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Similarity and differences in age, gender, ethnicity, and education as explanatory factors of tie loss in the core discussion network

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ABSTRACT

Individuals are more likely to interact with people who are similar in terms of socio-demographics and values than dissimilar people, which is often explained by a focus on selection effects. Yet, tie *loss* of dissimilar ties might also cause network homogeneity. Unfortunately, within the literature, there is a relative dearth of knowledge on the relationship between (dis)similarity and tie loss. Hence, we address this gap by theorizing and testing the relation between (dis)similarity and tie loss in the core discussion network (CDN) of Dutch citizens, also considering how ties are embedded in the CDN.

Introduction

A wide literature shows that individuals are more likely to interact with people who are similar in terms of socio-demographics and values than with dissimilar people (Kossinets and Watts, 2009; Marsden, 1988; McPherson et al., 2001; McPherson and Smith-Lovin, 1987). This has been found for romantic relationships, online dating behaviour, acquaintanceship networks, and also for confiding relationships which are the focus of this study (DiPrete et al., 2011; Huber and Malhotra, 2017; Kalmijn, 1998; Kandel, 1978; Marsden, 1988; McPherson et al., 2001; Völker, 2022). Homogeneity in confiding relationships arises because people are more likely to form relations with similar people. This, in turn, is often explained by meeting opportunities - similar people being more likely to share the same social settings (e.g. foci and collective activities) -, endogenous network dynamics (e.g. friends of friends become friends), and a preference for the known and predictable (Kandel, 1978; Mollenhorst et al., 2008). However, the explanatory focus on the input side – or selection – of social networks and relations may shroud the fact that homogeneity is also the product of de-selection, the focus of this study.

Confiding relationships are dynamic, and we know from the literature that these relations are subject to change over time, which is why they should be studied in a dynamic way, and not in a static way which is what most survey studies do. A dynamic analysis enables us to better study the mechanisms that lead to homogeneity in social life and to different forms of segregation, while a static analysis misses the fact that confiding relationships may end, and that tie loss (or, de-selection) may influence the composition of a social network as well. Indeed, previous research indicates that tie loss is far from random, partly because the so-called costs of maintaining relationships may depend on dyadic similarity (Small, 2017; Tulin et al., 2021). For instance, as we will study in more detail here, a relationship with demographically dissimilar friends, confidants, or acquaintances might require more effort than a relationship with a more similar person because with the latter social experiences and meeting places are more likely to be shared (Mollenhorst et al., 2016). A shared background or shared preferences can also increase empathy, which in turn makes a relationship more beneficial in terms of social support, and information from similar people is in general considered more trustworthy (Ertug et al., 2022; Jones and Shah, 2016; Newton et al., 2018; Small, 2017).

While the above seems plausible, we should not simply assume that explanations for tie loss are only mirroring tie formation as dissimilarity was not a hurdle to starting a relationship with these persons in the first place. Furthermore, confiding relationships in the core discussion network are not isolated relations since they are embedded in the CDN and this directly concerns dyadic similarity. For instance, a confidant may have a unique or common demographic profile in the Core Discussion Network (e.g. being the only female confidant in a CDN of male confidants implies high uniqueness). In this study, we argue that this uniqueness is likely to be related to whether this confidant remains part of that network. Similarly, the density and size of the CDN are network characteristics that might influence de-selection. Adding to what

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previous work points at, we thus propose that the size and the density of the core discussion network as well as at the embeddedness of a confidant within the network are potential causes of dropping confidants (Fischer and Offer, 2020; Tulin et al., 2021).

How dyadic similarity and network characteristics relate to dropping confidants with similar or dissimilar gender, migration background, age, or educational level has not been theorized and tested yet either. That the impact of dyadic similarity for tie loss is conditional on characteristics of the larger network is however to be expected. Particularly, the degree of homogeneity of the network as a whole and the uniqueness of a confidant vis-à-vis other confidants may very well impact the so-called added value of a confidant: a dyadic dissimilar person who is also unique in the larger CDN is likely to have a higher added value as such. We theorize this in more detail in this study for the impact on tie loss.

Overall, we consequently formulated the following set of research questions: (1) How is dyadic similarity between ego and confidant on age, gender, education, and migration background related to tie loss in the Core Discussion Network?" (2) "How is tie loss in the Core Discussion Network related to network similarity mechanisms (i.e., confidant uniqueness)?" And: (3) "How is the impact of dyadic similarity on tie loss in the core discussion network moderated by confidants' uniqueness?".

In answering these questions, we make two core contributions to the literature on tie loss. First, As described above, we contribute to the literature by more thoroughly theorizing the wider networks' role in shaping the impact of dyadic (dis)similarity on tie loss. Second, we provide a unique empirical test of the impact of dyadic similarity on tie loss. Specifically, we answer these questions by employing data from the LISS (Longitudinal Internet studies for the Social Sciences) dataset, a unique longitudinal dataset, largely representative of the Dutch-speaking population in The Netherlands spanning the years 2008–2018 (CentERdata, 2022). With the LISS we may track not only primary survey respondents (i.e., ego) over time but we also track, quite uniquely, the people they discuss important matters with (i.e., their confidants or alters). Moreover, the size of the LISS sample and the richness of data enables us to control for characteristics of the individual, characteristics of the alter, and life events of an individual. This enables the isolation of the social similarity effects rather original to this study. Tie-loss will be modeled by survival analyses in which we take into account that multiple ego-confidant relations are nested within ego and that the same ego-confidant dyad may be at risk for tie loss more than once when the confidant re-enters the CDN (Singer and Willet, 2003).

Theory

Tie maintenance in the core discussion network

The Core Discussion Network (CDN) consists of the people with whom an individual discusses important matters (Marsden, 1987; Small et al., 2015). These confiding relationships are generally someone's strong ties: (close) friends and family members who also provide support across the lifespan and are beneficial to individuals' everyday well-being (Burt, 1984; Marsden, 1987). But the CDN is also made up of weaker ties, of people who are generally targeted specifically by an individual to discuss a certain important matter, mostly because they are knowledgeable on that matter and available in their everyday context, such as work or school (Small, 2013). Given the nature of the CDN, people with whom an individual discusses important matters are bound to change over time, and indeed, previous research has indicated that there is a sizeable turnover of network members in the core discussion network (Fischer and Offer, 2020; Morgan et al., 1997; Small et al., 2015; Suitor and Keeton, 1997).

Considering how the literature, and this study alike, conceptualizes and measures CDN composition, a loss in confiding relationships is indicated by an individual not providing the same name in a so-called name generator in subsequent waves of a study (Marsden, 1987). Important to note is that confidant tie-loss does not per se mean that all connections with a confidant are broken; this person may still be part of the wider social network of ego (Fischer and Offer, 2020; Morgan et al., 1997).

From the literature, we know that tie loss is not only due to life course transitions (e.g., people moving, entering the job market, or educational transitions) or passing away (Bidart et al., 2020) which raises the issue of what causes confidant tie-loss. There are for instance methodological explanations that are associated with name generator usage: respondents may forget to mention a confidant in a subsequent wave, as Fischer and Offer have found (2020). Also, a more empirical mechanism is argued for in the literature: that (temporary) tie loss occurs if ego and alter do not have enough opportunities to meet due to the disappearance of shared contexts (Bidart et al., 2020; Fischer and Offer, 2020). Subsequently, when meeting opportunities are present again, the confiding relation could return. As we will see below, it is not rare to see that the same person re-enters the CDN after a period in which no important matters were discussed, which without further information might be explained by the latter two mechanisms. The focus in this study, however, is on substantive reasons for confidant tie-loss, and given the data constraints imposed by name generators, we focus theoretically on actions of ego.

In this respect, please note that discussing an important matter with someone is an *event*. But because a survey respondent indicates this event occurred within a specific period, we interpret this as there being a confiding *relation* between ego and named confidant in that period. The distinction between event and relation helps us theorise confidant tie-loss. Namely, we argue that confidant loss can be the result of explicit as well as implicit individual action (or non-action) of either ego or alter in the relationship.

Implicit and explicit actions have different theoretical implications. An explicit decision of an individual to break a confiding relationship could, for instance, be due to relationship strain or an argument between an individual and a confidant. Confidant loss can also be implicit, as individuals turn to other people to discuss important matters (i.e. confiding as an event), without an explicit decision to change a relationship with a previous confidant. Moreover, a change in personal circumstance could make someone less attractive as a discussion partner, as this person's knowledge and expertise are no longer sought for or appreciated. Also, a change in personal circumstances can lead to a situation where a person and a confidant do not share a meeting opportunity anymore, which could lead to temporary tie loss (Bidart et al., 2020; Fischer and Offer, 2020).

Theorizing the relation between similarity and tie maintenance

In theorizing the relationship between dyadic similarity and tie maintenance we draw from existing theories on strong tie formation, which emphasize shared meeting opportunities and similarity preferences (Feld, 1982; Kalmijn, 1998; McPherson et al., 2001). People are likely to create a relationship with people from a shared social context, such as school, club, neighbourhood, or workplace (i.e. opportunities), and people prefer to interact with people from similar socio-economic backgrounds or with similar cultural views, attitudes, or values (i.e. preferences). These two mechanisms work in tandem as social contexts in society are often segregated. So, people tend to participate in social contexts in which they are likely to meet people like them. Consequently, relationships with similar people are more likely than relationships with dissimilar people. These mechanisms are the starting point of our theorizing, but as will become clear below, we also consider how they might work differently for tie loss as initial barriers to tie formation have been overcome by forming a confidant tie initially.

The framework of meeting opportunities and preferences can be used in explaining tie maintenance particularly since it brings to the fore the costs of maintaining a confiding relationship and the benefits that a

person experiences from a confiding relationship. These, – maintenance costs and relationship benefits – are key theoretical elements that are used in this study to explain the maintenance of a confiding relationship. The emotional or time investment that an individual must make to maintain the relationship as well as the support and information that a confiding relationship could provide to an individual during a confiding event a key consideration for tie maintenance and tie loss. In general, relationship maintenance is costly, as it needs an investment of time by ego to keep in contact. Subsequently, not investing in a relationship will make it wither away (Burt, 2002). Below we will translate this general cost-benefit logic to more specific hypotheses in terms of dyadic ego-confidant (dis)similarity and (low) uniqueness of the confidant compared to other confidants.

