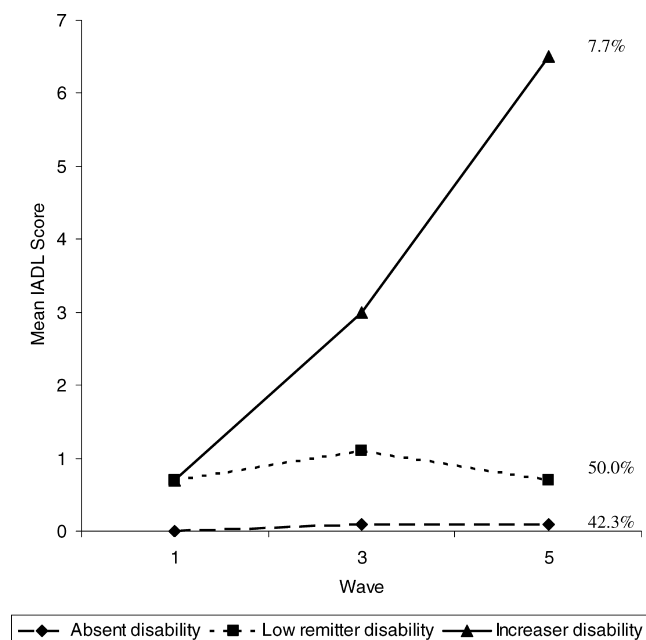


Figure 3. Trajectory groups of physical disability. IADL = instrumental activity of daily living.

examining the conditional probabilities of membership in each disability trajectory group given membership in the positive exchange groups. The majority (87.4%) of those in the chronically high positive exchange group belonged to either the absent ( $p < .01$ ) or low remitter ( $p < .001$ ) disability groups, with 12.6% experiencing increasing disability ( $p < .05$ ). Examination of the chronically low positive exchange group showed that although 13.8% ( $p < .05$ ) belonged to the increaser disability group, the majority belonged to either the low remitter (50.4%,  $p < .001$ ) or the absent (35.8%) disability groups, thus implying that low frequencies of positive exchanges are associated not only with an increase in disability over time but also with minimal disability. Finally, 56.2% ( $p < .001$ ) of those in the moderate increaser positive exchange group belonged to the low remitter disability group, whereas most of the remaining individuals demonstrated a pattern of little to no disability (39.4%,  $p < .001$ ).

Table 3. Probability of Disability Group Membership Conditional on Positive Exchange Group Membership

Positive Exchange Group	Disability Group		
	Absent	Low Remitter	Increaser
Chronically low	.36**	.50***	.14*
Moderate increaser	.39***	.56***	.04
Chronically high	.45***	.43**	.13*

Notes: Individual trajectories for disability and positive exchanges were adjusted for the following covariates: gender (0 = male, 1 = female), age, ethnicity (0 = ethnic minority, 1 = White), marital status (0 = unmarried, 1 = married), education level (0 = high school/vocational school or less, 1 = at least some college), total number of 12 possible health conditions (e.g., arthritis or rheumatism, hypertension, diabetes), weight, and level of engagement in light or moderate physical activities (e.g., walking, light gardening) (0 = never, 6 = daily).

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

Table 4. Probability of Disability Group Membership Conditional on Negative Exchange Group Membership

Negative Exchange Group	Disability Group		
	Absent	Low Remitter	Increaser
Absent	.58***	.31***	.11**
Chronically low	.35***	.65***	.00
Moderate increaser	.04	.71***	.25**

Notes: Individual trajectories for disability and positive exchanges were adjusted for the following covariates: gender (0 = male, 1 = female), age, ethnicity (0 = ethnic minority, 1 = White), marital status (0 = unmarried, 1 = married), education level (0 = high school/vocational school or less, 1 = at least some college), total number of 12 possible health conditions (e.g., arthritis or rheumatism, hypertension, diabetes), weight, and level of engagement in light or moderate physical activities (e.g., walking, light gardening) (0 = never, 6 = daily).

\*\* $p < .01$ ; \*\*\* $p < .001$ .

Which patterns of negative exchanges are associated with disability patterns?—When evaluating the conditional probabilities among disability and negative exchange trajectory groups, we found that the majority (71.3%) of participants in the moderate increaser negative exchange group belonged to the low remitter disability group, with 24.7% ( $p < .01$ ) showing a pattern of increasing disability (Table 4). Although membership in the absent negative exchange group was a modest predictor of increaser disability group membership, the majority belonged to the absent and low remitter disability groups. All participants showing chronically low negative exchanges demonstrated absent or low remitter disability patterns.

