

The Stability and Dynamics of Social Relationships: An Analysis of Factors of Influence on Changes in Ego-Centered Networks

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Abstract:

This paper investigates the stability and dynamics of social relationships in an attempt to ascertain the conditions under which relationships are stable and the factors that bring about changes. The analysis employs the data of 13,530 participants in the Socio-Economic Panel (SOEP) representative assessments of 2011 and 2016. In order to explain stability and dynamics in the relationships, we took particular account of the social contexts and types of relationships, changes in everyday life and support needs, as well as the respondents' age and gender. By means of logistic regression, we correlated the information given by the respondents and alters on a time axis. A high level of stability was shown in the namings which, however, are only putatively indicative of stable relationship networks. Rather, they appear to reflect the outcomes of efforts on the part of the respondents to maintain their individual "network signatures". Moreover, the network dynamics result from the combination of personal characteristics, such as age, gender, family status, social and normative contexts, as well as single, crucial, individual life events.

Keywords: Social relationships, stability, time, dynamics, social networks, social support, convoy, ego-centered network analysis, signature

Introduction:

In terms of structure, size, and composition, panel studies on ego-centered network data have shown a notable consistency in networks over time (cf. Fischer & Offer, 2020). Fischer and Offer (2020) referred to this as a paradoxon. Thus, mentions regarding persons who provide support (cf. Wellman, et al., 1997; Morgan, et al., 1996) are relatively stable, while at once, high fluctuation is observed in naming amongst alters (cf. Fischer & Offer, 2020). It is our objective to better understand this process by concentrating on the issue as to the conditions under which relationships remain stable and on the factors that lead to change.

In the following, we will first present our theoretical framework, take up available research on dynamics in network relationships, and formulate the hypotheses to be investigated based on our data. Second, we will elucidate and describe the ways in which we operationalized our data. Third, in our results section, we will describe the types of changes we identified between wave 1 and wave 2 and present the results of our multivariate analyses of factors probably have resulted in changes in the relationships occurring between the waves. Finally, we will provide a discussion and conclusions regarding the study.

1. Theoretical framework

Social relationships develop and reproduce in the course of mutual interaction processes. The starting point for this perception is Max Weber's understanding of social relationships: "The term 'social relationship' will be used to denote the behavior of a plurality of actors insofar as, in its meaningful content, the action of each takes account of that of the others and is oriented in these terms" (Weber, 1968, p. 26). Weber's definition emanates from dynamics in relationships as he had an interaction process in mind, in which people align their actions and behavior to one another. This alignment is contingent on a meaningful interest that determines interaction. People in modern societies act in divergent kinds of contexts and roles. For example, a woman may carry out the role of a mother in the family context and that of a teacher in her professional context. In other words, people themselves constitute a network of relationships (cf. Hennig & Kohl, 2011). "[...] Consisting of relationships, interactors turn their relationships outwards, activate them and this makes them visible" (Strathern, 1988; quoted by Deters, 2002, p. 46). Their actions are both the cause and the result of further actions. The dynamics of the interaction process thus become visible as the involved persons are put into active and then into passive roles (cf. Hennig, 2014, p. 166). For instance, the panel study conducted by Fischer and Offer (2020) referred to alters as active contacts in its first, but not in its second wave of assessment, although the relationships with those contacts were indeed "abeyant" (cf. Fischer & Offer, 2020, p. 78).

Dynamics in social relationships do not only result from interaction processes, but also from the dynamics of life courses. Thus, Antonucci (2001) pointed out that due to stages of life, social relationships change in the course of a given individual's life. Kahn and Antonucci (1980) illustrated this insight with the convoy model introduced in the 1980s as a framework for longitudinal investigations of social relationships. These authors assumed that throughout individuals' lives, they are involved in personal relationships with members of their families, friends, and others who all together form a network from the life course perspective, referred to as a convoy (cf. Baas, 2008, p. 150). The convoy model serves to conceptualize individuals as parts of dynamic networks surrounding those individuals while moving through space, time, and the life course and supporting them in their diverse living situations (Antonucci, 2001, p. 431). Depending on the individuals' age, new persons join the convoy while others leave or move within the convoy depending on the given life events. Such life events that may lead to changes include the transition from school to further education or job entry, the birth of a child, the transition into retirement, marriage or divorce, or one's partner's death (cf. Hollstein, 2001).

The convoy metaphor provides a structural concept, emphasizing the significance of personal factors (age, gender, personality) and situational factors (role expectations, resources, challenges) that influence social relationships (Antonucci, 2001, p. 430) and underscoring the relevance of network changes as results of the life course (Kahn & Antonucci, 1980).

1.1 Social relationships, roles and social contexts

Individuals' lives in modern societies are strongly dominated by formalized expectations and obligations. Some of these aspects, particularly in the case of changing social relationships over the life course, can well be captured with the concept of social roles. For example, certain events in the life course can lead to changes in social relationships,

which are reflected by changes in role relationships. Thus, the birth of a child may bring about changes in the role relationships between two partners additionally becoming a mother and a father.