In doing so, our demographic focus will be on age, gender, migration background, and educational level. Each of these social dimensions presents an identity based on which cleavages are forged along which society is organized. For each, the argument holds that people tend to partly identify themselves in these terms, that others read people in these terms and that, consequently, they shape people's experiences and perceptions. This is not to say that no other characteristics work similarly, but this selection focuses on core cleavages in society, which provide a strong first test of the mechanism. If we do not find them for (dis)similarity in these terms, it is unlikely we will find them for others. Moreover, the nature of each is not identical. For the goal of this study, however, we will theorize the mechanism among the general notion of similarity and dissimilarity.

Theorizing the impact of dyadic similarity

Dyadic similarity is related to the costs of maintaining a relationship, partly due to shared meeting opportunities. Namely, when ego and confidant share meeting places the investment in maintaining the relationship is reduced, which reduces the risk of confidant loss. Because meeting places tend to be segregated by the demographic characteristic of our focus, they primarily provide contact opportunities with similar others (Feld, 1982; Kossinets and Watts, 2009; Mollenhorst et al., 2008). We therefore assume that to keep meeting up with dissimilar confidants is more difficult as ego and confidant need to actively create meeting opportunities since they are less likely to engage in similar social contexts.

Furthermore, similar dyads are more likely to be well-embedded in ego's CDN network (Mollenhorst et al., 2016). This means that confidants know the other confidants in the CDN. People do not only meet friends one-on-one but also in groups, so social relations that are well-embedded in the social network are found to be stronger and more stable over time (Feld, 1997). Given the more favourable meeting opportunities that similar people have, maintenance costs are also lower for this type of meetings and confidant loss is thus less likely for similar confidants.

Additionally, similar potential confidants might not only hold the promise of providing more support, once a dyad is formed this might hold, and thus similar dyads are theorized to provide on average more support in a confiding relationship than dissimilar dyads. For instance, similar people are more likely to offer empathy as they are likely to have had similar experiences (Small, 2017). Information from people more similar to us is also considered more trustworthy (Jones and Shah, 2016). And similarity is related to shared interests and shared opinions, which makes conversation and interaction easier, also beyond the connection on which the relationship was formed. Similarity thus reduces the risk of relationship strain (Kalmijn, 1998). In sum, we assume that, in general, the emotional bond between ego and a similar confidant is stronger than between ego and a dissimilar confidant.

These mechanisms discussed above might differ in strength per type or ground of similarity, for instance, because society is more strongly segregated concerning some demographics (e.g. migration background and education) than others; however, we have no a priori reason to expect the mechanism to work fundamentally differently across the demographic similarities. Our focus, as discussed above is on identity-based social dimensions along which society is organized. The same logic might pertain to other similarities too (e.g. marital status), but this is not the focus of this study.

Altogether we formulate the following first general hypothesis on the relationship between similarity and confidant loss (H1) and we also formulate additional hypotheses on the mechanism discussed above, which can be empirically tested too (H2, H3):

H1. : Dyadic similarity on (a) migration background, (b) gender, (c) educational attainment, (d) age, is negatively related to the risk of confidant loss.

H2. : The negative relation between dyadic similarity and the risk of confidant loss is partly explained by the emotional closeness of the dyad.

H3. : The negative relation between dyadic similarity and the risk of confidant loss is partly explained by confidant embeddedness in the CDN.

As we theorize confidant *loss* specifically, we also consider the difference between forming ties and maintaining ties more explicitly. Dropping a confidant can only occur after first selecting a confidant. Having discussed important matters with a dissimilar confidant suggest that this confidant is valuable to ego, for instance in possessing unique knowledge and skills or having a shared experience (e.g. trauma, shared hobby) leading to a strong emotional bond regardless of social dissimilarity. Hence, the specific initial reason(s) why a dissimilar person is selected to discuss important matters may very well outweigh any additional costs for maintaining this relationship that result from dyadic dissimilarity along social dimensions, and then the initial hurdles that are set by dissimilarity are overcome, for instance, because partners actively try to find places to meet one another. Such mechanisms might partly nullify the expectations formulated above.

The effects described directly above might be time specific though. It could be argued that over time relationship strain due to dissimilarity builds ups leading to tie loss later. However, given that we know that social relationships are most vulnerable when they are newly formed (Burt, 2002), dissimilarity is more likely to lead to tie loss early on in a relationship. This aligns with the reasoning above as there are initial benefits to creating a relationship, particularly for a dissimilar other, it is likely the relationship is invested in. Might there be some experienced relationship strain, a dissimilar dyad may have found solutions that help to overcome these by for instance accepting the quirks of the other or growing towards each other in terms of values. Moreover, hurdles to tie maintenance can also be time-dependent as dissimilar dyads may actively search for ways to meet each other. Hence, we expect that the dissimilarity effect on tie loss will decrease over time. Based on the same reasoning we also expect that the effects of the mediators emotional closeness and embeddedness will decrease over time. These expectations are formalized in hypotheses H4, H5 and H6:

H4. : The negative relation between dyadic similarity on (a) migration background, (b) gender, (c) educational attainment, (d) age and the risk of confidant loss will decrease over time.

H5. : The strength of the negative relation between alter embeddedness and the risk of confidant loss will decrease over time.

H6. : The strength of the negative relation between emotional closeness and the risk of confidant loss will decrease over time.

Confidant uniqueness

From previous research we know that confidant tie loss is more likely when the CDN is larger and less likely when the CDN is denser, that is when confidents also know each other (Lubbers et al., 2010; van Tilburg, 1992). This demonstrates that confidant relations should not be studied independently. We build on this research and bring the social network

perspective one step further by theorizing how the uniqueness of a confidant – in relation to other confidants of ego – impacts tie loss.

Confiding relationships can provide support, information, and knowledge or expertise, and those that provide more unique resources are thus considered more beneficial and have a greater value for an individual. Above, we already argued that a confidant who is dissimilar to ego may be attractive because this confidant may have access to resources not available to ego, which is relatively similar to the strength of weak ties argument (Granovetter, 1973). A similar argument may hold if we assess the impact of confidant uniqueness with the other confidants in the network of ego. Confidants who are like other confidants may possess redundant information, having similar knowledge and resources. In contrast, confidants that are unique may also bring into reach unique information and resources.

Considering this argumentation, confidant uniqueness is, however, also crucial for understanding the effect of dyadic dissimilarity on the risk of confidant loss, which it is likely to condition. Namely, the risk of confidant loss due to dyadic dissimilarity, thus being different from ego, is lowered when a confidant is unique. In such a case the confidant is both dissimilar to ego and 'unique' in comparison to other confidants, which could provide information that differs from both the knowledge and experiences that ego has personally and that is provided by other confidants. Consequently, the benefits of the dissimilar confiding relationship will outweigh the maintenance costs of the relation, which is translated into unique and dissimilar dyads having a lower risk of confidant loss.

Based on this logic providing unique knowledge and experiences, we thus formulate two more hypotheses:

H7. : Confidant uniqueness on (a) migration background, (b) gender, (c) educational attainment, (d) age, is negatively related to the risk of confidant loss.

H8. :The negative relation between dyadic similarity and the risk of confidant loss is weakened by confidant uniqueness.

Method

Data

To test our hypotheses, we make use of data from the LISS (Longitudinal Internet studies for the Social Sciences) panel administered by CentERdata (Tilburg University, The Netherlands) (CentERdata, 2022). The LISS panel is a representative sample of Dutch adults who participate in monthly internet surveys. The sample is based on a true probability sample drawn from the Dutch population registry. Part of LISS is a longitudinal survey fielded yearly, since 2008, which covers a large variety of socio-economic issues and attitudes and includes a Core Discussion Network module. Furthermore, the LISS has provided unique alter ids for the first 11 waves of the LISS core studies. Hence, the LISS data provides unique longitudinal egocentric network data that ranges from 2008 thru 2018.

Confidant loss

We rely on the following confidant name generator: "Most people discuss important things with other people. If you look back on the last six months, with whom did you discuss important things? Please enter their first names below (to a maximum of 5)." Subsequently, for every ego we know the number of confidants that they have in a specific wave and the first names of these confidants. The latter was used to create confidant ids and track confidants across the 11 waves. Note that the names mentioned in a previous wave were not recalled for the respondent at the time of their response; they had to be tracked and connected by the researchers. In the coding and matching of confidant ids we corrected for spelling differences in first names. The name generator used by the LISS is a common method to measure the core discussion network and has been used often since its introduction (Marsden, 1987). However, it is not without its drawbacks, as pointed out by previous research (Bearman and Parigi, 2004; Fischer, 2009). For instance, there are cultural differences in interpreting the meaning of important matters which leads to interpersonal differences. Moreover, name-generators are time-consuming and cognitively demanding tasks that may result in response fatigue. Furthermore, longitudinal comparison of name generator response, which we do, can also be problematic as not renaming a confidant can have multiple causes. Namely, people can forget to mention a confiding relationship. Also, respondents are limited to name up to 5 confidants, which may limit the options for naming confidants. Moreover, as mentioned above, names mentioned in a previous wave were not recalled to respondents in the LISS survey. Therefore, we are careful to interpret the descriptives as absolute representations of tie loss. Yet, we are confident that tie loss at least taps into specific confidants being less important to a respondent and as such not renamed. Therefore, we have little reason to believe that the explanatory analyses will be severely biased by these problems. Moreover, a not renamed confidant can reappear in the CDN in subsequent waves and become again at risk for tie-loss. We will analyse these multiple spells.

We deem a confidant i to be lost between wave T and wave T + 1 when confidant i was named in wave T and not named in wave T + 1. This means that in the period between T and T + 1 the confidant relationship was lost. We label the period during which the confidant is continuously renamed a 'dyad spell'. The shortest dyad spell constitutes only one period (or observation), being named at wave T and lost at wave T + 1. It is possible that confidant i is renamed at T + 2, at which point a new dyad spell starts. Therefore, an observation (the period between wave T and T + 1) is hierarchically nested in a dyad spell, a dyad (since a dyad can re-occur), and an ego.

