

**Breaking Up is Hard to Do, Unless Everyone Else is Doing it Too:
Social Network Effects on Divorce in a Longitudinal Sample Followed for 32 Years**

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Abstract

Divorce is the dissolution of a social tie, but it is also possible that attitudes about divorce flow across social ties. To explore how social networks influence divorce and vice versa, we utilize a longitudinal data set from the long-running Framingham Heart Study. We find that divorce can spread between friends, siblings, and coworkers, and there are clusters of divorcees that extend two degrees of separation in the network. We also find that popular people are less likely to get divorced, divorcees have denser social networks, and they are much more likely to remarry other divorcees. Interestingly, we do not find that the presence of children influences the likelihood of divorce, but we do find that each child reduces the susceptibility to being influenced by peers who get divorced. Overall, the results suggest that attending to the health of one's friends' marriages serves to support and enhance the durability of one's own relationship, and that, from a policy perspective, divorce should be understood as a collective phenomenon that extends far beyond those directly affected.

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According to the Census Bureau (National Vital Statistics Reports, 2008), roughly 50% of marriages will end in divorce within the first 15 years, and, as of 2007, the annual incidence of divorce stands at 36 per 1,000 (National Vital Statistics Reports, 2007). Moreover, remarriage, while common, tends to be even less successful than first marriage, resulting in higher rates of divorce with each successive trip down the aisle (Krieder & Fields 2002). These numbers matter because the individual health and welfare consequences for those who get divorced and because the influence of divorce on subsequent child development can be significant. But they also raise questions about whether there is an “epidemic” of divorce and, if so, whether there is a role of social contagion in this “epidemic.”

Here, we examine the effect of divorce among one’s peers, and even among others farther away in the social network, on one’s own divorce risk. One possibility is that people who get divorced *promote* divorce in others by demonstrating that it is personally beneficial (or at least tolerable) or by providing support that allows an individual to contemplate and endure a rupture in their primary relationship. People in an unhappy relationship may be happier either on their own, embedded in a wider network of friends, or with a different partner. Another possibility is that people who get divorced *inhibit* divorce in others by demonstrating that it may be more personally costly than expected. People who watch the painful process of divorce may decide that their own unhappiness is worth bearing in order to avoid the cost of breaking up on themselves or their children. If the inhibitory effect of divorce is weaker than the promotion effect, then divorce might spread through a social network via a process of social contagion (involving a variety of mechanisms) from person to person to person.

Past work on social connections and divorce has generally focused on the costs and benefits of social support for health, economic well-being, and marital stability. One area of research, for example, suggests that social networks and other emotionally supportive social ties can provide protective inoculation from severe social stressors and even disease (Durkheim, 1992; Berkman & Syme, 1979). Other work has shown that people receiving help experienced less distress (though the effect was reversed when the aid came with advice) (Kitson 1992).¹ As Berkman (1995) writes, “For social support to be health promoting, it must provide both a sense of belonging and intimacy and must help people to be more competent and self-efficacious.” (245).

Hence, the question is whether outside forms of social support can reinforce a decision by unhappy spouses to stay in suboptimal relationships, or whether deeply engaged friends instead potentiate fissure in such relationships, in part by providing more effective forms of support. More broadly, little is known about whether person-to-person connections affect divorce, and prior literature has not explored the wider effects of the person-to-person-to-person effects of divorce, although the logic of such investigation seems clear. If one person’s divorce affects another’s likelihood of initiating marital disruption, why wouldn’t such effects diffuse through society in a more widespread manner?

There are two issues here, two distinct ways that social networks might affect divorce risk. First, the *structure* of the network in which one is embedded can itself affect risk of divorce. For example, the more friends a husband and wife have in common, the lower their risk of divorce. Or, the greater the transitivity of the network around them (the more their friends are friends with each other), the lower their risk of divorce (similar, for example, to the effect Bearman and Moody found with respect to suicide risk in adolescent girls (2004)). Or, possibly,

¹ Anyone with an intrusive parent can understand the psychological dynamic underlying this effect intuitively.

the more peripheral a couple is in the social network, the greater their risk of divorce. Second, regardless of structure, processes of social *contagion* could operate within the network. Here, the issue is what kinds of attitudes and behaviors are evinced by one's network neighbors, and what effects these might have. So, the greater the incidence of divorce among one's friends, the higher the likelihood one would follow suit. Prior work on how the architecture of social networks affect divorce risk is limited. Similarly, prior work on how attitudes towards divorce might diffuse through social networks is also scarce.

