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Social capital and employee well-being: disentangling intrapersonal and interpersonal selection and influence mechanisms*

RÉSUMÉ

Nous estimons que les explications sociologiques proposées dans le cadre du *capital social* pour expliquer le bien-être individuel sont incomplètes car elles ne font pas de distinction entre les mécanismes d'influence interpersonnelle et de sélection d'une part, et les processus cognitifs intrapersonnels d'autre part. Dans ce but, trois modèles théoriques de l'interaction dynamique entre la confiance interpersonnelle et la satisfaction au travail servent à élaborer et à tester empiriquement six hypothèses. Tout d'abord, d'après les mécanismes d'influence, la satisfaction au travail d'un individu peut résulter du nombre de choix de confiance sociométriques qu'il reçoit (effet de popularité) ou du degré de satisfaction au travail des acteurs à qui il fait confiance (effet de contamination). Deuxièmement, les mécanismes de sélection partent du principe qu'un acteur focal sera plus susceptible de développer des relations interpersonnelles avec des collègues dont le degré de satisfaction au travail est élevé (effet d'attraction) ou dont les degrés de satisfaction au travail sont semblables à ceux de l'acteur focal (effet d'homophilie). Enfin, d'après les mécanismes de propagation intrapersonnelles, un degré de satisfaction au travail élevé peut faciliter la création de relations de confiance interpersonnelles (propagation de la satisfaction), où les individus à l'origine d'un nombre important de relations de confiance interpersonnelles manifestent des degrés de satisfaction plus élevés (propagation de la confiance). Les données du réseau social longitudinal intra-organisationnel d'une société d'hébergement néerlandaise (n = 57) sont utilisées pour tester simultanément ces six hypothèses. Nous constatons un effet de contamination significatif, mais rien ne vient appuyer l'effet de popularité ni aucun des effets de sélection. De plus, contrairement à nos attentes, les employés dont le degré de satisfaction au travail est faible sont nettement plus susceptibles de développer des relations de confiance envers les autres.

Ever since the discovery of the “informal organization” through the now classic Hawthorne Experiments (Roethlisberger and Dickson, 1939), the impact of social relationships and group processes on individual and organizational outcomes has become a central concern among sociologists. These

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findings have had a lasting impact on the research agenda of the discipline in at least two ways. First, the Hawthorne studies provided an invaluable impulse for the development of a general theory of groups (Homans, 1950) and social capital (Bourdieu, 1986; Burt, 1992; Coleman, 1988). Second, with the emergence of the *human relations school* and its emphasis on the well-being of individual employees, researchers began to shift their attention from the technical to the social context, finding the latter to be one of the prime motivators of behavior in organizations.

A key theoretical contribution of this research is that it has elicited what should become one of the fundamental social mechanisms linking aspects of social groups to group level outcomes: social relationships improve individual and organizational performance, because they positively affect the satisfaction and well-being of employees (Perrow, [1972] 1986). Since then, employee well-being has remained a central topic for organizational sociologists. One of the central dimensions of employee well-being, job satisfaction, has become one of the most frequently studied variables in research on organizational behavior (see, *e.g.*, Spector, 1997, for an overview), due to its assumed positive impact on a large variety of individual and organization level outcomes, such as organizational climate, effort, productivity, cooperation, health, turnover and performance (see Perrow, [1972] 1986, for an early critical discussion of this literature).

In line with the general idea that an individual's social capital embodies resources, most current sociological explanations assume that social relationships affect job satisfaction through providing access to social support and valuable goods (see Hurlbert, 1991; Umberson *et al.*, 1996; Requina, 2003). Hence, depending on their position in the informal network, some employees are better able to generate social support, and mobilize advice or help than others. Their social capital improves their action opportunities, reduces potential constraints imposed by the context and, thereby, increases their well-being.

In this article, we will argue that such constraint-driven social capital explanations are incomplete. Sociological models of the interplay between social context and individual attitudes and behavior need a better micro-foundation, which will not only explicate the structure of opportunities and constraints of the social context, but also specify the psychological and cognitive processes they trigger. Hence, our proposal advocates what has become known as the *social mechanism* approach in analytical sociology (Hedström and Swedberg, 1998; Hedström, 2005). More specifically, we will argue that in order to fully understand the relationship between trust and an employee's job satisfaction in an organization, constraint-based social capital arguments need to be positioned in the context of three different classes of mechanisms.

The first set consists of *interpersonal influence mechanisms* (*e.g.*, Friedkin, 2001; Erickson, 1988). According to this structuralist perspective, an individual's attitudes and emotions are strongly determined by the social context. Because of their position in the social structure, some employees are more strongly exposed to the attitudes and beliefs of their colleagues than others are.

Explanations based on social-influence reasoning emphasize the impact of the social context on individual actors, who are conceptualized as passive recipients in an exogenously given social structural context. Since the Hawthorne experiments, such interpersonal influence mechanisms have provided the major frame of reference for models of employee well-being, and other individual and group level outcomes. Such an approach has obvious links with the broader social support literature from the 1980s and 1990s (e.g., Thoits, 1985). However, more recent advances in social network methodology and cognitive psychology have enabled the specification of two alternative mechanisms. We will contend that sociological research on social capital and its outcomes will remain incomplete as long as it neglects these alternative mechanisms.

The second class of mechanisms builds on the idea of *interpersonal selection*. Here, individuals are conceived as actively creating their social environment: an employee chooses his interaction colleagues based on the latter's characteristics (including attitudes, beliefs and sentiments). This approach emphasizes the idea that individuals shape their own social environment, and that an individual's well-being can affect whom he or she builds social relationships with. Although selection mechanisms such as the homophily principle have a long tradition in sociological reasoning (Lazarsfeld and Merton, 1954), they have not yet been adequately incorporated in models of job satisfaction. It is only with the substantial refinement of methodology for the analysis of network dynamics that it has become possible to clearly disentangle influence and selection processes (Steglich, Snijders, and Pearson, 2007).