We excluded kin ties since the dynamic of dropping ties is beyond the scope conditions of the theorization. Namely, kin ties (i.e., family relations and partners) tend to be similar on migration background, with partners being mostly of a different gender but a similar age. Given these strong patterns and that social relations with kin are less likely to be lost due to the large normative constraints, this will distort the similarity effects as we focus on here.[1] However, we do use the information on kin confidants to construct the confidant uniqueness, network size, density, and embeddedness variables. Our theoretical and empirical focus is thus on tie loss between ego and non-kin confidants.

Measures

Independent variables

Before moving to dyadic similarity and confidants' uniqueness, we need to discuss how age, gender, educational attainment, and migration background were measured.

Characteristics of ego. Educational attainment was measured by the self-reported educational attainment of respondents. We recoded the categories to education in years. This results in a continuous variable with levels 4 through 16. *Age* was measured by the self-reported age of respondents. The *gender* of ego was measured dichotomously with answer categories "male" and "female", not allowing for another option. *Migration background* was measured using a three-category variable "no migration background," "non-Western migration background", and "Western migration background". Migration background refers to the respondent having migrated themselves or at least one of their parent having moved to the Netherlands. The distinction 'Western/non-Western' stems from the traditional government classification used by

[1] We ran sensitivity analyses on the complete data (nonkin and kin) and with only kin. These show that similarity effects are indeed less profound within the kin data and that tie loss is also less frequent in the kin data.

Statistics Netherlands, roughly classifying Africa, Asia, and South America as 'non-Western'.[2]

Dyadic similarity. Dyadic similarity was measured for age, gender, educational attainment, and migration background. Information on confidants comes from ego, i.e. is reported by the individual survey respondent for each of the confidants using the same measurement as for ego self. For the categorical variables gender and migration background, we coded dyads to be similar when they were of the same gender or had the same migration background classification. The result was a dummy variable with a value of 1 indicating similar gender or migration background classification. For the continuous variables, age and educational attainment, we took the absolute difference between ego and confidant and divided this by the range of the age (1−13) or education variable (range 4–16). That leads to a variable running from 0 to 1, 1 being the most similar. This value was subtracted from one resulting in a *similarity* score ranging from 0 to 1, the latter indicating full similarity.

Confidant uniqueness. We measure how the confidant is dissimilar from the other confidants, that is: unique, for each social dimension separately. For the categorical similarity variables, gender and migration background, we calculated a reversed EI index (Bojanowski and Corten, 2014). Concretely, for each confidant in the network, we calculate the number of dissimilar and similar confidants in that ego's CDN. Then we subtract the number of dissimilar confidants from the number of similar confidants. The resulting difference score is higher if more confidants are similar (i.e. the specific confidant is less unique). To make this measure independent from network size of ego, we then divided the differences score by the total number of confidants. The resulting EI measure ranges from − 1–1, where − 1 indicates that a confidant is fully unique in a network and 1 indicates that the confidant is similar to all other confidants in the ego's CDN.

For the confidant similarity on educational attainment and age, we calculated an average similarity score: the average of the similarity scores of the confidant of interest with the other confidants in the network. For instance, for uniqueness in education, we calculate first for a confidant the similarity of that confidant with every other confidant in the network separately. Subsequently, we take the average of these confidant similarity scores to represent confidant uniqueness. A score of 0 indicates that a confidant is unique and a score of 1 indicates that the confidant is common.

Emotional closeness. We measure the emotional closeness of the confiding relationship with two items, which allows for assessing the emotional closeness of each confidant relative to the others in the CDN. On the first item, "Are all these people equally dear to you?", respondents could indicate either no or yes. If they were not equally dear for ego, the second item, "Which of these people are very dear to you?", was asked. From these two variables we constructed the variable emotional closeness with answer categories: "Very dear", "Not dear", and "All equally dear". The category "Not dear" was used as the reference category. Here we expect that confidants who are more emotionally close are less likely to be lost. [3]

Confidant embeddedness. Confidant embeddedness is measured from the number of indirect ties between a confidant and ego. Ego was prompted with the question: "How close are these persons to each other?" Answer categories are: "very close", "not very close, yet no strangers", and "total strangers". We use this ego reported data on whether confidants knew other confidants in the core discussion network. The number of indirect ties of a confidant with ego shows the embeddedness of a confidant in the network.[4]

Control variables

The LISS dataset is very rich, and this allows us to include important time-varying and time-constant covariates to isolate the impact of dyadic similarity and confidant uniqueness, which for instance also directly impact ties loss (such as moving) or indirectly (e.g. age of the confidant, which relates for instance to passing away).

Life events of ego

We control for three different life events of ego that are likely to affect the risk of tie loss: divorce, moving, and change in the number of children that live at home. Our general expectation is that these life events will lead to different social settings in which ego spends time and hence that tie loss with previous confidants will increase. We measured *divorce* as a state by tracking the marital status of ego over time; when there was a change in marital status from married to divorced in the time that we tracked ego, we coded ego to be divorced as of that time. We measured whether ego *moved* as a state by tracking the year in which ego entered their current residence. When there was a change during the time in which they are in the LISS panel we deem that ego has moved at that time. We made a distinction between moving within the same municipality and moving to another municipality. This results in a variable with the categories: "no move", "move within the same municipality", and "move outside of municipality". As a sensitivity analysis we checked whether events had a lingering effect (time lag) or where a transition, this proved not to be the case.[5]

Characteristics of confidant. We controlled for confidants' educational attainment, age, gender, and migration background, measured on the same scales as for ego, except for age. The age of confidants with: "What age is …, approximately?". Respondents could choose from a list of 13 different age categories, spanning between below 16 to over 71 by five-year intervals.

Dyad characteristics. We controlled for the type of relationship between ego and confidant, the length of the relationship, the number of periods a dyad has been part of the network, and the number of spells. The *type of relationship* between ego and confidant is measured by the question: "How do you know …?". Answer categories were: "colleague", "is part of the same group/club", "neighbour", "friend", "advisor", and "other". We added the type of relationships as dummy variables with a reference category "colleague". As already stated above, we removed kin-confidants from our sample, because breaking social relations with kin is unlikely.

Network characteristics. We controlled for the number of confidants in the network and the density of the network (i.e. the share of the potential relation between the confidants and ego that has been reported). When the confidant network of ego is larger, ego must spread its resources among more confidants or invest more in maintaining relations overall. As this is more demanding, it is more likely that confidants ties

[2] Historical legacies and political motivation lead to the inclusion of Indonesia, Israel and Japan among Western. For an elaborate discussion and critique of this classification see WRR report (Jennissen et al., 2018).

[3] Since it is a relative measure, we checked the stability of it during a dyad spell. For this we checked the number of changes from equally dear to either very dear or not dear. We see in 1644 observations a c change from equally dear to very dear or not dear and 1774 observations of the opposite change. So, given the change encompasses only 6.9% of our data, we believe that the measure is rather stable.

[4] We decided not to normalize the measure as this made more sense theoretically. An absolute difference in the number of alters a confidant knows is related to a difference in meeting opportunities, which could be shrouded by a normalized measure.

[5] Event was coded as (0,1,0,0). A lingering effect was coded as (0,1,0.5,0.25). A transition was coded as (0,0,1,1).

are lost. Hence, we expect that size is positively related to tie loss. Finally, we expect that when confidants know each other, ego is more likely to feel a normative pressure not to break a confidant relationship. Moreover, when confidants know each other, it may be easier for ego to meet up with confidants, and tie maintenance may be less costly. Thus, we expect that network density is related to a lower risk of tie loss.

See Table 1 for sample descriptive statistics. We standardized the continuous variables (dyadic similarity, confidant uniqueness, and numeric controls) with mean 0 and SD 1. For a correlation matrix of independent and dependent variables see Appendix A (Table A.3).

Analytical strategy

Our outcome variable measures whether a confidant is lost from the network in each period. Since the LISS panel used encompasses 11 waves, we have 10 periods in which a confidant can be lost. A specific ego-confidant dyad can have multiple spells in the core discussion network when a confidant re-enters the network after tie-loss. Our final sample contains a total of 49.449 observations nested in 35,526 unique dyad spells, which are subsequently nested in 30,853 dyads and 6996 egos.

We used discrete-time hazard models to estimate the (repeated) risk of confidant loss. These analyses were based on the complementary log-log, which is similar to logit models, but is more appropriate when an event is very likely (or very unlikely) to occur. Moreover, we used interval-censored data as the event of tie loss unfolds in continuous time, yet we measured it in discrete intervals, for which the complementary log-log link is the most attractive option (Singer and Willet, 2003). We added a random intercept for ego to counter endogeneity that arises from the specific nesting structure of our data and to account for unobserved heterogeneity due to omitted variable bias.[6] For instance, certain egos are more likely to deselect confidants than other ego's due to unobserved characteristics of ego. Preliminary analyses also showed that most variation was on the ego-level, compared to the dyad level To model the baseline hazard, we added a linear time trend.

Our analytical strategy is as follows: We first estimated a null model in which we only model the baseline hazard curve specified as model 1. Next, we estimated the dyadic similarity (model 2) and the confidant uniqueness (model 3) effects separately and combined (model 4). We then check the robustness of those relations by adding ego, confidant, dyad, and network control variables (model 5). We then turn to testing the mediation hypotheses, including emotional closeness (model 6) and confidant embeddedness (model 7). To test the time and similarity hypotheses we will add interaction terms in models 8–13. To test the similarity and uniqueness interaction hypotheses we add interaction terms in models 14–17. Finally, we show the results of the control variables in the section explaining confidant loss. All the models are estimated in R with the package lme4 (Bates et al., 2015). See our replication website for all code for replicating the analyses.

[6] We are aware that Random Intercept models do not control for all unobserved heterogeneity and that this may lead to biased estimates of fixed effects. However, we decided not use a Fixed Effects design because of the binary nature of our dependent variable and because we want to include group-level covariates into our explanatory model, which is not possible with a FE model. As a robustness check we also estimated a hybrid model (aka Between-Within Model) (Allison, 2009; Schnunk, 2013) of which the estimated coefficients of the fixed effects at the within-level are identical to those of fixed effects models (and hence unbiased). Results of these models are in line with the main effects found by the random intercept multilevel model as applied in the main analysis (see Appendix H).