Network Structure and Divorce

The existing literature on divorce offers some evidence regarding the impact of social support networks on the likelihood of marital rupture. This includes work examining the effect of the number of unique friends and the number of shared friends on the probability of divorce. Some work suggests that spouses who share the same friends are less likely to get divorced than those who do not (Ackerman, 1963). Other research from a nationally representative sample indicates that weaker network ties to one's spouse increase chances for marital infidelity, a factor that predisposes partners to divorce (Treas & Giesen, 2000). Yet such relationships are neither simple nor straightforward in nature. As Booth et al. (1991, 222) write: "simple embeddedness in the social fabric of society may not be sufficient to explain why some marriages endure and others break up."

To examine more subtle aspects of the influence of networks on marriage, additional work has explored a more nuanced characterization of social network support, examining different types of relationships. Bryant & Conger (1999) studied three types of influence to examine whether network support helps encourage a couple to stay together or instead drives them apart. First, they studied outside support for the relationship from friends and family to see whether approval for the relationship provides an important predictor of relationship success, as some earlier work suggested (Johnson & Milardo, 1984). Second, they examined whether shared social networks enhanced marital satisfaction, including whether liking each other's friends can improve marital happiness. Last, they investigated whether personal support *within* the relationship improved chances for marital success. An important aspect of this last component relates to a sense of reciprocal equality in the relationship, or whether one person feels he or she gives more than the other within the context of the marriage. Interestingly, only outside support from friends and family predicted marital success in the time period examined. However, the authors suggest an endogenous mechanism is at work among those who achieve success in relationships: "The greater the feelings of satisfaction, stability and commitment that partners have for their relationships, the greater the evidence for supportive extramarital relationships. In turn, the more supportive network members are, the greater are feelings of satisfaction, stability and commitment that partners have for their marital relationships. (448)"

Only one longitudinal panel study (Booth et al., 1991) has addressed the question of whether a greater number of social ties, and more frequent interaction among them, decreases the likelihood of divorce. The authors of this study defined *communicative integration* as the degree to which individuals remain embedded in a large social network and *normative integration* as a lack of divorce among one's reference group members. They found a small negative effect of communicative integration on divorce, but only for those who had been married less than seven years. Importantly, they found that normative integration reduced the likelihood of divorce, regardless of how long people had been married: "When one's reference group includes siblings or friends who have divorced, the individual is more likely to divorce." (221).

Distinct from the foregoing, the literature has not addressed how – conversely – divorce can affect networks. As Bryant & Conger conclude in their own study: “Most of the existing work only presents evidence of networks influencing relationships, rather than relationships influencing networks (448).” That is, almost none of the literature has examined the reciprocal impact of divorce on the surrounding social network. This is curious, since the act of divorce directly affects the structure of a network by removing (or at least altering) an existing tie, and since divorce in one person might also affect the risk of divorce among his or her friends and other social contacts.

Finally, despite the tremendous attention paid to the influence of divorce on children, which we discuss below, relatively less interest has been dedicated to the impact of children on the probability of divorce. In a panel study involving a hazard analysis, Waite & Lillard (1991) found that firstborn children enhance marital stability until the child reaches school age. Additional children improve the prospects for marital stability only while they remain very young. Having children prior to marriage, or having older children, portends poorly for marital endurance. In sum, these authors find that children only provide a marginal improvement in the likelihood of a marriage surviving twenty years. Heaton (1990), using a regression analysis on a current population sample, reported the stabilizing influence of up to three children on a marriage, noting that five or more children increased risk of divorce. Commensurate with the Waite & Lillard (1991) findings, Heaton (1990) also indicated that as children get older, the risk of divorce rises until the youngest child left home.