## DISCUSSION

The majority of past work examining the association between social exchanges and disability has focused on the effects of baseline levels of social support on the onset of disability or the probability of transitioning between states of disability and complete recovery over time. As a result, important questions regarding the relationship between both positive and negative social exchanges and changes in the level (i.e., severity) of disability over time have not been addressed. Furthermore, despite evidence suggesting that neither disability nor frequencies of positive and negative social exchanges invariably follow static, predictable patterns of decline in older adulthood, very little research has evaluated the associations among different patterns or trajectories of social exchanges and disability across multiple time points. The present study, therefore, sought to address some of these issues by examining the extent to which membership in distinct longitudinal trajectories of positive and negative social exchanges was associated with change in physical disability over time. Indeed, taken together, our results point to the importance of modeling and capturing both intraindividual change and stability over time within the same sample, thus more accurately portraying variance in the relationship between social exchanges and disability within the population.

The first goal was to determine the optimal number and shapes of the distinct trajectory groups for positive and negative exchanges and disability, adjusting for covariates. With regard to positive exchanges, two groups showed relatively stable

levels, with a third group demonstrating a modest, though significant, increase in the frequency of positive exchanges. These results are consistent with past research that has found intraindividual variation in both structural and functional aspects of social support, with some groups showing increases and others showing no significant change over time (Krause, 1999).

Examination of the frequency of negative exchanges similarly indicated that a three-group model best fit the data. Whereas two groups experienced stable, low levels of negative exchanges over the course of the 2-year assessment period, a small proportion reported a moderate level of negative exchanges with social network members that tended to increase slightly over time. Other studies of community-dwelling older adults have found similar trends of relatively low and/or stable negative exchanges (Krause & Rook, 2003; Rook, 1990, 1998).

Also in accordance with previous work, a three-group model best fit the data for disability, with one group showing little to no disability, a second group showing a linear increase in disability, and a third group showing a pattern of increased disability followed by remission (Anderson et al., 1998; Beckett et al., 1996; Branch et al., 1984; Crimmins & Saito, 1993; Rudberg et al., 1996).

Results from analyses of the conditional probabilities of belonging to the disability trajectory groups given membership in the various positive and negative exchange trajectory groups suggest that individuals in the chronically high positive exchange group were most likely to show a pattern of little to no disability or relatively low disability and functional recovery. These results suggest that experiencing positive exchanges (i.e., received social support) may serve a protective function and guard against a pattern of progressive functioning difficulties. This conclusion is further supported by the finding that membership in the moderate increaser positive exchange class, which was composed of individuals with relatively high levels of support across the three waves, also was associated with membership in the absent and low remitter disability groups. These findings are in line with prior work that has found that both structural and functional aspects of social support are associated not only with a reduced risk of developing disability in older adulthood (Avlund et al., 2004; Mendes de Leon et al., 1999; Seeman et al., 1995; Strawbridge, Cohen, Shema, & Kaplan, 1996) but also with fewer declines in physical performance and better physical functioning over time (Seeman et al., 1995). Nevertheless, it is important to note that membership in the chronically high positive exchange group also was associated with membership in the increaser disability group. It is possible that, among participants reporting more frequent positive exchanges and increasing disability, endorsements of positive social exchanges reflected a discrepancy between the amount and/or type of support that was wanted or needed and the support that was received. Prior work has linked such mismatches to negative psychological and health behavior outcomes (Martire et al., 2002; Newsom & Schulz, 1998; Reynolds & Perrin, 2004).

With respect to chronically low positive exchanges, results indicated that a significant proportion of individuals in the chronically low positive exchange group belonged to the increaser disability group. At first glance this may lend further

support to the argument that positive exchanges are protective, and thus, their absence may make one more susceptible to progressive increase in disability. It is important to note, however, that a larger percentage (35.8%) of this class belonged to the absent disability group. Therefore, consistent, low levels of positive exchanges were associated with an increase in disability over time as well as low levels of disability. The link between low positive exchanges and low disability is more unexpected, but it may be attributable to the role of personality characteristics involved in chronically low levels of positive exchanges. For instance, some individuals may be more self-reliant than others and thus may not need or seek out as much support from their network members. Moreover, experiencing a low level of positive exchanges may protect against increasing disability in its own right, as the receipt of support may elicit feelings of dependency and lack of autonomy among some individuals (Baltes, 1996).