Finally, we will identify a third class of mechanisms, which can be labeled *intrapersonal spillover mechanisms*. An individual's attitudes and sentiments may be related to his *own* tendency to build ties to others. According to this view, job satisfaction may either affect his or her *own* sociometric choice behavior, such as the degree to which a person tends to trust others (see Jones and George, 1998) or, alternatively, this person's sociometric choice behavior may have repercussions on his or her *own* attitudes and emotions. Research on the interplay between sociometric choice behavior, on the one hand, and individual personality traits, moods, and emotions, on the other, is a relatively new field. As a result, this type of social mechanism is still virtually absent in social capital and social network research.

The empirical scope of our study is limited to the specific issue of job satisfaction and interpersonal trust relationships in organizational settings. Nevertheless, this study will propose a set of general social mechanisms that might not only be relevant in other social settings as well, but that can also be tested for other types of social relationships and individual level attitudes.

In the next section we will elaborate further on the theoretical background and hypotheses that link trust ties to job satisfaction. In section three, we will present the data and research design. In section four, we will subsequently test the relative importance of intrapersonal spillover effects and interpersonal

influence and selection processes, using a longitudinal network approach. We will conclude by discussing the implications and limitations of this study.

Theoretical background and hypotheses

Trust and job satisfaction are among the concepts that have received considerable attention in organizational research. Yet, quite different views exist about the exact meaning of these concepts. In line with Lewicki, Tomlinson, and Gillespie (2006, p. 904), we will define interpersonal trust as confident expectations and/or willingness to be vulnerable. As a result trust is conceptualized as including cognitive, affective, and behavioral intention elements (1). Such a cognitive and affective dimension can also be found in the job satisfaction concept. Spector (1997) describes job satisfaction as “how people feel about their jobs and different aspects of their jobs. It is the extent to which people like (satisfaction) or dislike (dissatisfaction) their jobs” (p. 2). Hence, job satisfaction contains an affective component – how a person feels about his job and the work situation (Barsade and Gibson, 2007). It also involves a cognitive process (Fisher, 2000); this involves an evaluation or a judgment, which centers on the comparison of the observed reality about the work situation with some idea about the ideal situation (see Fisher, 2000, p. 185). As a result, both cognitive and affective mechanisms are likely to be involved in the interplay between interpersonal trust and satisfaction.

Interpersonal influence mechanisms: popularity and contagion

Many social theories suggest that social relationships affect an individual’s attitudes, sentiments and behavior. Two major types of influence mechanisms can generally be distinguished (*e.g.*, Ibarra and Andrews, 1993; see also Borgatti and Foster, 2003). We will refer to them as *popularity* and *contagion*.

Popularity. Here we are building on *self-determination theory* (Deci *et al.*, 1999; Deci and Ryan, 2002; Ryan and Deci, 2000) in order to explain the effect of the number of received interpersonal trust choices on an actor’s job satisfaction. Central to this theory is the idea that secure attachments to others are important sources of well-being. Attachment security is a function of the

(1) Research on organizational trust falls into two categories: studies conceptualizing trust as a feeling of confidence and support in an employer or one’s colleagues (*i.e.*, an individual level trait; see, *e.g.*, Driscoll, 1978; Thoms, Dose, and Scott, 2002), and studies addressing trust as an interpersonal relationship between individuals. Our study focuses on the

latter. However, it is beyond the scope of this paper to provide an extensive discussion of trust. We refer the interested reader to, for example, discussions in Mayer, Davis, and Schoorman (1995), McAllister (1995), Rousseau *et al.* (1998), Rousseau (1998), Kramer (1999), Dirks and Ferrin (2001) and Lewicki, Tomlinson, and Gillespie (2006).

degree to which specific others contribute to the fulfillment of basic needs – relatedness, autonomy and competence – and these relational attachments in turn are a precondition for individual well-being. Popularity – defined as the number of sociometric choices a person receives (*i.e.*, “indegree centrality”) – has been shown to be a key factor in satisfying the need for relatedness. Contacts with others may be expected to provide recognition and status, and to enhance an individual’s self-esteem. Several empirical studies, most of them on adolescents and pupils, indeed found that popularity was one of the key goals of humans (Jarvinen and Nicholls, 1996).

The positive impact of centrality on job satisfaction within small groups (Shaw, 1964) has already been reported in a series of early studies in the 50s and 60s. Roberts and O’Reilly (1979) reported how participants with communication ties had a higher job satisfaction than those who did not have any ties. More recent research reports similar findings (*e.g.*, Flap and Volker, 2001), showing that close personal ties like friendship relationships are particularly important for an actor’s well-being (*e.g.*, Morrison, 2004). In a study among MBA students on the link between centrality in informal networks and satisfaction with an educational program, Baldwin, Bedell, and Johnson (1997) argued that close friendship ties affect satisfaction in two ways. First, such ties are an important resource for psychosocial support; they are likely to enhance enjoyment and to buffer work problems. Second, they are instrumentally important for successful negotiations and enable access to crucial resources (*i.e.*, information). In sum, empirical research provides evidence for the claim that popularity and influence are robust predictors of well-being (Hahn and Oishi, 2006; Sheldon *et al.*, 2001) and that the number of peer nominations received is related to self-esteem and reduction of peer role strain (de Bruyn and van den Boom, 2005). Given the importance of trust among friends, and in particular the possibility of disclosing personal information among friends (Fischer, 1982; Agneessens, Waeye, and Lievens, 2006), being trusted by many others can be expected to be related both to close affective ties and more instrumental communication ties and according to the arguments proposed above, can be expected to generate a more positive attitude towards work in general.