Network Contagion and Divorce

Most of the work exploring the relationship between social networks and divorce has concentrated on person-to-person effects, particularly those related to parent-to-child intergenerational transfer of divorce risk. One common hypothesis is that parents who divorce are significantly more likely to produce progeny who also show an increased propensity to experience ruptured marriages; this tendency becomes exacerbated when both partners have parents who experienced divorce themselves (Bumpass et al., 1991; Feng et al., 1999; Keith & Finlay, 1988; Kulka & Winesgarten, 1979; Mueller & Pope, 1977.). In particular, daughters of divorced parents are more likely to divorce (Feng et al., 1999); one large study found that the risk of divorce in the first five years of marriage increased 70% among daughters of divorced parents (Bumpass et al, 1991). This risk may transfer differentially to daughters because such women display a stronger commitment to employment and plan to have fewer children, reducing their expected economic dependence on men (Goldscheider & Waite, 1991). While wives’ employment can ease financial stress in a marriage, it simultaneously potentiates conflict over household chores and childrearing, making marriages less enjoyable for both partners (Hochschild, 1989). In addition, wives’ financial independence makes divorce more economically feasible for such women.

Demographic patterns play an important role in the association between parental and child divorce (for an excellent review, see Amato, 1996). For example, age of marriage strongly influences prospects for success; young marriages are less likely to survive, and children of divorce tend to marry younger (Glenn & Kramer, 1987; Keith & Finlay, 1988). Children of divorce also seem to be more likely to cohabit prior to marriage, which some have argued is associated with increased divorce rates (Bumpass et al., 1989, Thornton, 1991; but see Elwert, 2007). In addition, compared with children from intact families, children of divorce attain less educational status, make less income, and have lower-level jobs, all of which combine to enhance the risk of divorce (Conger et al., 1990; Mueller & Cooper, 1986). In addition to these

demographic factors, some work suggests that specific behaviors play a key role in potentiating the risk of divorce. For example, children may learn destructive traits, like jealousy or distrust, from their parents, and import such problematic tendencies into their own relationships, or they may fail to learn important interpersonal skills, like the ability to communicate clearly or compromise effectively (Amato 1996; Wallerstein & Blakeslee, 1989).

Note that these extant studies focus almost exclusively on parent-to-child transmission of risk factors for divorce, ignoring the potentially important impact of the peer-to-peer influence we explore here. Moreover, previous studies have been largely unable to address questions of causality because of a lack of longitudinal data. Here, we use a 32-year longitudinal study that contains information about marital and other network ties to test several hypotheses regarding divorce and networks. We hypothesize that structural features of the network in which people are embedded will affect their divorce risk, that divorce can diffuse through the social network from person to person, and that divorce can in turn modify social network structure. We use a variety of analytic approaches to partially address thorny problems of causal inference in this setting.

METHODS

Assembling the FHS Social Network Dataset

The Framingham Heart Study (FHS) is a population-based, longitudinal, observational cohort study that was initiated in 1948 to prospectively investigate risk factors for cardiovascular disease. Since then, it has come to be composed of four separate but related cohort populations: (1) the “Original Cohort” enrolled in 1948 (N=5,209); (2) the “Offspring Cohort” (the children of the Original Cohort and spouses of the children) enrolled in 1971 (N=5,124); (3) the “Omni Cohort” enrolled in 1994 (N=508); and (4) the “Generation 3 Cohort” (the grandchildren of the Original Cohort) enrolled beginning in 2002 (N=4,095). The Original Cohort actually captured the majority of the adult residents of Framingham in 1948, and there was little refusal to participate. The Offspring Cohort included offspring of the Original Cohort and their spouses in 1971. The supplementary, multi-ethnic Omni Cohort was initiated to reflect the increased diversity in Framingham since the inception of the Original Cohort. For the Generation 3 Cohort, Offspring Cohort participants were asked to identify all their children and the children’s spouses, and 4,095 participants were enrolled beginning in 2002. Published reports provide details about sample composition and study design for all these cohorts (Cupples & D’Agostino, 1988; Kannel, Feinleib, Mcnamara, Garrison, & Castelli, 1979; Quan et al., 1997).