Interesting results also emerged from the examination of patterns of joint membership in negative exchange and disability trajectory groups. As expected, 24.7% of participants who experienced relatively frequent negative exchanges (i.e., moderate increasers) demonstrated a pattern of increasing disability, with 71.3% belonging to the low remitter disability class. A very small, nonsignificant proportion of the participants (3.9%) who experienced frequent negative exchanges belonged to the absent disability class. Conversely, among older adults showing chronically low and absent levels of negative exchanges, the majority belonged to either the absent or low remitter disability groups.

This set of results is in line with the findings from one of the few studies conducted to date that specifically examined negative social exchanges and disability in older adulthood (Krause & Shaw, 2002). Krause and Shaw used multiple regression techniques to model average change in disability from baseline and found that negative interactions in late life were positively associated with declines in ADL and IADL functioning. Such associations can be attributed to the fact that negative interpersonal exchanges might serve as chronic stressors that induce disability onset and progression (Krause & Shaw, 2002; Pearlin, 1989). Accordingly, experiencing a low frequency of negative exchanges may protect an individual from increasing disability and aid in functional recovery. It is worth mentioning, however, that 11.1% of those in the absent negative exchange group showed increases in disability over time. It is possible that for this group, the absence of negative exchanges was indicative of a low frequency of social exchanges in general, which may have been associated with increases in disability given the health-protective role of positive exchanges.

In sum, the results from the current study highlight the importance of construing both social exchanges and disability as dynamic longitudinal processes that demonstrate heterogeneity and intraindividual variation over time. Furthermore, these findings point to the value of using statistical methods that allow for the identification and analysis of distinct classes, or trajectories, of growth within the population. Such methods capture the relationships between numerous potential pathways of change across variables, a task that cannot be completed using traditional regression or hierarchical linear models. Nonetheless, there are a number of limitations that must be

noted in taking stock of the findings from the current study and in considering directions for future research.

First, there was attrition in the sample over time. Although comparison of individuals who did and did not participate in all three waves of the study revealed no significant baseline differences in disability level, frequency of positive or negative exchanges, age, perceived health status, gender, marital status, or ethnicity, those who did complete all three waves did report greater levels of education. Thus, although the overall response and dropout rates in the current study were similar to those found in other studies of older adults (Cooney, Schaie, & Willis, 1988; Rogers & Herzog, 1992), the results may not generalize to older adults with lower levels of education. Likewise, given our selection of older adults with little to no baseline disability, findings from the current study may not generalize to populations with more severe disability.

Next, the 2-year assessment period utilized in the current study may not have been sufficiently long to examine the gradual, long-term, cumulative impact of social exchanges on disability. Moreover, given that the measurement points were each separated by a span of 1 year, more immediate, direct influences of changes in social exchanges on self-reports of disability may not have been captured. Although the temporal distance between the waves in this study was comparable to that of other studies that have examined the association between negative exchanges and disability (Krause & Shaw, 2002), future work might benefit from the use of more frequent time points that span a longer time frame.

Although the comprehensive and multifaceted measure used to tap the frequency of positive and negative social exchanges was one of the strengths of this study, future work linking social network factors to disability might benefit from the use of a measure that is specifically tailored to persons with a disability. For example, an assessment of the frequency of positive and negative exchanges that take place as a direct result of one's disability and one's appraisal of these interactions might more readily detect hostile, overbearing, or dependency-inducing interpersonal behaviors in which network members sometimes engage. Our measure of positive support also was designed to assess received support rather than perceptions of available support. Some authors (Barrera, 1986; Sarason, Pierce, & Sarason, 1990) have argued that more subjective aspects of support, such as perceived availability, may be more potent predictors of mental and physical health. Future work, therefore, might consider exploring perceived as opposed to received support. Furthermore, in light of evidence suggesting that social support buffers the adverse effects of negative stressors (cf. Cohen, 2004), examination of the potential moderating effects of perceived support on the relationship between negative exchanges and disability would prove to be a valuable contribution to the literature in this area.

Distinguishing between social exchanges that occur in the context of obligatory (e.g., kin relationships) versus voluntary (e.g., friends) relationships also may be a valuable avenue for future work. This suggestion is supported in part by research that has shown that negative interactions in late adulthood are more likely to take place among family members than among friends (Morgan, 1989). Given that disability may lead to a decrease in social interactions with friends and an increase in interactions with family members, it would be useful to

examine the differential impact on changes in disability of positive and negative exchanges with friends versus family members.