All human beings take up various roles over their life courses, some of which are explicitly age-related. For instance, most people are pupils or students in their youth and leave that role in early adulthood to never reassume it in the formal sense (cf. Kahn & Antonucci, 1980, p. 262). The roles of workers, spouses, and parents are associated with more advanced age (cf. Kahn & Antonucci, 1980, p. 262). Furthermore, many roles may change with age in terms of contents and the ways in which there are practiced even though they may appear formally unchanged. Thus, in parents' roles, the requirements concerning contents change as their children enter adulthood (cf. Kahn & Antonucci, 1980, p. 262). Therefore, the experience of aging inevitably implies a change of roles. While certain roles or cherished parts of those roles have to be abandoned, others are acquired. Roles have a dynamic aspect that is connected with the continuities and discontinuities in individuals' lives and not with contents at a given point in time (cf. Kahn & Antonucci, 1980, p. 262). Moreover, roles imply spatial proximity and interaction.

This means that role behavior is always bound to social contexts. According to Friedrichs and Nonnenmacher (2014), social contexts are “a social-spatial, temporary structure – a ‘social enclosure’ – that is connected to expectations, opportunities and restrictions for actors and thus affects their behavior” (Friedrichs & Nonnenmacher, 2014, p. 4; own translation). This includes couples and families, associations, networks, residential areas, school classes, parties, regions and countries (cf. Friedrichs & Nonnenmacher, 2014), to name some examples. Many studies have evidenced the connection between social contexts and changes in social relationships (cf. Small, 2009; Mollenhorst, et al., 2014; Small, et al., 2015).

Since roles are always practiced in social contexts, both aspects are closely interconnected. By means of personal changes and life events, e.g., one's partner's death, social relationships and network structures can thus affect the context of the resp. Couple and/or family and change one's role from that of a partner to that of a widower. In turn, this process can result in network changes in terms of size or composition (cf. Hollstein, 2001). This leads us to Hypothesis H1: Individuals who have alters from various contexts among their networks, which stand for various role relationships, more frequently show changes in their networks.

1.2 Life events and network changes

Early studies on changes in personal relationships and networks over time (Mollenhorst, et al., 2014) emphasized that important life events may result in a loss of relationships or bring about new relationships. Transition into school, college, working life, matrimony, divorce, parenthood, and retirement are such life events.

Several investigations have shown that some of these transitions are connected to changes in personal networks (e.g., Fischer & Offer, 2020; Badawy, et al., 2018; Bidart & Cacciuttolo, 2013; Bidart & Lavenu, 2005; Bloem, et al., 2008; Feld, et al., 2007; Carstensen, et al., 1999; Kalmijn, 2003, 2012; Mollenhorst, 2014; Small, et al., 2015). For example, Kalmijn (2003) showed networks among freshly married couples to tend to decrease in size. Other studies (Small, 2009; Knight, et al., 2010) argued that many of these transitions,

especially into school, college, and employment, are connected to changes in institutional environments. Parenthood, retirement, and other events frequently even lead to a partial or complete change in the resp. institutional environment, e.g., when parents sign their newborns up for daycare centers and become acquainted with new networks of parents, or when elderly people enter retirement homes and thus new communities (cf. Small, et al., 2015). Small et al. (2015) also demonstrated that transformations in peoples' personal networks often result from the accumulation of changes in their personal status or institutional surroundings. In their study of beginning students in three areas of study at a large university, the stability of core discussion networks was seen to undergo noticeably rapid change over the first 6 to 12 months. This process unfolded as both the obligations the people faced and their routine activities were changing on account of new institutional circumstances. In this respect, the "core network" represents a highly contextual support network into which people are integrated and from which others drop out when the actors move between different contexts. Investigations into the relevance of respondents' health status suggested that illness may bring about increased or more active attachments (e.g., Badawy, et al., 2018; Perry & Pescosolido, 2012).

This leads to the conclusion that life events connected with changes in the interviewees' everyday lives result in the dynamics of their social relationships. Thus, entering retirement can bring along a loss of relationships. Also, the death of a partner or family member can impact the size of a network, as much as matrimony or childbirth can lead to new relationships. Hypothesis H2 derives from this finding: Professional or familial changes affect the stability of relationships, i.e. lead to changes.

1.3 Social support and the stability of relationships

Social support stands for the contents of social relationships and refers to social exchange. It is considered in terms of interpersonal interaction between individuals, which serves to materialize specific interests and needs.

According to Kahn and Antonucci (1980), individuals' convoys (networks) at all times encompass a set of individuals on whom they depend for support and others who depend on those individuals for support. These authors suggested that people's support requirements are defined by the combination of their stable characteristics at a given time (age and other demographic markers, personality, etc.) and the characteristics of the resp. situation (expectations and requirements in terms of work, the family, and other roles). Together with personal and situational characteristics, people's needs for social support affect the structure of their personal networks (size, connectedness, stability, etc.) (Kahn & Antonucci, 1980, p. 269).

This implies that different life phases (situational characteristics) require different kinds of support that can induce changes in personal networks. For example, support may become necessary for young people in job seeking while transitioning from training or for employees in their careers, while the need for nursing support is more relevant in cases of illness. There is also a need to talk about personal matters that are situational. Honesty and openness are particularly important in relationships based on trust, e.g., friendships and family relationships (cf. Schulte, 1997), as reflected in the willingness not to avoid talking about unpleasant truths. Likewise, relationships can trigger contradictory opinions or lead to disputes, which in turn depends on the interacting parties' situation.