Continuous surveillance and serial examinations of these cohorts provide longitudinal data. All of the participants are personally examined by FHS physicians and nurses (or, for the small minority for whom this is not possible, evaluated by telephone) and watched continuously for outcomes. The Offspring study has collected information on health events and risk factors roughly every four years. The Original Cohort has data available for roughly every two years. For the purposes of the analyses reported here, exam waves for the Original cohort were aligned with those of the Offspring cohort, so that all participants in the social network were treated as having been examined at just seven waves (in the same time windows as the Offspring, as noted in Table A-1).

Importantly, even participants who migrate out of the town of Framingham (to points throughout the U.S.) remain in the study and, remarkably, come back every few years to be examined and to complete survey forms; that is, there is no necessary loss to follow-up due to out-migration in this dataset, and very little loss to follow-up for any reason (e.g., only 10 cases out of 5,124 in the Offspring Cohort have been lost).

The Offspring Cohort is the key cohort of interest here, and it is our source of the focal participants, or the *egos* in our network. However, individuals to whom these egos are linked – in any of the four cohorts – are also included in the network. These linked individuals are termed *alters*. That is, whereas egos will come only from the Offspring Cohort, alters are drawn from the entire set of FHS cohorts (including also the Offspring Cohort itself). Hence, the total number of individuals in the FHS social network is 12,067, since alters identified in the Original, Generation 3, and Omni Cohorts are also included, so long as they were alive in 1971 or later.

The physical, laboratory, and survey examinations of the FHS participants provide a wide array of data. At each evaluation, participants complete a battery of questionnaires, a physician-administered medical history (including review of symptoms and hospitalizations), a physical examination administered by physicians on-site at the FHS facility, and a large variety of lab tests.

In addition, non-clinical personnel at the FHS maintained additional records in order to track participants. To ascertain the network ties, we computerized information from these archived, handwritten documents. These documents record the answers when all 5,124 of the egos were asked to comprehensively identify relatives, friends, neighbors (based on address), co-workers (based on place of employment), and relatives. The key fact that makes these administrative records so valuable for social network research is that, given the compact nature of the Framingham population in the period from 1971 to 2007, many of the nominated contacts were themselves also participants of one or another FHS cohort.

We have used these tracking sheets to develop network links for FHS Offspring participants to other participants in any of the four FHS cohorts. Thus, for example, it is possible to know which participants have a relationship (*e.g.*, spouse, sibling, friend, co-worker, neighbor) with other participants. On average, each ego has ties to nearly 11 alters in the overall data set. Of note, each link between two people might be identified by *either party* identifying the other; this observation is most relevant to the “friend” link, as we can make this link either when A nominates B as a friend, or when B nominates A (and, as discussed below, the directionality of this nomination is methodologically important). People in any of the FHS cohorts may marry or befriend or live next to each other or work with one another. Finally, given the high quality of addresses in the FHS data, the compact nature of Framingham, the wealth of information available about each participant’s residential history, and new mapping technologies, we determined who is whose neighbor, and we computed distances between individuals (Fitzpatrick & Modlin, 1986).

These sheets can also be used to supplement information obtained from the subjects when they were examined by physicians as part of their survey participation (that is, the test battery they complete about developments in their health and social life at every wave). Our measure of divorce was derived from marital status self-reports at each wave and a detailed analysis of spousal tie data derived from the tracking sheets. We combined self-reports with tracking sheet information because sometimes subjects would list themselves as “married” on the self-report, but the tracking sheet record showed that they were previously married to a *different* individual, implying a divorce had occurred between the exams if the previous spouse was still living. We code divorce as a dichotomous variable for each subject at each exam, with a 0 meaning never divorced and a 1 meaning the subject had been divorced at least once on or prior to the date of the current exam.

Tables A-2 and A-3 show summary statistics for divorce, network variables, and control variables we use to study the statistical relationship between divorce and social network structure and function. It is important to note that our sample exhibits a low average divorce rate because it is primarily white, middle class, and better educated than a representative sample for the U.S.

population. Figures A-1 and A-2 also show how the incidence of divorce has changed from one exam to another, and how it varies by age group and years of education. Divorce rates in our data are not as high as contemporary rates since many of the participants come from older cohorts, and divorce was rare at the beginning of our survey range. Figure A-1 shows that people are more likely to get divorced in later exams; the increase in divorce rates has increased for all age groups, but it has increased fastest for the younger age groups. Table A-3 shows that rates of divorce for men and women in the study are about the same.