In addition to their beneficial affective implications, interpersonal trust relationships are also likely to facilitate collaboration and the exchange of information and other resources (*e.g.*, Kramer, 1999; Tsai and Ghoshal, 1998). Trust put in ego can make ego’s views more important and hence may increase ego’s power and influence over others (*e.g.*, Brass and Burkhardt, 1993) as well as ego’s performance (*e.g.*, Cross and Cummings, 2004; Lazega *et al.*, 2007). Hence, being considered trustworthy by others can increase the availability of resources, such as information, which in turn is expected to affect performance and well-being. Both the instrumental and more affective arguments predict that actors receiving a high number of interpersonal trust choices are more satisfied.

Popularity Hypothesis (H1): The higher the number of interpersonal trust choices received by a focal actor (indegree centrality), the more likely it is that the job satisfaction of the focal actor will increase over time.

Contagion. A second type of interpersonal influence mechanism focuses on how a focal individual's attitudes and behavior are influenced by the attitudes and behavior of his or her contacts (*e.g.*, Caldwell and O'Reilly, 2003; Marsden and Friedkin, 1994). Two different theories lead to a similar hypothesis.

First, according to *social information theory* (Salancik and Pfeffer, 1977; Festinger, 1954) perceptions and evaluation schemes are formed within a social context (see O'Reilly and Caldwell, 1985). Job satisfaction can be considered as a "social construction" (Salancik and Pfeffer, 1977), which is formed by comparing one's own vision to that of others. When evaluating their own job, individuals are influenced in this evaluation by criteria and evaluation schemes of those others whom they have a close relationship with (Ferrin, Dirks, and Shah, 2006). Hence, the level of job satisfaction of a person can be expected to be affected by the job satisfaction of those colleagues he trusts. A number of empirical studies have shown how personal social relationships affect opinions and attitudes, including job satisfaction, by means of social contagion (Raabe and Beehr, 2003; Ibarra and Andrews, 1993; Kilduff, 1990; Rice and Aydin, 1991; Umphress *et al.*, 2003; Brass *et al.*, 2004). Krackhardt and Kilduff (1990) have shown that friends generally tend to agree more about coworkers' behavior (2). Hence, trust ties can be expected to be a major source of social contagion with respect to job satisfaction.

Second, *mood linkage*, *affective sharing*, and *emotional contagion* theories (Kelly and Barsade, 2001; Barger and Grandey, 2006; Cote, 2005) argue that moods and sentiments are transferred between two people through a variety of conscious and unconscious processes, like emotional contagion or behavioral entrainment. These theories claim that consistent affective reactions between two persons come about through unconsciously mimicking or adjusting to each other's expressions. Such affective sharing can occur particularly through interpersonal trust, because trust – as we have defined it here – encompasses such a strong affective bond. Recent research on emotional contagion (Barger and Grandey, 2006; Cote, 2005) does indeed show that emotion regulation abilities are associated with peer nominations of interpersonal sensitivity, the proportion of positive *versus* negative peer nominations, and reciprocal friendship nominations (Lopes *et al.*, 2005). Anderson, Keltner, and John (2003) show that individuals in a social relationship become emotionally similar over time, because this similarity helps to coordinate the thoughts and behaviors of the actors involved, increasing their mutual

(2) In fact, following the discomfort of cognitive dissonance (Festinger, 1957), Krackhardt and Kilduff (1990) have shown that disagreement between friends concerning opinions about others in the organizations in

fact leads to lower job satisfaction itself. However, since in this study job satisfaction is the attitude for which similarity is considered, we cannot test such a hypothesis here.

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understanding and social cohesion. Totterdell *et al.* (2004) showed that employees connected by work ties had a greater similarity of job-related affect than those who were not connected.

Building on such affect-related theories as *mood linkage*, *affect sharing* and *emotional contagion theories*, as well as on the more cognitive *social information theory*, we therefore hypothesize that the level of job satisfaction of a focal actor's contacts is likely to influence this actor's level of job satisfaction.

Contagion Hypothesis (H2): The higher (lower) the mean job satisfaction of those colleagues whom a focal actor trusts, the more likely it will be that the job satisfaction of the focal actor will increase (decrease) over time.

Interpersonal selection mechanisms: attractiveness and homophily

A competing series of explanations for the link between trust and job satisfaction focuses on interpersonal selection (see Mouw, 2006). Selection mechanisms share the idea that individual traits determine relational choices. Within this logic, the job satisfaction of the receiver, as well as the similarity between the sender and receiver, can be expected to affect the interpersonal trust relationships between them. We therefore turn our focus to two mechanisms for the emergence of interpersonal trust: *attractiveness* and *homophily*.

Attractiveness. A person's attractiveness refers to the degree to which others are inclined to build and maintain a personal relationship with this person. Both cognitive and affective conditions can play a role in a person's decision whether or not to build an interpersonal trust relationship with a focal actor (Kramer, 1999). *Emotional contagion theory* suggests that positive attitudes increase a person's attractiveness. For example, Bono and Ilies (2006) found that the positive emotional expression of leaders increased followers' attraction to the leader. Being in a positive mood might also lead to helpful behavior and cooperation, which in turn might generate trust (Brief and Weiss, 2002, p. 294; Isen and Baron, 1991).

At a more cognitive level, Jones and George (1998, pp. 532-533) argued that cooperative attitudes provide crucial information about the other party's trustworthiness (see also Butler, 1995; Ferrin, Dirks, and Shah, 2006). Since job satisfaction has been found to be related to cooperative behavior (Williams and Anderson, 1991; Smith, Organ, and Near, 1983), satisfied colleagues might be conceived as being more cooperative.

Hence, individuals exhibiting a high level of job satisfaction might be considered to be more trustworthy than individuals low in satisfaction, even when controlling for possible differences in popularity of the actor in the network.

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Attractiveness Hypothesis (H3): The higher the level of job satisfaction of the focal actor, the more likely it is that colleagues will direct an interpersonal trust choice to this focal actor.