Table 1
Descriptive statistics.

	N	Mean	SD	Median	Min	Max
Dependent variable						
Dropped	49449	0.643			0	1
Independent variable						
Dyadic similarity						
Education	49449	0	1	0.364	-4.982	0.850
Gender	49449	0	1	0.459	-2.184	0.459
Age	49449	0	1	-0.008	-8.310	0.747
Migration background	49449	0	1	0.420	-2.542	0.420
Confidant uniqueness						
Education	49449	0	1	0.000	-6.311	1.271
Gender	49449	0	1	0.097	-7.208	1.344
Age	49449	0	1	0.144	-2.084	1.258
Migration background	49449	0	1	0.398	-3.84	0.398
Emotional closeness						
Confidant is not dear	49449	0.249			0	1
Confidant is dear	49449	0.106			0	1
Closeness not asked	49449	0.645			0	1
Embeddedness	49449	0	1	-0.229	-1.791	1.332
Control variables						
Ego						
Education	6996	0	1	-0.202	-2.782	1.346
Age	6996	0	1	0.042	-1.722	3.115
Female	6996	0.567			0	1
Migration background						
No migration background	6996	0.817			0	1
Non-western migration background	6996	0.045			0	1
Western migration background	6996	0.080			0	1
Divorced (ref. not)	6996	0.461			0	1
New residence (ref. no move)	6996	0.019			0	1
New municipality	6996	0.009			0	1
First child born (ref. no birth)	6996	0.003			0	1
Confidant						
Education	30853	0	1	-0.287	-3.081	1.389
Age	30853	0	1	-0.072	-1.889	1.744
Female	30853	0.590		1	0	1
Migration background						
No migration background	30853	0.918			0	1
Non-western migration background	30853	0.047			0	1
Western migration background	30853	0.029			0	1
Table 1 *continued*						
Dyad						
Relationship						
Colleague	30853	0.094			0	1
Same group or club	30853	0.045			0	1
Neighbour	30853	0.059			0	1
Friend	30853	0.753			0	1
Advisor	30853	0.010			0	1
Other relation	30853	0.037			0	1
Times dropped earlier	30853	0	1	-0.384	-0.384	8.772
Knows confidant						
< 3 years	30853	0.116			0	1
for 3–6 years	30853	0.175			0	1
> 6 years	30853	0.701			0	1
Network						
Net density	49449	0	1	0.275	-2.714	0.873
Net size	49449	0	1	0.762	-2.824	0.762
Events						
Censored	49449	0.158			0	1

N = 49449
N Ego = 6996
N Dyad = 30853
N Dyad spell = 35526

Note: We used mean imputation for missing data in continuous variables (Allison, 2001). In the model estimation, we added imputation dummies. Moreover, missings on categorical variables were added as an extra category. For simplicity, we did not add these to the descriptive table.

Results

Describing confidant loss

Our data shows that confidant loss in terms of not recalling the same name a year later is frequent and that overall, the length of a dyad spell (i.e. the number of surveys in a row that the same confidant is mentioned) is short. Fig. 1 shows confidant loss in each period, separating the number of dyad spells that are lost and the number of dyad spells that are censored (e.g. ego left the LISS panel or dyad not lost during survey period). Given that we included 35,526 spells, a tie loss count of over 26,170 in period 1 shows that a resounding majority of dyad spells (73,7%) only span one period. Moreover, 68% of all confidants do not return in later surveys, their membership in the CDN is limited to only one period. Do remember, kin and partners are excluded from our main analyses (including them shows 61% of dyad spells spanning one period). The remaining 32% of confidants either remain in the CDN for a longer dyad spell or return after some time and enter a new dyad spell. Compared to previous research on network churn in egocentric networks this is on the high side as around 50% turnover within a single year is quite common (see Offer and Fischer, 2022). Nevertheless, our results are in line with previous studies, as these suggests that network churn typically ranges from one third to two thirds of the nominated ties being lost in a single year (Burt, 2000; Fischer and Offer, 2020; Mollenhorst et al., 2014; Suitor and Keeton, 1997; Tulin et al., 2021; van Duijn et al., 1999). Variations in network churn can be caused by sample characteristics, spacing between waves, and name generator specificity.[7]

The estimated survival and hazard functions are presented in Fig. 2. They also reflect that most dyad spells only last one period as the survival function is 0.247 in period one, which indicates that only 24.7% of the dyad spells survive the first period. Consequently, the hazard of confidant tie loss is greatest in the first period and this decreases with dyad spell length. In other words, if a confidant survived the first year their risk to be dropped in the second year is smaller than it was in the year before.[8]

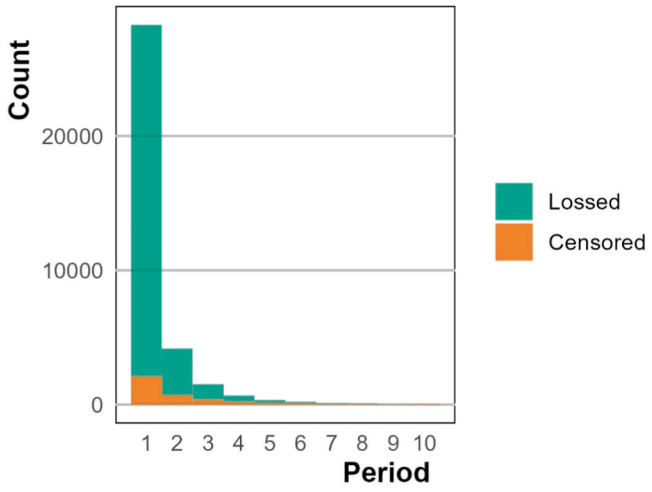

Fig. 1. Describing dyad spell length in the core discussion network.

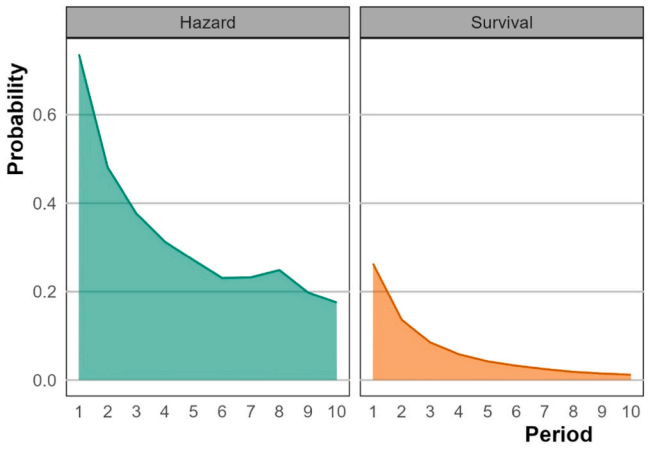

Fig. 2. Estimated hazard and survival functions.

Is dyadic similarity related to confidant loss?

To obtain a first indication on the relation between dyadic similarity and the risk of confidant loss, we estimate the survival function for dyad similarity (Fig. 3) using the Kaplan-Meier method (not controlling for any ego, dyad, or network characteristics yet). Moreover, to provide a simplified visualization, we recoded the continuous variables into dichotomous variables indicating either dissimilarity or similarity of a dyad.[9]

Regarding dyad similarity (Fig. 3), the hazard profiles of migration background, age, and gender showed that in the first three to six periods, similar dyads had a higher likelihood of survival (i.e. a lower risk of loss), and this was the most profound for gender; more similar people were less likely to be dropped as confidant.

However, after this period the difference in survival function of similar and dissimilar dyads decreases. The lower survival function for similar confidants around the six-year mark might reflect that particularly similar people survived in the network but were by then nevertheless lost. Or more substantively this change could indicate that the hurdles posed by dissimilarity are tackled early on in a relationship. Then, early on, dissimilar dyads are most likely to be lost during this time; however, when dissimilarity is overcome in the early phases or simply poses lower hurdles for specific confidants, it is less likely that these dissimilar confidants are dropped later.

For now, the results show that dyadic dissimilarity in gender, age, and migration background is related to confidant loss, dissimilarity is linked to a higher risk of confidant loss, especially early in the confiding relationship. However, we did not find such a difference in hazard profile for dyads with dissimilar educational attainment.

Next, for our main analysis, we estimated repeated risk models of confidant tie loss, which allows us to control for potentially confounding factors and test our hypotheses more stringently. A risk ratio lower than 1 indicates that the explanatory factor is negatively related to tie loss (i.e. lower than 1 is a higher likelihood to remain in the CDN), while a risk ratio of greater than 1 indicates a positive relation to tie loss.

The main results of our uncontrolled repeated risk models (the risk ratios are presented in Fig. 4 and Table 2) replicate the descriptive results: we found a negative relation for similarity on age ($RR = 0.923$, $Statistic = -11.889$), migration background ($RR = 0.973$, $Statistic = -3.728$), and gender ($RR = 0.905$, $Statistic = -15.339$), but not for

[7] For instance, the LISS name generator only generates one type of relation, the confiding relation, while other studies use different name generators in unison. This may have affected the accuracy of the name generator. Also, the LISS name generator did not recall the names that were mentioned in a previous wave. Moreover, we decided to remove kin ties from the data, which are often included in other studies of egocentric network change. Together, these could cause the relative high number of network churn in our final sample.

[8] Based on life table (Appendix A; table A.2)

[9] Dyads are coded as similar when they have a similar characteristics, dyads are coded as dissimilar when they differ on a characteristic.