Statistical Information and Sensitivity Analyses

The association between the divorce status of individuals connected to each other, and the clustering of divorce within a social network, could be attributed to at least three processes: 1) *influence* or *contagion*, whereby one person's divorce *promotes* or *inhibits* divorce in others; 2) *homophily*, whereby people with the same divorce status choose one another as friends and become connected (i.e., the tendency of like to attract like); (McPherson et al. 2001) or 3) *confounding*, whereby connected individuals jointly experience contemporaneous exposures (such as an economic downturn or co-residence in a wealthy neighborhood) that influence the likelihood of divorce. To distinguish among these effects requires repeated measures of divorce (Carrington et al., 2005), longitudinal information about network ties, and information about the nature or direction of the ties (e.g., who nominated whom as a friend) (Fowler & Christakis, 2008b).

For the analyses in Table 1-3, we considered the prospective effect of social network variables and other control variables on the likelihood of future divorce. For the analyses in Table 5 we restricted our analysis to those egos who were not divorced in the previous exam and we conducted regressions of ego's current divorce status as a function of ego's age, gender, education, and the alter's divorce status in the current exam. Focusing on egos who were not divorced at the prior exam (and who maintained a social tie with the alter since the previous exam) helps control for homophily, since it eliminates any potential correlation between ego's divorce status and alter's divorce status at the inception of the relationship between ego and alter.

The key coefficient in these models that measures the effect of influence is on the variable for alter contemporaneous divorce status. We used generalized estimating equation (GEE) procedures to account for multiple observations of the same ego across waves and across different ego-alter pairings (Liang & Zeger, 1986). We assumed an independent working correlation structure for the clusters (Schildcrout & Heagerty, 2005). These analyses underlie the results presented in Figure 3. Mean effect sizes and 95% confidence intervals were calculated by simulating the first difference in alter contemporaneous divorce status (changing from 0 to 1) using 1,000 randomly drawn sets of estimates from the coefficient covariance matrix and assuming all other variables are held at their means (King, Tomz, & Wittenberg, 2000).

The regression coefficients have mostly the expected effects, such that, for example, ego's age is a strong and significant predictor of the likelihood of divorce. The models in the tables include exam fixed effects, which, combined with age at baseline, account for the aging of the population and different norms regarding divorce in different cohorts (see Figures A-1 and A-2). The sample size is shown for each model, reflecting the total number of all such ties, with multiple observations for each tie if it existed in more than one exam, and allowing for the possibility that a given person can have multiple ties. As previously indicated, repeated observations were handled with GEE procedures.

We evaluated the possibility of omitted variables or confounding events explaining the associations by examining how the type or direction of the social relationship between ego and

alter affects the association between ego and alter. If unobserved factors drive the association between ego and alter divorce status, then directionality of friendship should not be relevant. Divorce status in the ego and the alter will move up and down together in response to the unobserved factors. In contrast, if an ego names an alter as a friend but the alter does not reciprocate, then a causal relationship would indicate that the alter would significantly influence the ego, but the ego would not necessarily influence the alter.

We explored the sensitivity of our results to model specification by conducting numerous other analyses each of which had various strengths and limitations, but none of which yielded substantially different results than those presented here. For example, we experimented with different error specifications. Although we identified only a single close friend for most of the egos, we studied how multiple observations on some egos affected the standard errors of our models. Huber-White sandwich estimates with clustering on the egos yielded very similar results. We also tested for the presence of serial correlation in all GEE models using a Lagrange multiplier test and found none (Beck, 2001).

The Kamada-Kawai algorithm used to prepare the images in Figure 1 generates a matrix of shortest network path distances from each node to all other nodes in the network and repositions nodes so as to reduce the sum of the difference between the plotted distances and the network distances (Kamada & Kawai, 1989). The fundamental pattern of ties in a social network (the topology) is fixed, but how this pattern is visually rendered depends on the analyst's objectives (Christakis & Fowler 2009).