Homophily. For a long time now, similarity of characteristics has been one of the major predictors of the emergence of social ties (*e.g.*, McPherson, Smith-Lovin, and Cook, 2001; Lazarsfeld and Merton, 1954; Louch, 2000). Actors generally tend to develop ties with others whom they consider similar to themselves (Byrne, 1971) (3). Similarity in status, values, attitudes and beliefs breeds social ties, because it enhances the predictability of the behavior of alters, particularly where other reliable cues of trustworthiness are absent (see Kramer, 1999), and triggers empathy with alters (Lazarsfeld and Merton, 1954; van de Bunt, Wittek, and de Klepper, 2005). Attitudinal similarity with regard to job satisfaction is an indicator of a shared vision and/or feeling regarding the organization or the job, which in turn can breed organizational and interpersonal trust (Kramer, 1999, p. 579). Hence, the more a focal actor agrees about the evaluation of their job, the more likely the focal actor is to develop a trust relationship with this actor.

Homophily Hypothesis (H4): The more similar the level of job satisfaction of a focal actor and a colleague, the higher the likelihood that the focal actor will direct an interpersonal trust choice towards this colleague.

Intrapersonal spillover mechanisms

With regard to the link between social networks and well-being, two additional processes should be distinguished where the focus is put on the relationship between the reported job satisfaction of a person and the subjective (reported) trust in others by that same person. Since these mechanisms focus on the evaluation and feelings of the actor towards both his job and his social surroundings, we will refer to them as *intrapersonal spillover* mechanisms.

Satisfaction spillover. One often-made assumption in the literature is that attitudes and feelings have an important impact on the behavior of an actor. Trust can be considered a behavior that involves the willingness to take risks (Mayer, Davis, and Schoorman, 1995, p. 724). Individuals who are satisfied with their job are more likely to have a positive mood (Ilies and Judge, 2002), have a more positive affect and higher self-esteem (Kohan and O'Connor, 2002). According to *affect-cognition theory*, a positive mood is likely to induce more optimistic interpretations and judgments about social events (Forgas and Locke, 2005), thereby facilitating the creation of social relationships. Since trust is often only partially based on experience, the affective

(3) However, in general part of this process might be due to the fact that similar actors tend to meet in similar settings (Feld, 1981). For example, people in the same team might be

more likely to develop ties with each other than with those outside it and also might be more likely to have a similar level of job satisfaction. We will need to control for this in the analysis.

state of a person can also play an important role in how to interpret the actions of others. For example, Green and Brock (1998), in an experimental study, found that a positive mood can instigate low trust individuals to initiate social interactions. Similarly, Jones and George (1998, p. 534) have identified a number of reasons why emotions and mood might influence the propensity to trust people. Hence, to the degree that job satisfaction reflects positive sentiments, affect-cognition theory can help us better understand this link between a person's job satisfaction and his perceived interpersonal trust towards others. Hence, satisfied employees will be more likely to develop interpersonal trust relationships with others than will more dissatisfied individuals.

Satisfaction spillover Hypothesis (H5): The higher the level of job satisfaction of a focal actor, the higher the likelihood that the focal actor will build a trust relationship with a colleague.

Trust spillover. With respect to the relationship between job satisfaction and the self-perceived tendency to trust others, the reverse causality has also been proposed. The main argument in this case is that extensive trust in colleagues may lead to a higher level of job satisfaction.

Although the majority of empirical studies on the link between interpersonal trust relationships and job satisfaction have focused on the level of trust as a general attitude towards peers or management, rather than as interpersonal trust relationships towards specific others, the findings of these studies do concur in the conclusion that trusting peers and management correlates positively with job satisfaction. For example, a study of employees of an Austrian energy company (Matzler and Renzl, 2006) found that interpersonal trust in peers and management had a strong effect on job satisfaction. Similarly, a Canadian study showed that workers' beliefs about the trustworthiness of supervisors affected self-reported job satisfaction (Cunningham and MacGregor, 2000). Moreover, several studies report that opportunities for and perceived quality of friendship relationships at work increase job satisfaction (Riordan and Griffeth, 1995; Morrison, 2004; Winstead *et al.*, 1995). These findings point towards a positive association between the number of interpersonal trust choices made by an individual and his or her level of job satisfaction, where trust has an impact on the job satisfaction of the actor.

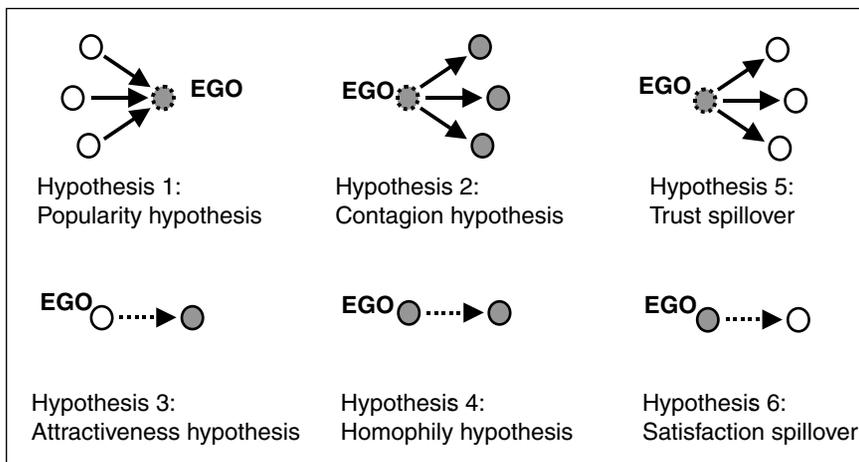
One possible explanation for the processes behind such a mechanism again relies on *self-determination* theory (Deci *et al.*, 1999; Deci and Ryan, 2002; Ryan and Deci, 2000). As we explained earlier, according to this theory, relatedness – together with the need for autonomy and competence – is one of the three universal key needs that have to be satisfied to realize daily well-being. Here, it is argued that the variation of employees in their security of attachment is a function of the degree to which the focal actor perceives that he/she can trust his colleagues, which thus contributes to experienced fulfillment of the basic needs for autonomy, competence and relatedness (La Guardia *et al.*, 2000). Hence, to the degree that close and stable interpersonal trust relationships are perceived as secure attachments, a person with a large network of

close personal relationships can be expected to exhibit higher levels of well-being, leading to our final hypothesis.