In their investigation into the effects of declining cognitive and physical abilities among older adults aged 55 to 85 on network changes, Aartsen et al. (2004) observed the number of family members in the resp. networks to grow with advancing age. In the presence of declining physical abilities, family members replaced friends and neighbors, yet only if the networks were large. Declining cognitive abilities, however, were seen to result in relationship losses that were not replaced by family members. Thus, physical declines seem to be associated with an increase and cognitive declines with a decrease in the potential number of supporters within a network.

Socioemotional selectivity theory (Carstensen, et al., 2006) argues that ego, with increasing age, changes his/her own network according to altered personal needs. Against the background of shrinking time horizons, elderly people are considered to consciously invest in maintaining particularly meaningful social partnerships with high levels of intimacy, while less important social relationships are rather relinquished. In addition, the duration of relationships may decline on account of changing boundary conditions (e.g., relocation, illness) such that motivational shifts are also identified in earlier life phases (Carstensen, et al., 2006). For this reason, the finding that networks vary according to age (cf. Aartsen, et al., 2004) does not necessarily support the conclusion that they are associated with different dynamics in different age groups – especially if the various events or situational support needs, which are very likely to occur in an age-specific manner, are controlled. This understanding leads us to Hypothesis H3: It is not age that elicits dynamics in networks, but rather the connected changes in support needs which may depend on the given situation.

In their investigations into the gender-specific structures of social support networks, Veiel and Herrle (1991) identified merely marginal differences between men's and women's networks. A strong tendency was seen toward gender homophily and the networks altogether consisted of more women than men. The larger proportion of women providing support, especially to relatives, is in line with the findings published by Buhrke and Fuqua (1987), according to which both men and women typically described their relationships with women to be closer. Likewise, women's stronger availability to other family members due to their housewife roles also seems to be causative of both the identified differences and the larger workload due to their caring functions (e.g., Menaghan, 1989; Thoits, 1986; Turner & Avison, 1989). This lets us deduce Hypothesis H4: The compositions of men's and women's networks show no significant differences (H4a). Yet since women provide more social support on account of their stronger caring functions, their networks show a higher level of dynamics than men's (H4b).

Investigations into changes in relationships have demonstrated that especially relationships with relatives, which offer a large extent of social support and show high contact frequency, are particularly stable (Wellman, et al., 1997; Morgan, et al., 1996). Therefore, our Hypothesis H5 infers that relationships named as supportive in the first wave were referred to again in the second wave.

In a study on changes in widows' networks, Morgan, Neal, and Carder (1996) emphasized that such changes are to be differentiated in terms of "core" and "peripheral" (Morgan, Neal & Carder, 1996, p. 22). While relationships in network cores remain strong and/or stable over time, new ones may be added, or others are omitted in the periphery even though the overall composition of the networks may largely remain stable.

Other investigations (Heydari, et al., 2018; Saramäki, et al., 2013) have assumed that the structure of ego-centered networks reflects the ways in which people balance their needs

for strong, emotionally intensive relationships and a multitude of weaker attachments. Heydari et al. (2018) observed that while all kinds of signatures showed persistent individual differences, they remained stable despite fluctuations in individual changes. The ego-centered network structure can be quantified with “social signatures”(Heydari, et al., 2018, p. 1), which describe how people assign their communicational efforts to the members of (changes in) their personal networks. In this homeostatic process (Fischer & Offer, 2020, p. 77), individuals show marked and stable preferences for network “signatures” (Heydari, et al., 2018; Saramäki, et al., 2013). When relationships are omitted, they form new relationships in an attempt to maintain the general character of their ego network signature. Network size and composition may well remain the same before and shortly after an event, i.e. the social signature is maintained. Still, a dynamic would be observable, as other people fulfill the corresponding needs for strong and weak ties.

We would thus argue that stability in the overall composition of networks does not imply that individual relationships have not changed, i.e. that some have been added and others omitted (H6).

2. Data and methods

We made use of the data emerging from two waves of the German Socio-Economic Panel (SOEP), an annual representative household panel. More than 20,000 individuals from approx. 11,000 German households have been interviewed annually since 1984. On account of its many years of continuous existence, the analysis of representative data over time is well feasible (Wagner, et al., 2007, p. 140), since the basic idea is to investigate social-science and economic topics with the aid of households, life courses, and life-course-related behavior. Since its initiation, several additions have been made and subsamples have been taken. Increasingly enhanced analytical power has been achieved based on extensions with subsamples and additional surveys. The data comprise ever more life phases, and interviewing a growing number of individuals has led to a higher level of representativeness (Wagner, et al., 2007, pp. 152 f.). The extensions also include the issue of social network integration, which is captured every five years. Our analysis profits from the circumstance that the instruments applied to assess network integration have been held constant over time and that thus, changes cannot be reduced to different survey designs. The first wave we accessed was carried out in 2011, the second in 2016. In total, the two waves provided data on 13,530 individuals who were 18 to 96 years old in 2011. As there is a scarcity of panel data on network integration, which is based on a stable survey design and facilitates a link with comprehensive information on 13,530 respondents’ life courses and life-course-related behavior, we applied this dataset for our analyses. Table 1 shows a complete description of the panel respondents’ demographic and socio-economic characteristics.