As this last point suggests, it is important to take into consideration that the association between disability and frequency of social exchanges (positive and negative) is reciprocal and mutually reinforcing over time. Although the current analyses focused on the conditional probabilities of demonstrating various longitudinal patterns of disability as a function of patterns of positive and negative exchanges, the possibility that changes in disability levels altered the nature and frequency of social exchanges with network members cannot be ruled out. Physical disability affects numerous aspects of social functioning, including social network composition, participation in social activities, and the perceived quality and quantity of support that is received (Fyrand, Moum, Finset, & Glennas, 2002; Fyrand, Moum, Wichstrom, Finset, & Glennas, 2000). Future investigations that model the bidirectional and, perhaps more important, lagged associations between social exchanges and disability would not only add to current knowledge on this topic but would also help better set the stage for exploration of the mechanisms by which these constructs are linked.

The results of the present study may inform the evaluation and treatment of older adults who are currently experiencing or at risk for disability. The fact that various distinct patterns of social exchanges related to the course of disability suggests that improving the social environment by educating and counseling not only older adults, but also their network members, may help to alleviate future symptoms and increasing disability. It is important to recognize, however, that no one intervention will be uniformly effective across individuals. Findings from this study highlight the possible value in tailoring treatments and interventions at the individual level, as the need and desire for various types of support, and the potential challenges posed by negative interactions with network members, will most likely vary for each person.

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#### REFERENCES

- Anderson, R. T., James, M. K., Miller, M. E., Worley, A. S., & Longino, C. F. (1998). The timing of change: Patterns in transitions in functional status among elderly persons. *Journal of Gerontology: Social Sciences*, *53B*, S17–S27.
- Aneshensel, C. S., Frerichs, R. R., & Huba, G. J. (1984). Depression and physical illness: A multiwave, nonrecursive causal model. *Journal of Health and Social Behavior*, *25*, 350–371.
- Avlund, K., Lund, R., Holstein, B. E., & Due, P. (2004). Social relations as determinant of onset of disability in aging. *Archives of Gerontology and Geriatrics*, *38*, 85–99.
- Baltes, M. M. (1996). *The many faces of dependency in old age*. New York: Cambridge University Press.