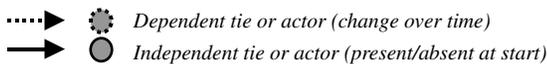
Trust spillover Hypothesis (H6): The higher the number of interpersonal trust choices originating from a focal actor (outdegree centrality), the higher the likelihood that the level of job satisfaction of the focal actor will increase over time.

In sum, we have proposed six different hypotheses, reflecting three different social mechanisms in a network (Figure I).

FIGURE I. – *Graphical representation of different mechanisms*



Note:



Data and method

Data

Data were collected in a panel study on social network dynamics in a Dutch housing corporation. The panel has four measurements, conducted in the period between 1995 and 1997, with intervals from three to four months. The organization consists of six departments and 70 permanent employees. Due to turnover between the first and the last moment in time, 57 participants in total were included in the analysis. Of this sample, 26 (46%) of the respondents are women (see Table I). The mean age is almost 40 years old with a standard deviation of 9. There are 15 (17%) respondents with formal authority over somebody in the firm (with a total of 5 levels).

TABLE I. – *Descriptive statistics of actors in the network*

| | N | Minimum | Maximum | Mean | Std. Deviation |
|----------------------------------|----|---------|---------|-------|----------------|
| Hierarchical level of respondent | 57 | 1.00 | 5.00 | 1.49 | 0.98 |
| Age | 53 | 21.00 | 60.00 | 39.53 | 9.19 |
| Job satisfaction (time point 1) | 46 | 0.00 | 17.00 | 12.33 | 3.30 |
| Job satisfaction (time point 4) | 49 | 5.00 | 16.00 | 11.37 | 2.93 |
| Outdegree (time point 1) | 50 | 0.05 | 0.98 | 0.33 | 0.23 |
| Indegree (time point 1) | 57 | 0.04 | 0.63 | 0.32 | 0.14 |
| Outdegree (time point 4) | 53 | 0.00 | 1.00 | 0.37 | 0.26 |
| Indegree (time point 4) | 57 | 0.10 | 0.71 | 0.37 | 0.13 |

Interpersonal trust

The level of interpersonal trust was measured at four points in time using the following question. “We all feel closer to some colleagues than to others. By ‘closeness’ we mean how strongly you trust a specific colleague. For example, who do you confide important personal information (private or work related) to? Please indicate on the following list of colleagues, which of the descriptions comes closest to your relationship with this colleague.” The answer categories were: “Person not known to me”, “Distant – you would not confide even unimportant personal matters to his person”, “Neutral – you do not know this person well enough to confide personal matters to him”, “Strong – you confide matters to this person that are relatively important to you” and “Very strong – you confide matters to this person that are very important to you”. For the analysis, the relationship was dichotomized at the level neutral *versus* strong. The density at time point 1 was 0.33 and 0.36 at time point 4, with substantially more variation in outdegree than in indegree at both points in time (see Table I). Correlation (see Table II) between indegree at two time points was particularly high (0.87), and substantial for outdegree (0.59). Indegree and outdegree were not significantly correlated.

TABLE II. – *Correlations between job satisfaction and indegree and outdegree in trust network for two points in time*

| | Outdegree at time point 1 | Indegree at time point 1 | Outdegree at time point 4 | Indegree at time point 4 | Job satisfaction at time point 1 (1-4) |
|--|---------------------------------|--------------------------------|---------------------------------|--------------------------------|---|
| Indegree at time point 1 | 0.004 | | | | |
| | 50 | | | | |
| Outdegree at time point 4 | 0.594** | -0.002 | | | |
| | 50 | 53 | | | |
| Indegree at time point 4 | 0.064 | 0.875** | 0.002 | | |
| | 50 | 57 | 53 | | |
| Job satisfaction at time point 1 (1-4) | 0.293* | 0.352* | 0.265° | 0.375* | |
| | 46 | 46 | 46 | 46 | |
| Job satisfaction at time point 4 (1-4) | 0.093 | 0.048 | 0.132 | 0.189 | 0.550** |
| | 46 | 49 | 49 | 49 | 44 |

Note : ° $p < 0.10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Job satisfaction

The level of job satisfaction was measured at the first and last points in time. Job satisfaction as defined in this paper refers to overall satisfaction about diverse aspects of the job, including: income, job security, the nature of the job, room for decision making, recognition by colleagues and management, utilization of job skills, career possibilities, cooperation by colleagues and management, and social atmosphere. Each was measured on a 100-point scale and the items were summated and subsequently reduced to 18 categories. The Cronbach's alpha at time point 1 was 0.870 ($N = 59$) and 0.873 ($N = 59$) at time point 4. Job satisfaction was significantly correlated between the two points in time and job satisfaction at time point 1 was also correlated with most indegree and outdegree measures (see Table II) (4).

Background characteristics and control variables

Because the position of an employee in the trust network at time point 1 might be partially due to differences in background characteristics, we added

(4) We do want to emphasize that the mechanisms in this paper focus on dynamic changes over time, and that such a correlation does not give any direct indication of support for our hypotheses.

age, gender and hierarchical level of the employee as control variables, when testing the popularity effect and the contagion effect on changes in job satisfaction as well as on the intrapersonal trust spillover effect (Hypotheses 1, 2 and 6).