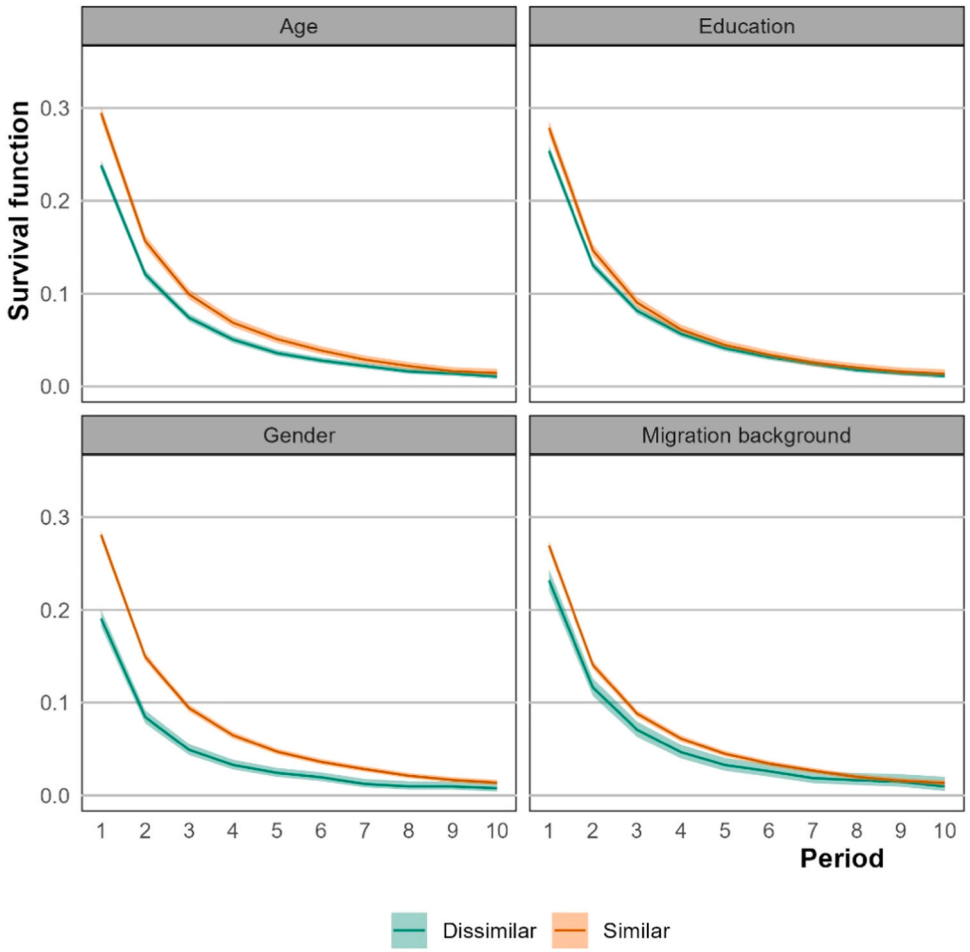

Fig. 3. Estimated hazard function for dissimilar and similar dyads on Age, Migration background, Education, and Gender. *Note:* 95% CI.

education ($RR = 0.990$, *Statistic* $= -1.571$). After adding the ego, confidant, dyad, and network control variables, the effects of similarity appeared to be robust for dyadic similarity on gender ($RR = 0.921$, *Statistic* $= -11.681$) and age ($RR = 0.968$, *Statistic* $= -4.281$), indicating that confidants that are similar to ego in terms of age or gender are less likely to be lost. Also, the result for education is not affected substantively, indicating similarity in education is not strongly linked to confidant loss. One relationship did change substantively after adding controls. The negative relation for similarity on migration background disappeared when adding ego, confidant, dyad, and network characteristics ($RR = 0.988$, *Statistic* $= -1.101$). The effect appeared to be confounded by ego's migration background as this was highly related to dyadic similarity in migration background. Individuals with a so-called non-Western migration background appeared to have more confidants with a dissimilar migration background in their network *and* they lose confidants more often, but dissimilar confidants are not lost more often apart from this.

All in all, the results thus indicated that dyadic similarity in gender and age decreases the risk of confidant tie loss, thus supporting hypotheses H1(b) and H1(d) while we found no clear evidence for hypotheses H1(a) and H1(c).

Do emotional closeness and confidant embeddedness explain similarity effects?

To test hypotheses H2 and H3 we added emotional closeness and confidant embeddedness as mediator variables to the models to test the hypothesized indirect effects. Emotional closeness had a strong direct effect on the risk of confidant loss. Confidants, whom ego deems as relatively dear, are less likely to be dropped by ego than confidants that are not dear to ego ($RR = 0.688$, *Statistic* $= -15.193$). Moreover, when a confidant is equally dear to ego as other confidants the risk of confidant being dropped is smaller than for confidants who are not dear ($RR = 0.828$, *Statistic* $= -10.979$). These results are in line with our theoretical expectations about the linkage between emotional closeness and tie loss; however, the results also indicated that emotional closeness does *not* mediate any relation between dyadic similarity and the risk of confidant loss. This is also corroborated by the non-existent bivariate relation (see Appendix B). Confidants that are similar are not necessarily more similar.

Furthermore, we similarly found no evidence for a mediation effect by confidant embeddedness. Even though confidant embeddedness has a negative significant effect on the risk of confidant loss ($RR = 0.907$, *Statistic* $= -7.925$), as expected, we find little change in the effect size of dyadic similarity. This is also corroborated by a lack of bivariate relation between embeddedness and similarity. Similar relations are not necessarily better embedded, although there is a small (0.12) correlation between age similarity and embeddedness (see Appendix B). This means that we can reject both H2 and H3.

Do the dyadic effects change over time?

Next, we test our hypotheses (H4, H5, and H6) for how the similarity effect change over time (see Table 3), which are interpreted against the backdrop of the results in Table 2: the longer a relationship exists, the less likely it is to be lost.

First, the effect of dyadic similarity on the risk of confidant loss was expected to be the greatest at the start of a relationship and likely to

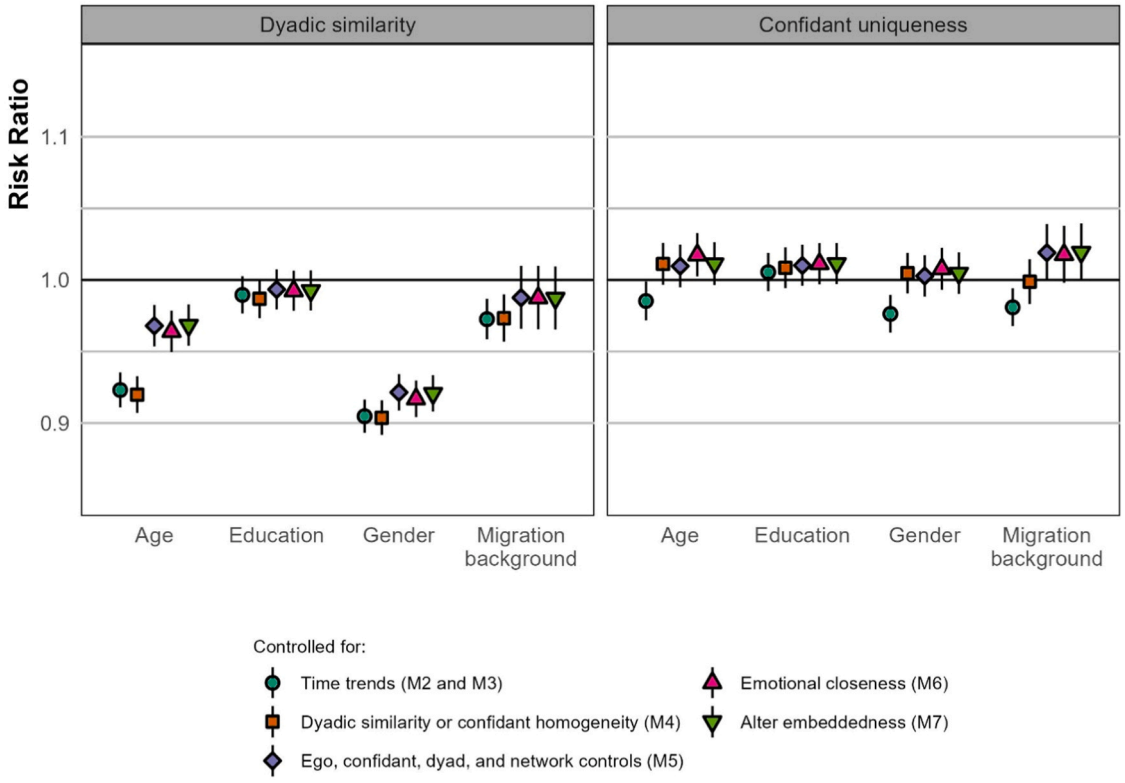

Fig. 4. Coefficient plot of dyadic similarity and confidant homogeneity effects on confidant tie loss. *Note:* Coefficient plot based on Table 2. These show the parameters (risk ratios) of dyadic similarity and confidant uniqueness for different model specifications.

Table 2
Results of repeated risk models of confidant tie loss.

	Model 2		Model 3		Model 4		Model 5		Model 6		Model 7	
	RR	Z-statistic	RR	Z-statistic	RR	Z-statistic	RR	Z-statistic	RR	Z-statistic	RR	Z-statistic
Dyadic similarity												
Education	0.990	-1.571			0.987	-1.880	0.993	-0.934	0.992	-1.059	0.993	-1.039
Age	0.923***	-11.889			0.920***	-11.829	0.968***	-4.281	0.964***	-4.792	0.968***	-4.229
Gender	0.905***	-15.339			0.904***	-14.880	0.921***	-11.681	0.917***	-12.307	0.921***	-11.789
Migration background	0.973***	-3.728			0.973**	-3.134	0.988	-1.101	0.987	-1.106	0.987	-1.136
Confidant uniqueness												
Education			1.005	0.798	1.008	1.174	1.010	1.391	1.011	1.538	1.011	1.572
Age			0.985*	-2.105	1.011	1.499	1.010	1.272	1.018*	2.279	1.011	1.485
Gender			0.976***	-3.491	1.005	0.649	1.003	0.367	1.008	1.032	1.005	0.631
Migration background			0.981**	-2.810	0.999	-0.157	1.019	1.902	1.018	1.763	1.019	1.928
Mediators												
Emotional closeness												
Not dear									Ref.		Ref.	
Dear									0.688***	-15.193		
Equally dear									0.828***	-10.979		
Embeddedness											0.907***	-7.925
Time												
Constant	1.859***	46.716	1.877***	47.520	1.860***	46.711	2.825***	29.808	3.078***	31.283	2.679***	27.754
Time	0.736***	-39.278	0.729***	-40.485	0.737***	-39.212	0.748***	-36.248	0.753***	-35.368	0.750***	-35.881
Controls included	None		None		None		All		All		All	
Random Effects												
σ^2	1.640		1.640		1.640		1.640		1.640		1.640	
τ_{00}	0.190		0.190		0.190		0.180		0.190		0.190	
ICC	0.100		0.100		0.100		0.100		0.100		0.100	
N ego	6996		6996		6996		6996		6996		6996	
Observations	49449		49449		49449		49449		49449		49449	

* $p < 0.05$ * * $p < 0.01$ * ** $p < 0.001$

decrease over time. We tested this proposition in model 8 thru model 11 (Table 3). We found evidence for a declining dissimilarity effect of age dissimilarity on the risk of confidant loss ($RR = 1.022$, $Statistic = 2.520$), yet not for education, gender, and migration background dissimilarity. To aid the interpretation of this result we created a marginal effects plot (see Fig. 5, top panel), which shows that over time the predictions between high age similarity (+1 SD) and low age dyadic similarity (−1 SD) overlap. The effect of age dissimilarity is thus declining over time. So, age differences become less important over time, suggesting differences in life stages are overcome. For the other demographics, no such effect is

Table 3
Results of repeated risk models: interaction between time and dyadic similarity, emotional closeness, and embeddedness.