Table 1: Sample characteristics and life event frequencies

Demography of the wave, 2011	%
male	44.1
Age (yrs)	
18-30	13.1
31-50	46.6
51-65	23.6
> 65	16.7
Family status	
Living together	64.9
Living apart	2.2
Single	16.0
Divorced	10.5
Widowed	6.4
Professional qualification	
No training	15.9
Vocational training	58.7
University or similar	25.4
Life events between wave 1 and wave 2	
Met new partner	2.4
Getting married	0.9
Starting cohabitation	1.2
Birth of child	1.7
Child came to household	1.2
Child left household	3.8
Separation from partner	1.5
Divorce	0.4
Death of partner	0.4
Death of father	1.5
Death of mother	1.4
Death of child	0.1
Death of other household member	0.0
Other family changes	2.0
Unemployment	3.6
Retirement/pension	0.9
Health satisfaction	
Better than satisfactory	45.1
Satisfactory	35.7
Worse than satisfactory	19.2

Source: German Socio-Economic Panel, 2011 and 2016; N = 13,530 respondents; own calculations.

1.4 Network instrument

The waves applied an identical network instrument to assess the individuals in the survey. With the aid of five generators, five individuals or groups of people, respectively, could be mentioned. The generators were a) discussing important things, b/c) helping with career advancement and in long-term need of care, d) people with whom one occasionally has disputed, and e) who is allowed to tell the respondent unpleasant truths. Information on the relationship type and social context are available to describe the members of the network.

Relationship types were available for partners, families (e.g., mother/father, daughter/son, etc.), and relatives (mother/father in law, aunt/uncle, etc.). Relationship types

stood for the social roles these persons adopted toward ego. For family and kinship relationships, there was additional information as to whether they were at all present (e.g., grandchild or aunt/uncle), the number of such relationships, and the distance between their own and the respondents' homes. With the help of information on the presence of family members and their living distance, the number of generations of a family was reconstructed as well as the nuclear family's geographical proximity, as these factors could also have given rise to support requirements.

For friends and acquaintances, the network instrument yielded information regarding the social context of the relationship, e.g., people from school/training/university or others from the neighborhood. Beyond this, there was no more information. Thus, we were unable to investigate whether relationships had been disrupted or why they had been omitted from the network. In addition, the data do not provide any information about why relationships were no longer mentioned in the second wave. With reference to Perry et al. (2018), Fischer and Offer (2020) indicated that the difference between real network changes and those reported is an issue with ego-centered networks (cf. Fischer & Offer, 2020, p. 78). Thus, Fischer and Offer (2020) reported a) that the alters had simply been forgotten, b) that alters still available as supporters had not been mentioned, and c) that, for various reasons, alters with whom the relationships had been positive or negative were no longer mentioned (Fischer & Offer, 2020, p. 78). They also ascertained a) that those who had actually dropped out of the network, i.e. who neither reappeared on the list nor were simply forgotten, generally were extended kin, coworkers or acquaintances, alters not referred to as key supporters, and alters seen as "difficult"; and b) that respondents who omitted many of their alters probably had moved out of the region between the waves (cf. Fischer & Offer, 2020, p. 78). Theoretically interpreting these results, the authors suggested that the likelihood of dropping out of the network was reducible to the function and change of context (cf. Fischer & Offer, 2020, p. 78). Particularly when alters were no longer mentioned, the reason appears to have been the balance between support and burdens involved in the relationship (cf. Fischer & Offer, 2020, p. 78).

However, due to the limitation of naming to five persons in our study, we assume that the most important persons had been mentioned or that individuals no longer mentioned had consciously been omitted from the network.

Other limitations in the data may be due to the method of data collection. Interviewer effects, such as deviance, time pressure, or deficient interviewer training (cf. Valente, et al., 2017; Brüderl, et al., 2013; Paik & Sanchagrin, 2013; Van Tillburg, 1998) or survey conditioning (Duan, et al., 2007), can lead to naming failures. Particularly in the case of panel data, experience with one and the same survey, especially the form of questions (cf. Marsden, 2003), may have affected the given answers (for more details, see Fischer & Offer, 2020). Compared to interviewee effects, the interviewer effects (e.g., Riebschläger, 1995) identified with regard to the SOEP are of little consequence. In this connection, neglect of these effects did not result in significant changes in the results of the interviewee effects (Riebschläger, 1995). Moreover, the SOEP applies methods to avoid any kind of interviewer effects by assigning more experienced interviewers to larger households and newer augmentation samples and less experienced ones to others (TNS Infratest Sozialforschung, 2011, p. 25). We are empirically unable to verify which of the mentioned factors, if any at all, could have played a role in data acquisition, as these are secondary data. Based on our argumentation, however, we do not assume the results to be biased due to interviewer effects.