For the attractiveness effect, the homophily effect and the job satisfaction spillover effect, we posit that job satisfaction may guide the building of trust networks. However, because the tendency to trust specific persons might also be caused by their respective background characteristics, or the similarity between people based on these characteristics (called category-based and role-based trust by Kramer, 1999, p. 577), age, gender and hierarchical position were also included to test the impact of job satisfaction on trust formation.

In addition, the level of job satisfaction at time point 1 might be related to the level of trust given or received at that time point, or to the extent to which they were part of specific local configurations, such as transitive triples. Since the formation of ties might be due to a tendency to choose actors that are expansive or popular, or a tendency to form specific local configurations (such as the formation of transitive triples, or to reciprocate trust ties) (see van de Bunt, Wittek, and de Klepper, 2005; Louch, 2000), the possible impact of these purely structural effects at time point 1 also needed to be controlled for. We therefore added additional effects to control for the possible effect that: 1) actors might build trust ties towards those others that trust them and might end existing trust with those who do not reciprocate their trust (reciprocity effect); 2) that actors, who are already trusted by many others, might attract more trust from others over time (popularity effect); 3) that actors that start out having a lot of trust towards others might be more likely to build still more trust ties (expansiveness effect); 4) that actors might start trusting those others who are trusted by those whom they already trust (transitivity effect), or those that trust third parties that trust ego (3-cycle effects); and finally to control for 5) a possible tendency for actors to start building trust relationships with those who trust similar others, as they themselves do (balance effect).

Moreover, we also included an indicator of whether the tie was one between an employee and his supervisor, so we could control for possible differences in trust formation resulting from being in an employee-supervisor relationship. In addition, we controlled for the possibility that people might develop more ties within their own team than with others outside their team.

Method

In order to disentangle interpersonal social selection from social influence mechanisms, as well as from intrapersonal spillover effects, we applied stochastic actor-oriented network models (see Steglich, Snijders, and Pearson, 2007; Snijders, 2005) as they are implemented in the Siena algorithm (Boer *et*

al., 2006; Snijders *et al.*, 2007; Steglich, Snijders, and Pearson, 2007) (5). This enabled us to simultaneously model the effect the network position of an actor in the trust network had on the changes in his or her job satisfaction, and the effect of job satisfaction on changes in the trust network, while simultaneously controlling for background characteristics.

This algorithm models changes in attitude and network relationships between two observed time points as the results of a series of consecutive steps. In each step either a possible change in the attitude by one unit or a change in a network tie of the selected actor is considered, based on whether this would increase his own attitude or the network surrounding him in the desired direction (Snijders, 1996, 2001, 2005). The model uses a Markov chain-like approach, so that in the simulation only the last step is considered in the decision to make any subsequent changes. More concretely, the model looks at how changes in the trust network and job satisfaction over time (as continuous space) can be considered as the result of the surrounding network structure and/or the job satisfaction of the actor and those around him at the previous point in time. As a result, with this model we were able to disentangle interpersonal social selection from social influence mechanisms and also from intrapersonal spillover effects (see Steglich, Snijders, and Pearson, 2007; Snijders, 2005). In addition to the parameters corresponding to the six hypotheses, we included a number of control effects for the change in job satisfaction and the change in trust between actors, as we described previously. A first set of control parameters covers structural properties and consists of effects for reciprocity, popularity, activity, transitivity and similarity in choices of others (which is here called balance). The second set covers attribute variables (age, gender and hierarchy). Since both might simultaneously cause changes in trust and job satisfaction, we needed to take these into consideration as control variables.

Results

Table III summarizes the results of the parameter estimates. The upper part of Table III relates to the network dynamics and refers to changes in trust ties. The lower part represents behavior dynamics and captures changes in job satisfaction. We will refer to the parameters by their numbers in the table.

(5) Siena 3.1 is part of the software package STOCNET 1.8 (Boer *et al.*, 2006; Snijders, 2005) and is freely available at <http://stat.gamma.rug.nl/stocnet/>.

TABLE III. – *Parameter estimates for social selection and social influence mechanisms between trust and job satisfaction with control-variables*

| Network dynamics change in trust tie | Model 1 | | |
|---|---------|-------|------------------|
| | param | s. e. | P (one sided) |
| 1. Network rate parameter | 16.458 | 1.224 | 0.000*** |
| 2. Outdegree (density) | -1.985 | 0.308 | 0.000*** |
| Structural effects | | | |
| 3. Reciprocity | 1.379 | 0.223 | 0.000*** |
| 4. Transitive triplets | 0.126 | 0.011 | 0.000*** |
| 5. Balance | -2.127 | 0.732 | 0.002** |
| 6. Popularity of alter | 1.227 | 1.039 | 0.119 |
| 7. Activity of alter | -4.803 | 0.860 | 0.000*** |
| 8. 3-cycles | -0.030 | 0.031 | 0.161 |
| Effect of other ties | | | |
| 9. Tie to hierarchical superior | 1.379 | 0.354 | 0.000*** |
| 10. Tie from hierarchical superior | 1.549 | 0.393 | 0.000*** |
| 11. Between same team | 0.891 | 0.174 | 0.000*** |
| Actor attributes | | | |
| 12. Hierarchy - alter | -0.017 | 0.065 | 0.397 |
| 13. - ego | -0.494 | 0.091 | 0.000*** |
| 14. - similarity | -0.003 | 0.279 | 0.496 |
| 15. Gender - alter | 0.058 | 0.096 | 0.274 |
| 16. - ego | -0.170 | 0.127 | 0.090 |
| 17. - similarity | 0.195 | 0.092 | 0.017* |
| 18. Age - alter | -0.009 | 0.006 | 0.050* |
| 19. - ego | -0.016 | 0.008 | 0.025* |
| 20. - similarity | -0.035 | 0.288 | 0.451 |
| 21. Job satisfaction - alter | 0.002 | 0.027 | 0.478 |
| 22. - ego | -0.092 | 0.035 | 0.004*** |
| 23. - similarity | 0.775 | 0.671 | 0.124 |
| Behavior dynamics change in job satisfaction | | | |
| 24. Rate job satisfaction | 10.068 | 2.831 | 0.000*** |
| 25. Job satisfaction - tendency | 0.184 | 0.259 | 0.238 |
| Structural effects | | | |
| 26. Average similarity | 4.252 | 2.237 | 0.029* |
| 27. Indegree | -0.016 | 0.015 | 0.152 |
| 28. Outdegree | -0.008 | 0.006 | 0.113 |
| Actor attributes | | | |
| 29. Effect from hierarchy | -0.015 | 0.079 | 0.425 |
| 30. Effect from gender | -0.086 | 0.143 | 0.274 |
| 31. Effect from age | -0.021 | 0.012 | 0.037* |