- Barrera, M. (1986). Distinctions between social support concepts, measures, and models. *American Journal of Community Psychology, 14*, 413–445.
- Beckett, L. A., Brock, D. B., Lemke, J. H., Mendes de Leon, C. F., Guralnik, J. M., Fillenbaum, G. G., et al. (1996). Analysis of change in self-reported physical function among older persons in four population studies. *American Journal of Epidemiology, 143*, 766–778.
- Branch, L. G., Katz, S., Knipmann, K., & Papsidero, J. (1984). A prospective study of functional status among community elders. *American Journal of Public Health, 74*, 266–268.
- Bruce, M. L. (1999). The association between depression and disability. *American Journal of Geriatric Psychiatry, 7*, 8–11.
- Cohen, S. (2004). Social relationships and health. *American Psychologist, 59*, 676–684.
- Cooney, T. M., Schaie, K. W., & Willis, S. L. (1988). The relationship between prior functioning on cognitive and personality dimensions and subject attrition in longitudinal research. *Journal of Gerontology: Psychological Sciences, 43B*, P12–P17.
- Crimmins, E. M., & Saito, Y. (1993). Getting better and getting worse: Transition in functional status among older Americans. *Journal of Aging and Health, 5*, 3–36.
- D'Unger, A. V., Land, K. C., McCall, P. L., & Nagin, D. S. (1998). How many latent classes of delinquent/criminal careers? Results from mixed Poisson regression analyses of the London, Philadelphia, and Racine cohort studies. *American Journal of Sociology, 103*, 1593–1630.
- Finch, J. F., Okun, M. A., Pool, G. J., & Ruehlman, L. S. (1999). A comparison of the influence of conflictual and supportive interactions on psychological distress. *Journal of Personality, 67*, 581–621.
- Fyrand, L., Moum, T., Finset, A., & Glennas, A. (2002). The impact of disability and disease duration on social support of women with rheumatoid arthritis. *Journal of Behavioral Medicine, 25*, 251–268.
- Fyrand, L., Moum, T., Wichstrom, L., Finset, A., & Glennas, A. (2000). Social network size of female patients with rheumatoid arthritis compared to healthy controls. *Scandinavian Journal of Rheumatology, 29*, 38–43.
- Glass, T. A., Matchar, D. B., Belyea, M., & Feussner, J. R. (1993). Impact of social support on outcome in first stroke. *Stroke, 24*, 64–70.
- Hays, J. C., Saunders, W. B., Flint, E. P., Kaplan, B. H., & Blazer, D. G. (1997). Social support and depression as risk factors for loss of physical function in late life. *Aging and Mental Health, 1*, 209–220.
- Jones, B. L., & Nagin, D. S. (2005). *Advances in group-based trajectory modeling and a SAS procedure for estimating them*. Manuscript submitted for publication.
- Jones, B. L., Nagin, D. S., & Roeder, K. (2001). A SAS procedure based on mixture models for estimating developmental trajectories. *Sociological Methods and Research, 29*, 374–393.
- Katz, S. C., Ford, A. B., & Moskowitz, R. W. (1963). Studies of illness in the aged. The index of ADL: A standardized measure of biological and psychosocial function. *Journal of the American Medical Association, 185*, 914–919.
- Kiecolt-Glaser, J. K. (1999). Stress, personal relationships, and immune function: Health implications. *Brain, Behavior, and Immunity, 13*, 61–72.
- Krause, N. (1999). Assessing change in social support during late life. *Research on Aging, 21*, 539–569.
- Krause, N., & Rook, K. S. (2003). Negative interaction in late life: Issues in the stability and generalizability of conflict across relationships. *Journal of Gerontology: Psychological Sciences, 58B*, P88–P99.
- Krause, N., & Shaw, B. A. (2002). Negative interaction and changes in functional disability during late life. *Journal of Social and Personal Relationships, 19*, 339–359.
- Lawton, M. P., & Brody, E. M. (1969). Assessment of older people: Self-maintaining and instrumental activities of daily living. *The Gerontologist, 9*, 179–186.
- Marsland, A. L., Bachen, E. A., Cohen, S., & Manuck, S. B. (2001). Stress, immunity, and susceptibility to infectious disease. In A. Baum, T. A. Revenson, & J. E. Singer (Eds.), *Handbook of health psychology* (pp. 683–695). Mahwah, NJ: Erlbaum.
- Martire, L. M., Schulz, R., Mittlmark, M. B., & Newsom, J. T. (1999). Stability and change in older adults' social contact and social support: The Cardiovascular Health Study. *Journal of Gerontology: Social Sciences, 54B*, S302–S311.
- Martire, L. M., Stephens, M. A., Druley, J. A., & Wojno, W. C. (2002). Negative reactions to received spousal care: Predictors and consequences of miscarried support. *Health Psychology, 21*, 167–176.
- Mendes de Leon, C. F., Glass, T. A., Beckett, L. A., Seeman, T. E., Evans, D. A., & Berkman, L. F. (1999). Social networks and disability transitions across eight intervals of yearly data in the New Haven EPESE. *Journal of Gerontology: Social Sciences, 54B*, S162–S172.
- Mendes de Leon, C. F., Glass, T. A., & Berkman, L. F. (2003). Social engagement and disability in a community population of older adults: The New Haven EPESE. *American Journal of Epidemiology, 157*, 633–642.
- Mendes de Leon, C. F., Gold, D. T., Glass, T. A., Kaplan, L., & George, L. K. (2001). Disability as a function of social networks and support in elderly African Americans and Whites: The Duke EPESE 1986–1992. *Journal of Gerontology: Social Sciences, 56B*, S179–S190.
- Morgan, D. L. (1989). Adjusting to widowhood: Do social networks really make it easier? *The Gerontologist, 29*, 101–107.
- Nagin, D. S., & Tremblay, R. E. (2001). Analyzing developmental trajectories of distinct but related behaviors: A group-based method. *Psychological Methods, 6*, 18–34.
- Newsom, J. T. (1999). Another side to caregiving: Negative reactions to being helped. *Current Directions in Psychological Science, 8*, 183–187.
- Newsom, J. T., Nishishiba, M., Morgan, D. L., & Rook, K. S. (2003). The relative importance of three domains of positive and negative social exchanges: A longitudinal model with comparable measures. *Psychology and Aging, 18*, 746–754.
- Newsom, J. T., & Schulz, R. (1998). Caregiving from the recipient's perspective: Negative reactions to being helped. *Health Psychology, 17*, 172–181.
- Pearlin, L. I. (1989). The sociological study of stress. *Journal of Health and Social Behavior, 22*, 337–356.
- Reynolds, J. S., & Perrin, N. A. (2004). Mismatches in social support and psychosocial adjustment to breast cancer. *Health Psychology, 23*, 425–430.
- Rogers, W. L., & Herzog, A. R. (1992). Collecting data from the oldest old: Problems and procedures. In R. M. Suzman, D. P. Willis, & K. G. Manton (Eds.), *The oldest old* (pp. 135–156). New York: Oxford University Press.
- Rook, K. S. (1984). The negative side of social interaction: Impact on psychological well-being. *Journal of Personality and Social Psychology, 46*, 1097–1108.
- Rook, K. S. (1990). Stressful aspects of older adults' social relationships: Current theory and research. In M. P. Stephens, J. H. Crowther, S. E. Hobfoll, & D. L. Tennenbaum (Eds.), *Stress and coping in later-life families. Series in applied psychology* (pp. 173–192). Washington, DC: Hemisphere.
- Rook, K. S. (1994). Assessing the health-related dimensions of older adults' social relationships. In M. P. Lawton & J. Teresi (Eds.), *Annual review of gerontology and geriatrics* (Vol. 1, pp. 142–181). New York: Springer.
- Rook, K. S. (1998). Investigating the positive and negative sides of personal relationships: Through a glass darkly? In B. H. Spitzberg & W. R. Cupach (Eds.), *The dark side of close relationships* (pp. 369–393). Mahwah, NJ: Erlbaum.
- Rook, K. S., & Pietromonaco, P. R. (1987). Close relationships: Ties that heal or ties that bind? In W. H. Jones & D. Perlman (Eds.), *Advances in personal relationships* (Vol. 1, pp. 1–35). Greenwich, CT: JAI Press.
- Rudberg, M. A., Parzen, M. I., Leonard, L. A., & Cassel, C. K. (1996). Functional limitation pathways and transitions in community-dwelling older persons. *The Gerontologist, 36*, 430–440.
- Sarason, B. R., Pierce, G. R., & Sarason, I. G. (1990). Social support: The sense of acceptance and the role of relationships. In B. R. Sarason, I. G. Sarason, & G. R. Pierce (Eds.), *Social support: An interactional view* (pp. 97–128). New York: Wiley.
- Seeman, T. E., Berkman, L. F., Charpentier, P. A., Blazer, D. G., Albert, M. S., & Tinetti, M. E. (1995). Behavioral and psychosocial predictors of physical performance: MacArthur Studies of Successful Aging. *Journal of Gerontology: Medical Sciences, 50A*, M177–M183.