1.5 Social events

The respondents were asked whether any changes had occurred in their family lives between 2011 and 2016, e.g., separations from or moving in with one's partner, and children being born or moving out of the household. In terms of professional changes, data were collected as to retirements, completion of training, entering a new job, and becoming unemployed in that period.

1.6 Personal characteristics of ego

In this connection, data were available concerning age, gender, family status, professional status, and gross monthly income.

1.7 Situational characteristics

For Kahn and Antonucci (1980), situational characteristics are reflected in roles, amongst others. In this connection, such roles are represented by the kind of relationships between alter and ego.

1.8 Assessment of network changes

Network size, the proportion of family members in the networks, and the index of qualitative variation (IQV) applying to the network composition were calculated for both waves. The IQV¹ is a measure of diversity, which provides information on the qualitative variation of relationship types in a given network. In the case under examination here, it provided information about the distribution of relationships to the spouse (partner), former (spouse) partner, parents, children, grandparents, grandchildren, relatives, colleagues at work, persons from education, neighbors, persons from a club, leisure time partners, paid aids, outpatient service, etc., and others. These types of relationships stood for various contexts in which the respondents were acting. The more diverse the specified relationship types were, the more heterogeneous the network composition or the larger the qualitative variation of social contexts was within a given network. The IQV can vary from 0.00 to 1.00. When all of the cases of the distribution are in one category, no diversity or variation is present and the IQV is 0.00. Thus, the index reflects the homogeneity or heterogeneity of social contexts in which the respondents are acting.

Turnover was calculated for the network changes (cf. Perry, et al., 2018). For this purpose, the networks of the two waves were pooled and divided by the sum of the alters having dropped out between the two waves and those newly added between the two waves by the sum of all persons mentioned at both times (cf. Perry, et al., 2018, p. 253). This procedure results in a measure for the instability of the network size. The turnover is high if the “network size, composition or other aggregate measures remain stable” (cf. Perry, et al., 2018, p. 253).

¹Based on Agresti & Agresti (1977), Marsden introduced the IQV for the analysis of ego-centered network data in 1987.

Results

To start with, network size according to interactions and contexts was compared for waves 1 and 2 at the namings level. Table 2 shows the mean values and standard deviation of network size in 2011 and 2016 for the individuals with whom important things were discussed, who provided help in job seeking and in long-term care requirements, with whom one quarreled and whom one could tell unpleasant truths, and for the resulting overall network and the named ages according to context.

Table 2: Mean values and standard deviation of network size and contexts of alters for both waves

	Wave 1 2011	Wave 2 2016
<i>Network size according to interactions</i>	<i>Mean (SD)</i>	<i>Mean (SD)</i>
Talking about important things	2.60 (1.39)	2.70 (1.47)
Help with career advancement	1.02 (1.28)	0.94 (1.28)
Help in long-term care	2.19 (1.31)	2.23 (1.33)
People with whom one occasionally has disputes	1.07 (1.20)	1.00 (1.19)
People who are allowed to tell unpleasant truths	2.25 (1.48)	2.24 (1.50)
Total	4.31 (1.94)	4.26 (1.95)
<i>Average mean values of namings of social contacts</i>		
Partner, ex-partner	1.02 (0.18)	1.02 (0.17)
Family	2.26 (1.06)	2.26 (1.06)
Relatives	1.34 (0.56)	1.34 (0.56)
Coworkers	1.36 (0.55)	1.36 (0.54)
Neighbors	1.00 (0.87)	1.01 (0.12)
Members of a club, leisure time partners	1.01 (0.15)	1.03 (0.24)
Paid aids, outpatient service	1.00 (0.00)	1.00 (0.01)
Others	1.01 (0.14)	1.02 (0.20)

Source: German Socio-Economic Panel, 2011 and 2016; N = 13,530 respondents; own calculations.

SD, standard deviation.

With regard to the mean values for the two waves, the proportion of individuals with whom important things could personally be discussed and of those providing support in long-term care were shown to have slightly increased. With regard to the other issues, the proportion of mentioned individuals was seen to have somewhat decreased, as did average network size.

Likewise, the average mean values of namings of the network members' various contexts in 2011 and 2016 suggest relative stability in the relationships. In this connection, the differences in mean values between the two waves are also marginal.

Varying between 0 and 1, turnover was calculated for changes in network size, the mean value for which was 0.51 with a standard deviation of 0.23. The mean value is indicative of changes within the respondents' namings.

As a next step, we thus examined the individual changes in network characteristics between 2011 and 2016 (Table 3). Indeed, only 23% of the networks were shown to have remained stable in terms of size, while network sizes decreased by 40% and increased by

37% of the respondents, respectively. No change was identified in 21% of the respondents in terms of naming family members within this time frame – 36% mentioned less and 42% mentioned more family members in 2016 compared to 2011.

Comparing the IQV as indicative of network composition according to social contexts, no changes were identified in 17% of the respondents over the period under investigation. Network composition was seen to have become more homogeneous in 42% and more heterogeneous in 41%.

Table 3: Changes in network characteristics between 2011 and 2016 (%)

	Network size	Proportion of family members	IQV
Decrease	40	37	42
No change	23	21	17
Increase	37	42	41

Source: German Socio-Economic Panel, 2011 and 2016; N = 13,530 respondents; own calculations.