Note : ^o p < 0.10 ; * p < 0.05 ; ** p < 0.01 ; *** p < 0.001 (one sided).

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On a descriptive level, the analysis produced the following results. First, the network rate parameter in the network dynamics part of the model indicates to what extent actors tend to consider changing their trust relationships to others. Between the two periods at which the trust network was observed, actors on average considered changing ties to other actors almost 16.5 times. Second, the negative outdegree effect shows that overall there is a net tendency to end an existing trust tie rather than to create a new tie. On the behavioral side, the rate function for job satisfaction indicates the extent to which actors tend to change their level of job satisfaction by one unit between the two points in time. On average actors changed their level of job satisfaction about ten times between both observed time points. The parameter for tendency indicates that there is no real net change in job satisfaction between both points in time.

As for the control variables, what was most noteworthy were the positive effects for the reciprocity (3) and transitivity (4) effect, and the negative balance (5) and activity (7) effects. The positive reciprocity effect indicated that over time there was a preference to build trust with those who had put trust in ego previously, while the transitivity effect indicated that there was a tendency for ego to start trusting those colleagues who were trusted by those whom ego already trusted. On the other hand, the negative balance effect indicated that actors were less likely to trust those who trusted the same others as ego did. The negative activity effect indicated that, overall, employees were less likely to develop trust towards those who themselves trusted many other colleagues. We also note that hierarchical superiors (13) and older employees (19) tended to put less trust in others, while more trust developed between employees of the same gender (17) and within their own team (11). In addition, trust was particularly likely to emerge between employees and their own supervisor (9 and 10). Finally, we found that for older employee's job satisfaction tended to decrease over time (31).

Turning to the hypotheses, the indegree effect (27) captures the idea that being trusted by more others has a positive effect on that person's job satisfaction. Since this parameter was not significant, however, we rejected the popularity hypothesis (H1). In other words, indegree centrality in the trust network does not generate any positive effect on satisfaction. On the other hand, the similarity parameter (26) was significant in a one-tailed test ($\alpha = 0.05$), thus lending support to the contagion hypothesis (H2): employees tend to adjust their job satisfaction to that of the actors they trust – that is, an employee seems to increase his or her own job satisfaction if he/she is tied to others who have a high level of job satisfaction, and will lower his/her job satisfaction if those he/she is connected to have a low job satisfaction level (6).

(6) An additional and partly competing mechanism might be that actors (irrespective of whether they are connected by a trust tie) will tend to converge towards a similar level in terms of job satisfaction. To test this we added a quadratic effect for job satisfaction. However,

adding both parameters (similarity and the quadratic effect) generates high standard errors for both parameters and a correlation of 0.921, which is indicative of a high multicollinearity effect. A goodness of fit (score) test where the quadratic effect was set to 0 did indicate that

The attractiveness hypothesis (H3) posits that satisfied actors will attract more trust choices than dissatisfied ones. Since the alter effect for job satisfaction (21) was not significant, this hypothesis found no support in our data. This means that actors tend to be almost as likely to trust others, whether or not those others have a high or low level of job satisfaction. The similarity effect (23) in the network dynamic part of the analysis captures the homophily mechanism. This effect was not significant, leading us to reject the homophily hypothesis (H4) – that is, two employees having a similar level of job satisfaction does not increase (or decrease) the likelihood that a trust relationship will develop between those two actors.

According to the intrapersonal trust spillover hypothesis (H6), individuals who tend to trust others more are expected to exhibit higher levels of job satisfaction. Since the outdegree parameter (28) in the behavioral dynamics part of the model was not significant we also found no support for this hypothesis. In fact, our analyses contradicted the job satisfaction spillover hypothesis (H5), which argues that actors scoring high on job satisfaction will tend to create a higher number of trust relationships over time. The ego effect (22) in the network dynamic part of the model was negative and significant, implying that actors with a high level of job satisfaction were less (rather than more) likely to form trust ties over time, compared to less satisfied actors. Table IV summarizes the results.

TABLE IV. – *Summary of results*

| Mechanism | Theory | Result |
|--|---|----------------------------------|
| Interpersonal influence – Popularity – Contagion | Social support Social information/Mood linkage | Not supported Supported |
| Interpersonal selection – Attractiveness – Homophily | Emotional contagion Uncertainty reduction | Not supported Not supported |
| Intrapersonal spillover – Satisfaction spillover – Trust spillover | Affect cognition Self-determination | Opposite effect Not supported |

Discussion and conclusion

Our study advances previous research on the interrelationship between informal networks and job satisfaction in several respects. First, unlike most

this parameter does not have any additional explanatory power other than that of the similarity effect ($p = 0.910$), while it does have an almost significant contribution when the

similarity parameter is not added ($p = 0.078$). This can be interpreted as indicating that, as a result of the contagion effect, the variation on the job satisfaction scale reduces over time.