RESULTS

In Figure 1, we show a portion of the social network that demonstrates a clustering of divorced (red nodes) and non-divorced (yellow nodes) people. To determine whether the clustering of divorced people shown in Figure 1 could be explained by chance, we implemented the following permutation test: we compared the observed network to 1,000 randomly generated networks in which we preserved the network topology and the overall prevalence of divorce but in which we randomly shuffled the assignment of the divorce value to each node (Szabo & Barabasi, 2007). If clustering in the social network is occurring, then the probability that an ego is divorced given that an alter is divorced should be higher in the observed network than in the random networks. This procedure also allows us to generate confidence intervals and measure how far, in terms of social distance, the correlation in divorce between ego and alter reaches.

As described below and illustrated in the left panel of Figure 2, we found a significant relationship between ego and alter divorce status, and this relationship extends up to two degrees of separation. In other words, a person's tendency to divorce depends not just on his friend's divorce status, but also extends to his friend's friend. The full network shows that participants are 75% (95% C.I. 58% to 96%) more likely to be divorced if a person (obviously other than their spouse) that they are directly connected to (at one degree of separation) is divorced. The size of the effect for people at two degrees of separation (e.g., the friend of a friend) is 33% (95% C.I. 18% to 52%). At three degrees of separation the effect disappears (−2%, 95% C.I. −12% to 9%), in contrast to the “three degrees of influence” rule of social network contagion that has been exhibited for obesity, smoking, happiness, and loneliness (Cacioppo et al. 2009; Christakis & Fowler 2007; Christakis & Fowler 2008; Fowler & Christakis 2008a).

Notice in the right panel of Figure 2 that the decline in the effect size with social distance contrasts to a lack of decline in the effect size as people become more geographically distant from one another. Although the association in divorce status is stronger among people who co-reside in the same household (category 1 in Figure 2, $p < 0.001$) geographic distance appears to have no

effect on the strength of the association among those who do not reside together. We confirmed this result by testing an interaction between distance and the effect size. These results suggest that a divorced friend or family member who lives hundreds of miles away may have as much influence on an ego's risk of divorce as one who lives next door.

Network Structure and Divorce

Given the strong clustering of divorce outcomes that are present in the network, we explored the possibility that the structure of the network itself has an effect on divorce rates (and vice versa). Table 1 shows that although the number of family ties and the number of people the ego names as a friend do not appear to be related to the future likelihood of divorce ($p=0.64$ and $p=0.23$, respectively), the number of people who name the ego as a friend has a strong and significant effect. Each additional person who names the ego as a friend reduces her probability of divorce by 10% (C.I. 4% to 17%). In other words, more popular people are less likely to get divorced. This may relate to an argument put forward by Bryant & Conger (1999) suggesting the reciprocally supportive role of marital relationships and friendship networks; those with a good relationship also possess a strong, supportive friendship network, with both aspects of an individual's social network enhancing the viability of the other. In addition, people with better social skills may select into better marriages and also have access to more supportive friendship networks as a result of those same benefits. Those supportive friendship networks may also make it easier for individuals to weather inevitable marital stresses without having to resort to marital rupture. Some evidence does suggest that marital well being results more from self-selection into better marriages than from the marriage itself causing happiness (Mastekaasa, 1992). However, the prospective models we use here control for network characteristics in the previous period, suggesting that the relationship is not solely driven by selection.

Table 2 shows that the causal arrow also points in the opposite direction: divorce has a significant effect on the structure of the network. People who go through a divorce experience a 4% (C.I. 0% to 8%) decrease in the number of people who name them as friends. They also name about 7% (C.I. 3% to 12%) fewer friends on average. People who get divorced may become less popular at least partly because they likely lose members of their spouse's social network as friends. In addition, newly single friends may be perceived as social threats by married friends who worry about marital poaching, or suspect their partner may be susceptible to infidelity.