- Seeman, T. E., Bruce, M. L., & McAvay, G. J. (1996). Social network characteristics and onset of ADL disability: MacArthur Studies of Successful Aging. *Journal of Gerontology: Social Sciences, 51B*, S191–S200.
- Seeman, T. E., & McEwen, B. S. (1996). Impact of social environment characteristics on neuroendocrine regulation. *Psychosomatic Medicine, 58*, 459–471.
- Sorkin, D. H., & Rook, K. S. (2004). Interpersonal control strivings and vulnerability to negative social exchanges in later life. *Psychology and Aging, 19*, 555–564.
- Stephens, M. A. P., Druley, J. A., & Zautra, A. J. (2002). Older adults' recovery from surgery for osteoarthritis of the knee: Psychosocial resources and constraints as predictors of outcomes. *Health Psychology, 21*, 377–383.
- Strawbridge, W. J., Cohen, R. D., Shema, S. J., & Kaplan, G. A. (1996). Successful aging: Predictors and associated activities. *American Journal of Epidemiology, 144*, 135–141.
- Stuck, A. E., Walther, J. M., Nikolaus, T., Bula, C. J., Hohmann, C., & Beck, J. C. (1999). Risk factors for functional status decline in community-living elderly people: A systematic literature review. *Social Science and Medicine, 48*, 445–469.
- Uchino, B. N., Cacioppo, J. T., & Kiecolt-Glaser, J. K. (1996). The relationship between social support and physiological processes: A review with emphasis on underlying mechanisms and implications for health. *Psychological Bulletin, 119*, 488–531.
- Unger, J. B., McAvay, G., Bruce, M. L., Berkman, L., & Seeman, T. (1999). Variation in the impact of social network characteristics on physical functioning in elderly persons: MacArthur Studies of Successful Aging. *Journal of Gerontology: Social Sciences, 54B*, S245–S251.
- Wilcox, V. L., Kasl, S. V., & Berkman, L. F. (1994). Social support and physical disability in older people after hospitalization: A prospective study. *Health Psychology, 13*, 170–179.

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