previous empirical studies, our study is based on longitudinal data, allowing us to disentangle interpersonal influence and selection mechanisms and intrapersonal spillover mechanisms. We specified six hypotheses concerning the dynamic relationship between trust and job satisfaction. Two of them reflect selection mechanisms, two represent influence mechanisms and two represent intrapersonal spillover mechanisms. None of the selection mechanisms yielded significant results. In addition, from the social influence side, “being popular” (*i.e.*, receiving many interpersonal trust choices from others) as such does not significantly affect the level of job satisfaction of a focal actor. However, the other influence mechanisms – the contagion hypothesis – were fully supported by our analysis. That is, interpersonal ties of trust to satisfied alters will increase the likelihood that the focal actor will also become more satisfied with his or her job, while he will become less satisfied if the persons he trusts have a low level of satisfaction. This finding is in line with both social information and mood linkage theories. It refines some of the earlier social capital research, which assumed that having many social ties had a positive impact on individual satisfaction and well-being (popularity hypothesis). It reinforces earlier suggestions indicating the need to consider not only the ties in a person’s network, but also the characteristics of the nodes to which these ties provide access (Lin, 2001). More specifically, our findings indicate that future research on the link between social relationships and job satisfaction might benefit from incorporating both cognitive and affect-based arguments. Close interpersonal ties can function as transmitters of frameworks for evaluating one’s job situation, and as a channel for moods and emotions through which satisfaction and the perceived well-being of others in the organization are affected.

Second, our study incorporates intrapersonal spillover mechanisms into network research. We found that employees with a low level of job satisfaction tended to develop more trust ties than did those with a higher level of job satisfaction. This surprising finding contradicts our satisfaction spillover hypothesis, derived from affect-cognition theory, according to which a person’s positive mood should trigger the initiation of interpersonal trust relationships. There might be two possible future avenues to explain this unexpected result. First, previous mood linkage research found that “low and high negative affect states such as calm and anxiety, are more easily shared through network ties than are low and high positive affect states, such as gloomy and enthusiastic” (Totterdell *et al.*, 2004, p. 864). However, the cognitive and social processes underlying this effect are still not clear and deserve further study. Second, dissatisfied individuals may search for coalition partners and allies in their attempts to build a basis of oppositional solidarity in their organization (Witteck and van de Bunt, 2004). From this more instrumental perspective, dissatisfied individuals have a stronger incentive to build interpersonal trust ties than do satisfied individuals. We found no evidence for the trust spillover hypothesis, according to which the initiation of many interpersonal trust ties should positively affect a focal actor’s job satisfaction (Matzler and Renzl, 2006; Cunningham and MacGregor, 2000).

More generally, the investigation of intrapersonal spillover mechanisms reveals a blind spot in the practice of previous social network research. For the most part this type of research relies on gathering information about networks and attributes through surveys. In such cases a distinction needs to be made between sociometric information gathered by self-reporting of the focal actor and the information supplied by the focal person's contacts. To avoid common-method bias (Podsakoff *et al.*, 2003), the self-reported sociometric information is often discarded from any analysis that also involves self-reporting of some personal variable. Not surprisingly, most social network scholars tend to focus on gathering presumed objective measurements of a network structure, while sociometric information gathered through self-reporting by the focal actor are usually treated as a measurement issue. Instead, they prefer to use the sociometric choices reported by the focal person's contacts. As a result, relevant information on the subjective evaluation of sociometric choice behavior by the source of the tie is often neglected, and this practice precludes the possibility of disentangling intrapersonal cognitive processes from interpersonal social mechanisms. We suggest that social network research might benefit from incorporating intrapersonal processes into its models, especially if we consider changes in attitudes and social relationships over time.

Several limitations of our study deserve to be mentioned. First, our study does not distinguish between different dimensions of job satisfaction. Flap and Volker (2001, pp. 304-306) have argued that extrinsic job satisfaction might be more related to informational ties, whereas interpersonal trust might be more relevant for job satisfaction related to the job itself and the social context. One further direction of research, therefore, would be to test the same selection and influence mechanisms distinguishing intrinsic from extrinsic job satisfaction. A second direction for future research would be to also incorporate the relationship between the advice network and both dimensions of job satisfaction. Given the instrumental nature of advice relationships, cognitive rather than affect-based mechanisms might be more relevant for modeling the interrelationship between advice and satisfaction.

Second, we incorporated social relationships in the form of simple counts of indegree and outdegree of individuals. This simple form of measuring an individual's popularity or expansiveness neglects important structural features of his or her ego-network. For example, Krackhardt (1999) has argued that popular individuals, who occupy a central position between different, but disconnected, cliques, experience a great deal of cross-pressure and conflicting expectations, which negatively affects their satisfaction and well-being at work.

Moreover, the model assumes a linear effect of centrality on job satisfaction. Recently, arguments have been put forward that very high levels of trust might be counterproductive, because this reduces control too much (Langfred, 2004). In other words there might be a reverse U-shaped effect of level of trust for outcome variables such as performance and job satisfaction.

Finally, being limited to one organization, our study does not allow for any assessment of the potential impact of variations in organizational contexts.

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Previous research has shown that such contextual differences can have a strong moderating impact. For example, Dirks and Ferrin (2001) as well as Jarvenpaa, Shaw, and Staples (2004) have argued that the effect of trust weakens as information structure becomes more established. Hence, more research on different contexts with different organizational structures is needed to be able to generalize our results.

On a theoretical level, our study indicates that social network researchers might benefit from paying closer attention to recent advances in social-psychological research. Drawing on affect-cognition, self-determination, and mood linkage theories allowed us to derive hypotheses on hitherto neglected mechanisms that might drive the co-evolution of social networks and individual sentiments. All three theoretical approaches share the assumption of a strong mutual influence between individual emotions and social relationships. The systematic elaboration of these interrelationships can be seen as a fruitful and necessary future extension of the social capital research agenda.

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