IQV, index of qualitative variation.

Network size and composition remained unchanged in 849 (6.3%) of the 13,530 respondents over the period of observation.

Even though our descriptive review of the social relationships indicated a certain degree of stability, this does not imply that the individuals named with regard to the diverse relationship contents were the same people at the two points in time. Table 4 shows that the majority of individuals in relationships referred to in 2011 were mentioned again five years later. In concrete terms, 36,794 (63.6%) of the 57,841 alters named in 2011 were still in the networks in 2016.

Table 4: Drop-out and newly named alters in the network according to relationship type and interactions

	N = 2011	Dropped out, 2016 (%)	Newly named, 2016 (%)
<i>Relationships, 2011</i>			
Spouse/partner	10,788	3.6	3.7
Former spouse/partner	686	2.4	2.2
Parents	10,507	14.8	8.2
Children	8,835	6.7	17.3
Grandparents	478	1.5	0.7
Grandchildren	271	0.7	1.8
Relatives	10,264	25.8	22.2
Coworkers	5,080	13.1	14.2
Colleagues from training	1,129	3.5	2.0
Neighbors	1,303	4.3	5.0
Members of a club, leisure time partners	1,322	4.2	4.6

	N = 2011	Dropped out, 2016 (%)	Newly named, 2016 (%)
Paid aids, outpatient service etc.	2,715	7.6	8.9
Other(s)	4,463	11.5	8.9
Number of alters ¹	57,841	21,047	20,923
<i>Types of interaction, 2011</i>			
Talking about important things	35,250	37.5	40.9
Help with career advancement	13,828	57.3	53.6
Help in long-term care	29,721	39.3	40.5
People with whom one occasionally has disputes	14,616	64.9	62.3
People who are allowed to tell unpleasant truths	30,540	42.7	42.6

Source: German Socio-Economic Panel, 2011 and 2016; own calculations.

All percentages were calculated at the age level; a total of 78,764 persons were named in the two waves.

¹ The figures indicate that 57,841 alters were named in 2011; 21,047 alters dropped out in 2016 and 20,943 alters were newly named in the second wave.

We identified high levels of variation in exploring the percentages of alters in each category of role context in terms of who explicitly was no longer mentioned and who were newly named by 2016 (Table 4). Especially parents and relatives were most frequently no longer named in wave 2, followed by non-relatives, especially coworkers, paid aids, and others. In the second wave, the parent dropouts were replaced by more frequent namings of children. Among the other omitted individuals, they were replaced to approx. the same extent. This finding seems to be consistent with the results published by other authors (Heydari, et al., 2018; Saramäki, et al., 2013) who assumed frequently stable signatures in the roles in spite of network changes (Heydari, et al., 2018).

In an attempt to test our hypotheses regarding the stability or discontinuity of the relationships, we calculated a logistic regression model including two levels and two points in time. A dichotomous variable was applied as the dependent variable, describing relationship dynamics between 2011 and 2016 and assessing whether changes had or had not taken place between the two waves with regard to the relationship partners' namings. The variable was nominally scaled (0 = stable / no change and 1 = change). We did not consider whether a given relationship had been dropped or whether it had been newly established as the differences were of nearly the same magnitude and we were unable to be certain whether omitted namings were more relevant than those newly introduced.

The logistic regression model was applied to examine the effects of various survey characteristics, relationship contents, relationship types, and the occurrence of various important life events between 2011 and 2016. We also investigated network size, network composition, and the proportion of family members in the networks with regard to relationship stability. The basis was a multilevel dataset since we measured the various survey characteristics and the occurrence of important life events over the observational period for ego and the relationship contents and types at the level of the alters. The ego data were joined to the network data. We used 'age' in groups (18-30, 31-50, 51-65 and above 65 years) and 'gross monthly income for the personal factors. The personal factors also included

‘gender (male, female)’, ‘family status (living together, living apart, single, divorced and widowed)’, ‘living distance to one’s nuclear family’ and ‘employment (full-time employment, part-time employment, apprenticeship/training, marginal employment, semi-retirement, voluntary military service)’, ‘professional qualifications (no training, vocational training/apprenticeship, university or similar)’ and estimated ‘health satisfaction (better than satisfactory, satisfactory, worse than satisfactory)’. The life events having occurred between 2011 and 2016 and sampled were ‘met new partner’, ‘getting married’, ‘starting cohabitation in with partner’, ‘child born’, ‘child came to household’, ‘child left household’, ‘living apart from partner’, ‘divorced’, ‘partner, father, mother, child, other household member died’, ‘other family changes’, and ‘unemployment’ and ‘retirement/pension’.

In terms of the content-related aspects of social relationships, we used the respective namings on the five generators varying between 0 (no naming) and 1 (naming).

The social factors represent the role of relationships between ego and alter, which we grouped into partners, family (children and parents), relatives, coworkers, neighbors, leisure time partners, paid aids, and others.

As to network structure, we used the three dichotomously coded indicators that reflected whether a change had occurred between 2011 and 2016: network size, the IQV, and the proportion of family members in the network.