	Model 8		Model 9		Model 10		Model 11		Model 12		Model 13	
	RR	Z-statistic	RR	Z-statistic	RR	Z-statistic	RR	Z-statistic	RR	Z-statistic	RR	Z-statistic
Main effects												
Constant	3.513***	27.695	3.516***	27.705	3.516***	27.709	3.516***	27.707	3.342***	24.939	3.503***	27.618
Linear time	0.755***	-35.075	0.753***	-35.087	0.753***	-34.903	0.754***	-35.037	0.784***	-16.114	0.754***	-35.109
Dyadic similarity												
Education	1.000	0.006	0.992	-1.129	0.992	-1.135	0.992	-1.155	0.992	-1.131	0.992	-1.137
Age	0.964***	-4.732	0.938***	-4.785	0.965***	-4.716	0.964***	-4.732	0.965***	-4.718	0.964***	-4.744
Gender	0.916***	-12.384	0.916***	-12.377	0.898***	-8.156	0.916***	-12.373	0.916***	-12.378	0.916***	-12.387
Migration background	0.987	-1.135	0.987	-1.135	0.987	-1.139	0.973	-1.754	0.987	-1.130	0.987	-1.159
Mediators												
Emotional closeness												
Not dear	Ref.		Ref.		Ref.		Ref.		Ref.		Ref.	
Dear	0.695***	-14.718	0.695***	-14.700	0.695***	-14.71	0.695***	-14.726	0.757***	-6.177	0.696***	-14.683
Not asked	0.834***	-10.519	0.834***	-10.514	0.834***	-10.518	0.834***	-10.510	0.890***	-3.985	0.834***	-10.474
Embeddedness	0.919***	-6.734	0.919***	-6.747	0.919***	-6.737	0.919***	-6.744	0.919***	-6.802	0.893***	-6.984
Interaction with time												
Dyadic similarity												
Education	0.994	-0.822										
Age			1.022*	2.520								
Gender					1.016	1.796						
Migration background							1.011	1.347				
Mediators												
Emotional closeness												
Not dear									Ref.	Ref.		
Dear									0.940*	-2.292		
Not asked									0.953**	-2.706		
Embeddedness											1.023**	2.809
Random effects												
σ^2	1.640		1.640		1.640		1.640		1.640		1.640	
τ_{00}	0.190		0.190		0.190		0.180		0.180		0.190	
ICC	0.100		0.100		0.100		0.100		0.100		0.100	
N ego	6996		6996		6996		6996		6996		6996	
Observations	49449		49449		49449		49449		49449		49449	

*p < 0.05 * * p < 0.01 * ** p < 0.001
Note: ego, confidant, dyad, and network controls were present in all models.

found. One possible explanation for this difference is that as opposed to educational level, gender, and migration background, age is always changing also among adults, which might link to a stronger growing understanding and thus less of a dissimilarity effect. Overall, we thus found evidence for H4(d) and can reject H4(a)-H4(c).

Second, we also hypothesized the expectation that the effects of the mediating variables emotional closeness and alter embeddedness would decrease over time, which we tested in models 12 and 13. The results show evidence for substantial moderation effects of time on both. The effect of alter embeddedness decreases over time (*RR* = 1.023, *Statistic* = 2.809), while the effect of emotional closeness increases over time (Dear: *RR* = 0.940, *Statistic* = −2.292; Not asked: *RR* = 0.953, *Statistic* = −2.706). This is also reflected in the marginal effect plots (middle and low panel). They show that the predicted probability difference between low (−1 SD) and high (+1 SD) alter embeddedness decreases over time and even flips over time. Moreover, the difference in predicted probability for the different levels of emotional closeness is increasing. Hence, we found evidence for acceptance of H5 and the rejection of H6.

Is confidant uniqueness related to confidant loss?

For confidant uniqueness, we follow the same analytical steps as we did for dyad similarity. The survival profiles for confidant uniqueness (Fig. 6) showed similar patterns for gender and migration background as discussed above: there appeared to be a reduced risk of confidant loss for confidants who were similar to other confidants in the early periods of a dyad spell. These effects disappeared when dyad spell length increased. For education and age, the degree to which a confidant is unique seemed to matter little for the survival profile, i.e. for losing such a confidant.

Turning to the repeated risk models (Table 2 and Fig. 4) for testing the confidant uniqueness hypotheses, the results show even less evidence for either a positive or negative relation with tie-loss. When we only control for the effect of time, there is evidence for a confidant uniqueness effect for age (*RR* = 0.985, *Statistic* = −2.105), gender (*RR* = 0.976, *Statistic* = −3.491), and migration background (*RR* = 0.981, *Statistic* = −2.810); but, when we control for dyad similarity, these effects disappear. Interestingly, when we add control variables and emotional closeness to the model (M6), the effect becomes positive and significant for age confidant uniqueness. We also ran a hybrid model as a sensitivity check with only dyadic similarity and confidant uniqueness as explanatory factors (see note 5 and Appendix H). Based on this model, we conclude that confidants who were more unique concerning age and gender – but not concerning education and migration background – have a lower risk to be dropped. But all in all, our results indicate a complex picture in which not all types of confidant uniqueness are consistently related to the risk of confidant loss. Hence, we reject H7.

Does uniqueness moderate the dyadic similarity effect?

Lastly, we formulated the expectation that the effect of dyadic similarity is conditional on confidant uniqueness in H8, particularly that the risk to be dropped from the core discussion network for dissimilar confidants is lower for unique confidants than for common confidants For, this purpose we estimated the interaction of dyad similarity and confidant uniqueness in separate models for gender, education, migration background, and age, which are presented in Table 4.

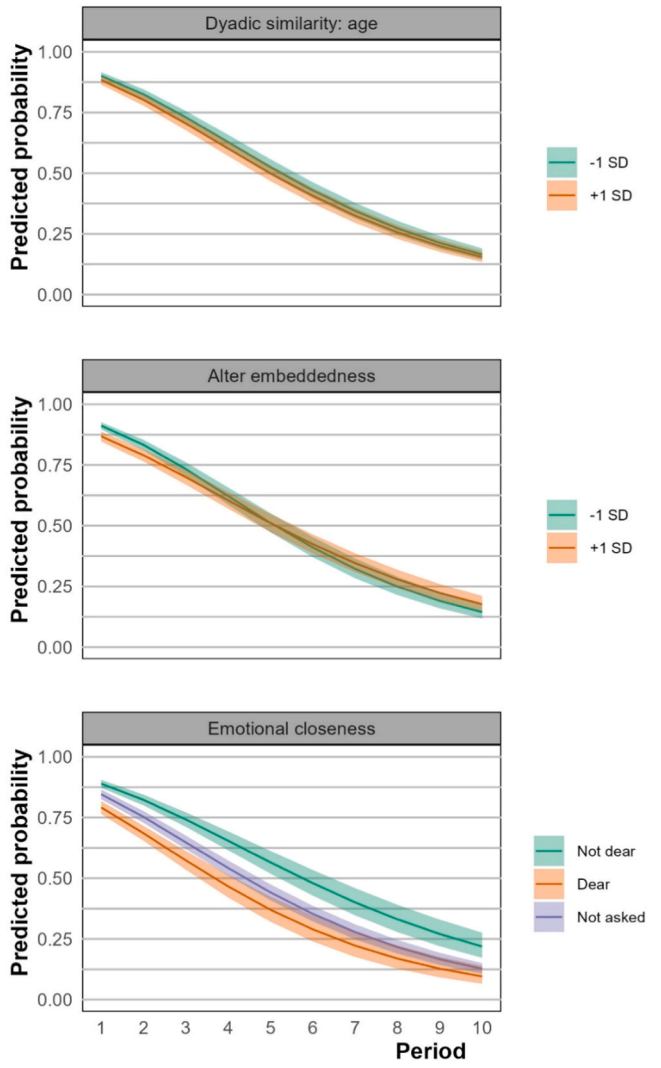

Fig. 5. : Average Marginal effect plot: relations of dyadic similarity and gender for different levels of confidant uniqueness on gender. *Note*: Predicted probabilities of tie loss were calculated for someone with a mean value on the continuous variables and reference category for the categorical variables.

Only between confidant uniqueness and confidant similarity on gender did we find a significant interaction effect ($RR = 1.026$, *Statistic* $= 3.499$), of which we provided marginal effect plots to provide a substantive interpretation of the interaction (Fig. 7). While it is a statistically significant effect, the positive risk ratio is contrary to what we expected. The positive risk ratio shows that the risk to be dropped from the network for dissimilar dyads is actually greater when they are unique than when they are common. Hence, we found evidence to reject H8. Substantively this suggests that particularly confidants who are dissimilar from ego *and* the larger CDN, i.e. 'demographically isolated confidants', have a disproportional likelihood be dropped.

Control variables at ego, dyad, and network level

Above we focussed on testing our hypotheses by presenting the main results. These relationships were controlled for core ego, dyad, and network characteristics. As results on these control variables (as summarized in Fig. 8) might be interesting to some in and of themselves and because they might direct future research, we briefly turn to them below before turning to the conclusion and discussion.