As the data structure allowed a logistic multilevel regression analysis of changing relationships over the period to be computed, we first calculated the null model for this analysis. The interclass correlation coefficient (ICC) was 0.013, thus indicating a very low level of variance between the levels. Rather, the period of time between the two waves, which was represented by the dependent variable, seemed to play a more crucial role than the changes in individual factors. For this reason, we calculated a simple logistic regression analysis of the changes in relationships between 2011 and 2016.

Table 5 shows the indications for the logistic regression model. With regard to our hypotheses, we obtained the following results:

Table 5: Logistic regression model of change in relationships between 2011 and 2016

Change in relationships ^a	Odds ratio
Personal factors	
Age	
18-30	ref.
31-50	1.154***
51-65	1.072
> 65	.9266
Gender	
Male	.831***
Female	ref.
Family status	
Living together	.856***
Living apart	ref.
Single	1.318***
Divorced	.975
Widowed	1.160***
Living distance to one’s family	1.384***
Professional qualification	
No training	.998
Vocational training	ref.
	.884***

University or similar	.767***
Health satisfaction	
Better than satisfactory	1.094
Satisfactory	1.056
Worse than satisfactory	1.122
Employment	
Full-time	ref.
Part-time	.9231
Apprenticeship/training	.879***
Marginal employment	.965
Semi-retirement	.904
Voluntary military service	.902
Gross income/month	.999***
Life events, 2011-2016	
Met new partner	.986
Getting married	1.477***
Starting cohabitation	1.104
Birth of child	.928
Child came to household	.868
Child left home	.945
Separation from partner	1.263**
Divorced	1.308*
Death of partner	2.478***
Death of father	1.185*
Death of mother	1.453***
Death of child	1.571
Death of other household members	.993
Other family changes	.823
Unemployment	1.090
Retirement/pension	1.051
Relationship contents ^b	
Talking about important things	.258***
Help with career advancement	.427***
Help in long-term care	.229***
People with whom one occasionally has disputes	.331***
People who are allowed to tell unpleasant truths	.311***
Network characteristics ^c	
IQV	1.361***
Proportion of family members	1.308***
Network size	1.129***
Relationship type	
Partner	ref.
Parents	1.044
Children	.6609***
Relatives	2.320***
Colleagues	1.783***
Neighbors	3.941***
Leisure time partners	4.253***
Paid aids, outpatient service	1.758***
Others	2.701***
Pseudo R2	0.3649
Log-likelihood	-33844.719
Alters (#)	78,525
Respondents (#)	13,530

Source: German Socio-Economic Panel, 2011 and 2016; *p < 0.5, **p < 0.1, ***p < 0.001.

a: Binary coding of dependent variable 'change in social relationships': (0) no change in namings, and (1) change in namings. The coefficients represent the log-odds.

b: Measurement drawn from the first wave 2011.

c: Measures the changes of network characteristics between 2011 and 2016.

In our first hypothesis, H1, we assumed a directed connection to be in place between the heterogeneity of the alters' social contexts and network changes. This heterogeneity is reflected by the IQV. The model shows an increasing IQV to be significantly connected to network changes, such that the assumption was confirmed.

Hypothesis H2 started out from the assumption that professional or familial changes affect the stability of relationships. The results show that only getting married and separating from one's partner, one's partner's or parents' (especially one's mother's) death, getting divorced and other changes in one's family (which are not dealt with in detail here) affected relationship stability. While getting married can result in new relationships, divorce, separation or death can cause relationships to be discontinued. As our dependent variable captured changes in the relationships between 2011 and 2016, yet did not differentiate whether new relationships had been added or old ones discontinued, we can merely assess that these events had resulted in changes in the relationships. No significant changes were identified when a child was born, left a household, died, or joined a household. In our data, professional changes did not lead to relevant changes in the relationships. Young people being apprenticed were observed to have had significantly more stable relationships than individuals in full-time employment. Otherwise, employment showed no effects with regard to changes in the networks. Although overall, the occurrence of individual life events was seen to have influenced relationship stability, no conclusions can be made that this would generally apply to professional or familial changes.

The connection between age and network dynamics in Hypothesis H3 only proved true for individuals aged 31 to 50. This difference is statistically significant and shows medium-aged people in particular to have a higher likelihood of relationship dynamics than other age groups. This served to confirm this hypothesis, as it does not generally apply that age induces dynamics in networks but rather than changing support requirements can simply be situationally conditioned.

Assuming identical network compositions among men and women, Hypothesis H4a was rejected. According to our data, however, women had more heterogeneously composed networks (mean IQV: women, 0.7; men, 0.65) and the average network sizes were 4.5 among women and 4.1 among men. Therefore, Hypothesis H4b was also dismissed, as women showed significantly fewer dynamics in their social relationships than men, as presented in Table 5.

Furthermore, the model suggests that the kind of relationships had a significant impact on network changes (Table 5). In this connection, we established that relationships with one's partner were much more stable than with one's children, parents, relatives, coworkers, neighbors, leisure time partners, paid aids, and others. While the connection was not significant among parents, it was highly relevant for children, relatives, and acquaintances.