First, the demographic characteristics for both ego and confidant displayed inequalities in network stability and confidant loss. Networks of higher-educated respondents were more stable: the higher the educational attainment of ego, the lower the risk that of one their confidants is lost. Also, as briefly touched upon above already, people with a non-Western migration background tended to drop confidants more easily. Moreover, both these results are in line with the literature on social inequalities in social networks, which indicates that disadvantageous (e.g. lower educated and those with a migration background) groups have more unstable social networks (Cornwell, 2015). However, we also found that women tended to have more stable networks, with the risk of confidant loss being lower in networks where ego was a woman. Interestingly, life events of ego did not affect the risk of confidant loss. This even holds for moving residence, also to another municipality, which seems surprising; however, it should be noted that in the Dutch context distances between municipalities are also small when one moves to a neighbour municipality. Given this realization and the direction of the coefficient, this result should not be interpreted as moving not increasing the risk of confidant loss; but it could be conditional on distance.[10]

Second, some of the dyad characteristics had a profound effect on the risk of confidant loss. The longer a confidant was a member of the CDN, and the longer ego and confidant knew each other (according to ego), the lower the risk of confidant loss. This shows that new confiding relations are more at risk of confidant loss than already established confiding relations. Moreover, reappearing in a network was associated with a lower likelihood of confidant loss. This shows support for the idea that the core discussion network is a subset of the wider social network of ego and that confidants reappear from time to time. Furthermore, those who reappear are less likely to be lost than confidants who are new to the core discussion network.

In addition, the role of the confidant in relationships to ego is also related to the risk of confidant loss. Particularly, friends had the lowest risk of confidant loss reflecting more stable relationships, while advisors had the greatest risk of confidant loss. This neatly aligned with the notion that the core discussion network can consist of both strong, such as close friends, and weaker ties such as advisors. The latter are social ties that ego likely targets to discuss a specific issue and are likely to be lost when this is not necessary anymore.

Finally, the risk of confidant loss increased when there were more confidants in the network. The density of the core discussion network, however, when controlled for ego, dyad, and confidant characteristics was not related to the risk of confidant loss.

Robustness

The results of two different robustness analyses are worth mentioning. First, we checked whether there were subgroups differences in losing dissimilar confidants. For instance, there could be gender, age, educational, and migrant group differences in similarity preferences. Hence, we estimated four different models which included an interaction between an ego characteristic and the associated similarity measure (see Appendix D). The results showed that there were no subgroup differences.

Second, we also created a combined similarity measure, coded as the mean of dyadic similarity on education, age, gender, and migration background. Subsequently, we estimated the repeated risk models with the combined similarity measure (see Appendix E). The results provided evidence for a robust main effect of dyadic similarity, but not for confidant uniqueness, which is in line with our main results. Similarly, we found a declining effect over time of combined dyadic similarity. Moreover, the interaction between dyadic similarity and uniqueness did not provide evidence for a weakening effect.

[10] We also tried different life-event specifications, but these null-findings seem to be robust (see appendix G).

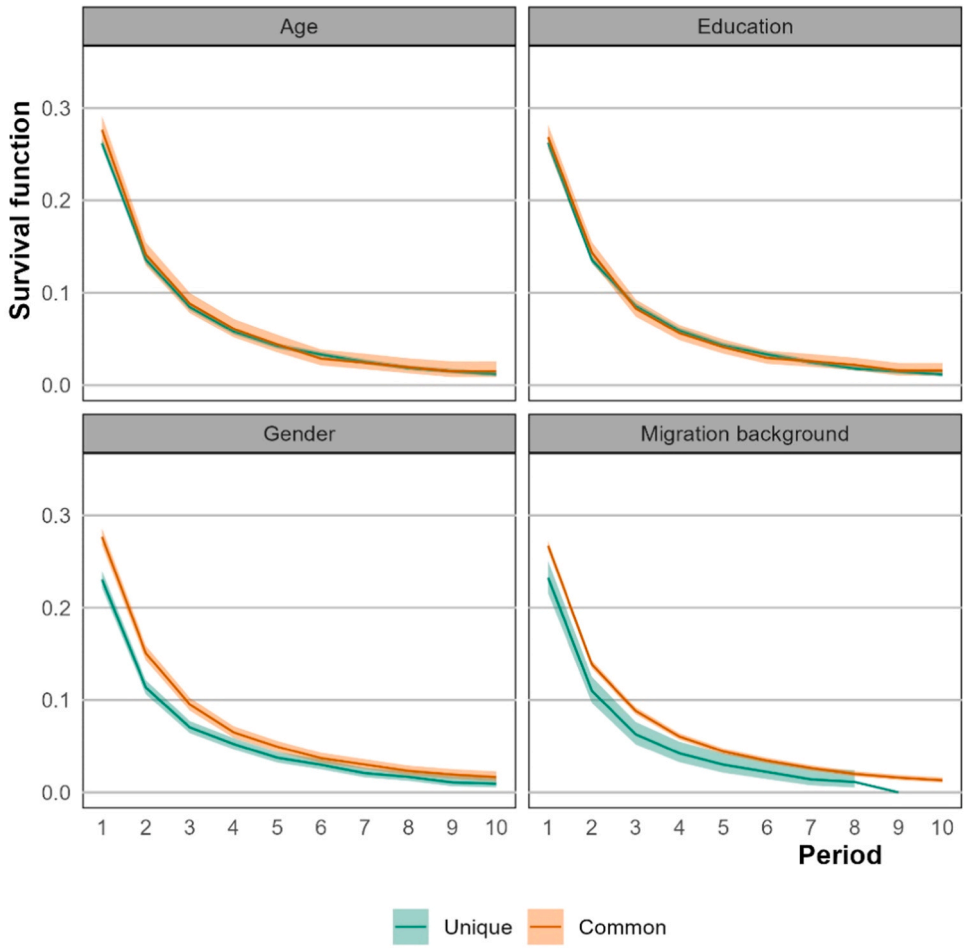

Fig. 6. Estimated hazard function for unique and common confidants. *Note*: 95% CI.

Table 4
Results of repeated risk models: interaction between dyadic similarity and confidant uniqueness.

	Model 14		Model 15		Model 16		Model 17	
	RR	Z-statistic	RR	Z-statistic	RR	Z-statistic	RR	Z-statistic
Dyadic similarity								
Education	0.992	-1.121	0.992	-1.134	0.992	-1.095	0.992	-1.142
Age	0.964***	-4.728	0.966***	-3.917	0.965***	-4.665	0.965***	-4.721
Gender	0.916***	-12.379	0.916***	-12.378	0.932***	-8.314	0.916***	-12.377
Migration background	0.987	-1.136	0.987	-1.134	0.987	-1.168	0.984	-1.014
Confidant uniqueness								
Education	1.012	1.622	1.012	1.670	1.012	1.631	1.012	1.683
Age	1.019*	2.432	1.019*	2.455	1.016*	2.116	1.019*	2.419
Gender	1.009	1.231	1.009	1.217	1.012	1.615	1.009	1.230
Migration background	1.018	1.788	1.018	1.793	1.018	1.798	1.017	1.463
Interaction								
Education	0.999	-0.121						
Age			1.002	0.410				
Gender					1.026***	3.499		
Migration background							0.998	-0.281
Random effects								
σ^2	1.640		1.640		1.640		1.640	
τ_{00}	0.190		0.190		0.190		0.180	
ICC	0.100		0.100		0.100		0.100	
N ego	6996		6996		6996		6996	
Observations	49449		49449		49449		49449	

*p < 0.05 * * p < 0.01 * ** p < 0.001
Note: ego, confidant, dyad, and network controls were present in all models.

Conclusion and discussion

Research often finds that personal networks of individuals are highly homogeneous and also the confiding relationships of individuals often consist of people with a similar demographic background (DiPrete et al., 2011; Kossinets and Watts, 2009; McPherson et al., 2001). Such patterns

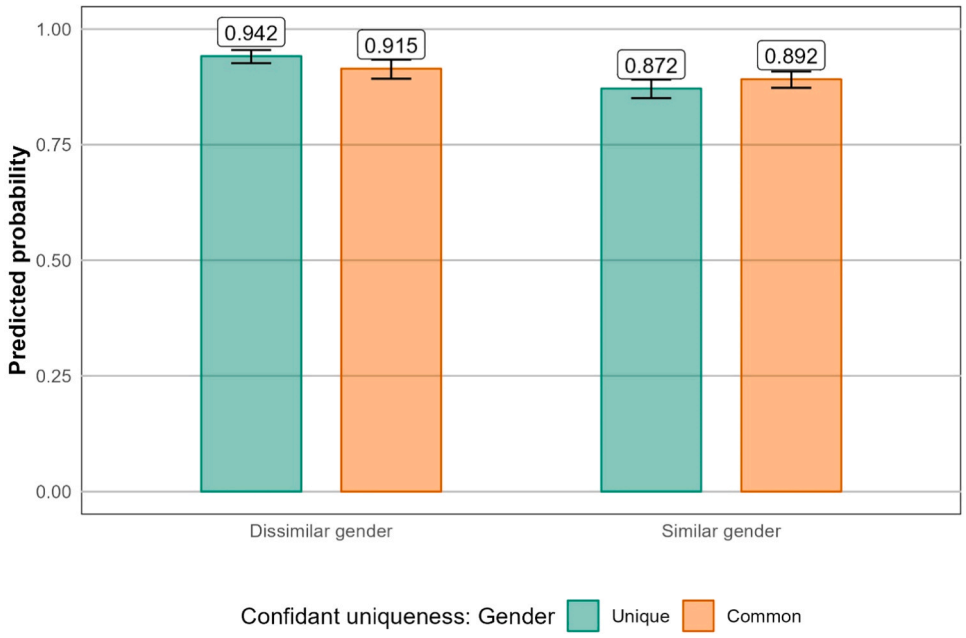

Fig. 7. Average Marginal effect plot: relations of dyadic similarity and gender for different levels of confidant uniqueness on gender. *Note*: Predicted probabilities of tie loss calculated for someone with a mean value on the continuous variables and reference category for the categorical variables for different levels of gender dyadic similarity and gender confidant uniqueness. Calculated for period 0.

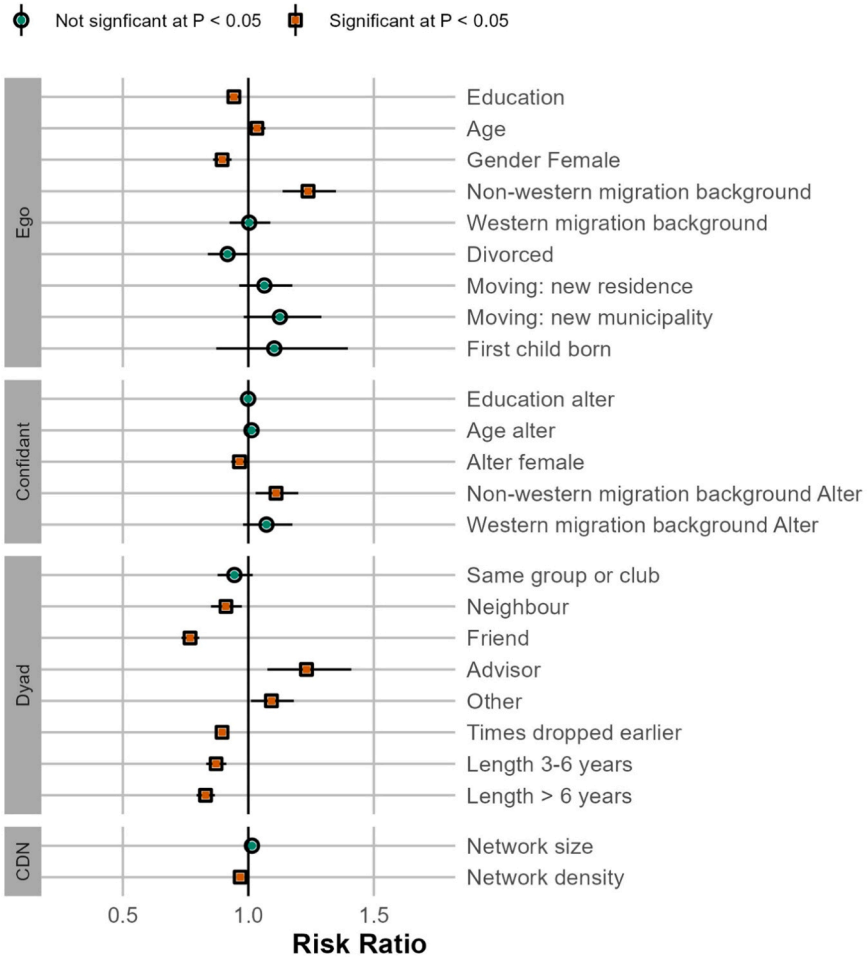

Fig. 8. Effects on confidant loss of ego, confidant, dyad, and network control variables. *Note:* The figure shows Risk Ratio estimates with a 95% CI for control variables. These are the estimates from model 5, of which a full table is included in Appendix B.

are generally explained by effects that operate when forming the relationship (Marsden, 1988; Tulin et al., 2021), with meeting opportunities, endogenous network dynamics, and similarity preferences working in tandem to form confiding relationships with similar people (Blau, 1977; Feld, 1982; Mollenhorst et al., 2008). In contrast, the role that similarity plays in tie *maintenance* is often overlooked, even though network homogeneity can also occur due to the *loss* of (dissimilar) confiding relations. In this paper, we wanted to contribute to this gap by investigating non-kin confidant loss in the Core Discussion Network across eleven years. Consequently, our first research question was formulated as: "How is dyadic similarity between ego and confidant on age, gender, education, and migration background related to tie loss in the Core Discussion Network?".

Overall, our results showed evidence for a relation between dyadic similarity and confidant tie loss, but only for specific demographic characteristics: we found most clearly that gender and age similarity decreased the chance a confidant will be dropped from the CDN. Interestingly, these relations were not explained by the emotional closeness mechanism or the embeddedness mechanism. Thus the lower risk of confidant loss for similar confidants does not stem from similar confidants being emotionally closer or better embedded in the network. This is particularly relevant in light of our overarching argument to theorize tie loss or maintenance (vis-à-vis tie formation) in its own right. The core mechanisms in our reasoning built on the tie formation literature, which made sense given the state of the literature (but see Fischer and Offer, 2020; Tulin et al., 2021). While our results on the linkage between similarity and tie loss seem to confirm that this application is supported, our test of the mechanism strongly suggests that tie loss entails a different dynamic as our result undermines the theory's core mechanism. Having that said, one might argue that emotional closeness was measured relatively, which is suboptimal; however, the relationship between emotional closeness and tie loss itself was found suggesting the measurement did function. For now, this study showed that to explain the relation between similarity and tie maintenance we need more than just adjusting existing theories on tie formation.

We also investigated whether the effect of similarity was affected by the duration of the confiding relation. We formed the expectation that the similarity effect would be greatest when the confidant relation was just formed and that this would decline over time. We only found partial evidence for this effect as only the effect of age similarity was reduced. Moreover, we also investigated whether the effect of embeddedness and emotional closeness was reduced over time. We found that the effect of embeddedness was indeed reduced, which could indicate that ego and alter indeed create new ways to meet each other. For emotional closeness we did not find a declining effect over time, instead, we found that during the relationship the emotional closeness effect increased.

For similarity in migration background and educational attainment, we did not find a robust effect, and initial differences in migration background similarity were explained by migration-background respondents being more likely to drop confidants altogether. This nil-finding is both important and surprising as previous research indicated that similarity in migration background mattered. (Tulin et al., 2021). One explanation for migration background's null-finding is the measurement of ego's migration background in the LISS data, as people from a non-western migration background are positioned in the same bracket while the group of people with a non-western migration background is quite diverse. However, also considering our null finding on education (see Tulin et al., 2021), provides support for a more substantive explanation. It might be argued that migration background and education are relatively more incisive social cleavages and for these cleavages forming confidant ties with dissimilar people might be more unlikely, suggesting that a stronger selection takes place for the dissimilar dyads that are created, which implies less of a risk of tie loss. Another explanation could be that age and gender are more related to (unmeasured) life-course events than education and migration background. For instance, confidants with a similar gender or age can offer support during such moments and dissimilar confidants are then more likely to be dropped. Finally, education and migration dissimilarity might be more instrumental, as they can offer more novel and new information. So, when ties are initially made with confidants from a different migration background or with a different level of educational attainment, they could be less likely to be lost due to the instrumental benefits they provide. Based on this study, we establish that different similarities work differently for confidant loss, but we cannot draw strong conclusions on the why. We believe that investigating the differences in social similarity is needed to widen our understanding of the relation between dyadic similarity and confidant loss.

Here, we wanted to go further than just dyadic similarity, by also taking the demographic uniqueness of a confidant into account. Hence, we formulated the second set of research questions: "How is tie loss in the Core Discussion Network related to network similarity mechanisms (i.e., confidant uniqueness)?" And: "How is the impact of dyadic similarity on tie loss in the core discussion network moderated by confidants' uniqueness?". The results regarding these questions showed no clear support for the idea that confidant uniqueness affects the risk of confidant loss. Even though we found direct effects of confidant uniqueness these disappeared completely when we controlled for dyad similarity, indicating the core dissimilarity that leads to tie loss is found at the dyad level. Moreover, the results also showed little evidence for a weakening effect of uniqueness on the negative relation between dyadic dissimilarity and the risk of confidant loss. From these findings, one could take the conclusion that network effects are not that profound in predicting confidant loss. Yet, this would be a wrong conclusion as the robust results for control variables, including confidant embeddedness and network size, clearly showed that the structure of the network can have a profound effect on the risk of confidant loss. The uniqueness of a confidant, however, is not one of these.

In reflecting on the meaning of the results above we have taken design elements into account; nevertheless, we want to reflect on some challenges somewhat more below, also because they can inform future research. In that respect, one of the main virtues of this study was the unique longitudinal data we could use to study similarity and confidant tie loss. At the same time, this implies that we needed to rely on the traditional egocentric measurement of one's CDN, which has some characteristics that should be and have been considered when interpreting the results. One important caveat of this traditional measure is that the risk of confidant loss is measured by a confidant not being named in a year following one being mentioned. This means we did not know for certain whether the confidant was deselected or forgotten by the respondent and it is likely that respondents select in each period a selection of confidants from a pool of possible confidants (even though quite often they list fewer confidants than the survey did allow (56% of respondents)). Consequently, it could be argued that the measurement tie loss used is an upper boundary estimate. Moreover, if, for instance, dissimilar confidants are more likely to move due to segregation in housing this might to some (i.e. a limited) extent explain higher tie loss risk for dissimilar ties, while we cannot control for tie loss due to the confidant moving. The LISS data did not contain questions on why a confidant was dropped from the network. Future studies on egocentric network change should include such measures to ascertain whether confidant loss is really confidant loss (Fischer and Offer, 2020) and explore the role of the confidant in tie maintenance in more detail, for instance by contacting a sample of confidants. In addition, in the current study, we treat similarity in isolation, and we did not go into depth about what combinations of similarity could be especially salient. For future research, it would be interesting to take a more multidimensional perspective as there could be differences in the type of dissimilarity (e.g. lower or higher educated, younger or older).

Altogether, in this study, we contributed to the research on tie loss in the core discussion network specifically, and network dynamics in personal networks more generally. Our findings indicated that dyad similarity decreased the risk of confidant loss, but only limitedly and only for

gender and age dyadic similarity. The findings also indicated that the effect of age similarity is greatest at the onset of a confiding relation. Similarly, the effect of confidant embeddedness declines during the relationship. Moreover, our current theoretical models for explaining similarity effects in tie maintenance point to some fitting directions but are far from offering conclusive explanations or mechanisms that understand tie *loss*. Hence, future research should focus on theory development to fully understand the relation between similarity and tie loss.

Data availability

Materials for replication of the analyses can be found on the replication website: https://thijmenjeroense.github.io/cdn-tie-loss-similarity/.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.socnet.2023.09.003.

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