In terms of relationship contents, we observed relationships to be more likely stable when the individuals had been mentioned in the first wave. This served to confirm Hypothesis H5.

People who were living apart from their partners were divorced or widowed for any reason also more frequently showed changes in their relationships than did singles or cohabiting partners. Individuals having completed vocational training and university graduates showed more stable relationships compared to those without professional qualifications.

The changes in network structure also significantly increased the likelihood of network dynamics. For example, contrary to what had been assumed, the composition of the networks also changed when the relationships remained stable over time. The changes in proportions of family members suggested that the relationships in family networks were also not stable over time, nor were network sizes. This served to corroborate Hypothesis H6, as stability in the overall network composition does not imply that individual relationships had not changed, i.e. some had been added while others had been omitted. The indications in Tables 3 and 4 also confirm this hypothesis.

Conclusion

The objective of this investigation was to explore the issue as to which social relationships remain constant in ego-centered networks and which fluctuate and why. The high level of stability in the namings indicates that a large proportion of the respondents attempted to maintain the individual “signatures” of the networks or “convoys”.

This leads to the insight that the actual dynamics in the social relationships between 2011 and 2016 were obscured. More closely analyzing the changes in network characteristics, such as network size, the proportion of family members, and qualitative variation among the respondents’ relationship types, descriptive statistics revealed that no changes had occurred in any of these areas in only slightly 6.3% of the respondents. In all the other respondents, changes were identified in one or the other area. For example, the networks decreased and increased in size in 40% and 37% of the respondents, respectively. The proportion of family members rose by 42% and dropped by 37%, and the heterogeneity of network composition decreased by 42% and increased by 41% of the respondents over the observational period.

In terms of individual relationship contents, furthermore, descriptive statistics showed that the partnership relationships had remained relatively stable over time, while changes are to be observed in the namings over time in all the other types of relationships.

With reference to the connection between social relationships, roles, and social contexts, we assumed that respondents frequently acting in various contexts would also show changes in their networks. Based on various investigations (e.g., Fischer & Offer, 2020; Badawy, et al., 2018; Bidart & Cacciuttolo, 2013; Bidart & Lavenue, 2005; Bloem, et al., 2008; Carstensen, et al., 1999; Kalmijn, 2003, 2012; Mollenhorst, 2014; Small, et al., 2015), we also considered that familial or professional life events as well as changes in ego’s personal factors, especially age, would have brought about changes in the social relationships. Referring to studies on the gender-specific structures of social support networks (e.g., Veiel & Herrle, 1991), we assumed that there were no differences in men’s and women’s network compositions and that women, on account of their higher caring function (e.g., Menaghan,

1989; Thoits, 1986; Turner & Avison, 1989) would have presented a higher level of dynamics in their network relationships than men. With reference to studies on the stability of support relationships (Wellman, et al., 1997; Morgan, et al., 1996), we at once thought that relationships that have provided support in the first wave would have been mentioned again in the second wave. Since supportive relationships are also dependent on the given needs, it does not imply that the overall network composition would have changed in spite of newly added or omitted relationships.

We computed a logistic multilevel model with the information provided by both ego and the alters to assess our assumptions.

The substantial implications of our findings are, first, that contexts play an extensive role. Compared to partnerships, all other role relationships increased the likelihood of change in the social relationships, with those with relatives and coworkers dropping out most frequently.

Second, personal characteristics, such as age, gender, and family status, directly affect changes in the networks. The dynamics in social relationships were seen to increase in medium-aged individuals, while women showed more stable relationships than men, contrary to what we had assumed. The likelihood of changes in network relationships was observed to rise in singles or respondents who, for whatever reason, were separated from their partners, be it that they were not living together, were divorced, or widowed. Regardless of these factors, the gross monthly income also played a role in network dynamics. The likelihood of network changes increased with growing income.

Third, the relationships already named in 2011 in terms of relationship contents were mentioned again in the second wave, such that the results of the studies on the stability of supportive relationships were corroborated. In particular, the respondents maintained relationships with individuals who received their help and with close relatives. The normative context seems to have played a decisive role in this connection.

By analogy with Small et al. (2015), our data also revealed that the relationships in family networks and the sizes of networks had been unstable over time. In terms of the overall network, we also identified changes in network composition. However, observed from the outside, these networks appear to have been stable in the “signature” (Heydari, et al., 2018).

Similar to the investigation published by Mollenhorst et al.(2014), our results showed the occurrence of important life events only to have had individual effects on relationship stability. For instance, changes in the nuclear families’ geographical proximity and in professional status had no significant effects on relationship stability, while getting married, discontinuing partnership or getting divorced, one’s partner’s or parents’ (especially one’s mother’s) death, as well as further unspecified familial changes significantly affected relationship stability. The impacts of these life events were also independent of the other factors. Compared to the other factors, however, their explanatory power is rather weak with regard to network changes.

This study helps us better understand the dynamics of personal networks, particularly in terms of which relationships persist and which fluctuate and why.

We had recourse to available data which also limited the possibilities of analysis. Thus, it is recommended that more consideration be given to the kinds of changes in

networks to be described over time in order to generate appropriate information and facilitate the set-up of such studies (cf. Feld, et al., 2007).

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