Table 3 shows that divorce also has an effect on the pattern of ties between ones' friends. A measure of *transitivity* – the probability that two of ones' contacts are connected with one another – is significantly related to previous divorce status (even controlling for the total number of contacts, which is structurally related to transitivity). The implication is that people who go through a divorce tend to immerse themselves in denser groups with fewer ties outside these groups. In contrast, transitivity appears to have no effect on the future likelihood of divorce ($p=0.37$). Moreover, we find that sharing the same friends with one's spouse does not significantly mitigate the likelihood of divorce. The correlation between sharing at least one friend and getting divorced at the next exam is negative but not significant (Pearson $\rho = -0.012$, $p=0.20$). Similarly, the correlation between fraction of shared friends and getting divorced at the next exam is negative but not significant (Pearson $\rho = -0.011$, $p=0.22$). Taken together, these results suggest that divorce has a stronger effect on the structure of the network than the structure of the network has on divorce.

Table 4 shows that divorced people exhibit strong *homogamy* with other divorcees. After controlling for age, education, gender, and baseline divorce rates at each exam, people who

have been divorced are much more likely to remarry someone who has gone through the same experience. Compared to others, divorcees are more than twice as likely to marry someone who was divorced *prior* to the last exam (increase of 138%, C.I. 44% to 313%). And the association is even stronger for recent divorcees. Those who became divorced in the previous exam are four times more likely to marry a divorcee (increase of 303%, C.I. 118% to 638%). These results do not explain *why* divorcees choose each other, but they do suggest that homophily may be an important source of clustering in the overall social network.

Network Contagion and Divorce

To study person-to-person effects, we examined the direct ties and individual-level determinants of ego divorce status. In the models we present in Table 5 we control for several factors as noted earlier, and the effect of social influence from one person on another is captured by the “Alter Currently Divorced” coefficient in the first row. We have highlighted in bold the social influence coefficients that are significant. Figure 3 summarizes the results from these models for friends, siblings, neighbors, and coworkers. People who have named a friend who has gotten divorced are 147% (95% C.I. 13% to 368%) more likely to get divorced themselves by the time they come to their next exam. Among friends, we can distinguish additional possibilities. Since each person was asked to name a friend, and not all of these nominations were reciprocated, we have ego-perceived friends (denoted here as “friends”) and “alter-perceived friends” (the alter named the ego as a friend, but not vice versa). We find that the influence of alter-perceived friends is not significant (the estimate is 23%, C.I. –53% to 165%). If the associations in the social network were merely due to shared experience, the significance and effect sizes for different types of friendships should be similar. That is, if some third factor were explaining both ego and alter divorce decisions, it should not respect the directionality of the friendship tie.

We also find significant effects for other kinds of alters. People with a divorced sibling are 22% (95% C.I. 0.1% to 45%) more likely to get divorced by the next exam than those without a divorced sibling. And while neighbors who live within 25 meters do not appear to affect each other (23%, C.I. –18% to 77%), we do find a significant association among co-workers at small firms (defined as those where 10 or fewer FHS participants work). People with a divorced co-worker are 55% more likely to get divorced at the next exam (C.I. 2% to 126%) than those with a non-divorced co-worker.

The Role of Children

We wondered whether children would have a protective effect by encouraging couples who would otherwise get divorced to stay together for the sake of raising their children, or to provide a self-conscious role model against their children’s future prospects for divorce. As noted earlier, most literature and cross-sectional data suggests that children reduce the likelihood of divorce slightly, although childlessness, and especially infertility, can also sometimes precipitate divorce. In Table 6, we study the relationship between number of children and divorce and we find no such effect; in fact, the main effect of children on divorce is slightly positive, albeit not significant at conventional levels ($p=0.13$). However, we also include an interaction between the alter’s divorce status and ego’s number of children and we find that each additional child significantly ($p=0.05$) reduces the effect of alter’s divorce status on ego’s likelihood of getting divorced. For couples with no children the effect is much stronger than average—an alter who is divorced nearly sextuples the risk of divorce in the ego (593%, C.I.

106% to 1593%). But by the time a person has a third child, the effect of alter's divorce status becomes insignificant (84%, C.I. -33% to 306%) and by the fifth child it completely vanishes (-4%, C.I. -86% to 233%). These results suggest that the protective effect of children acts specifically on a parent's susceptibility to influence by peers who have gotten divorced.

DISCUSSION

Using a long-term longitudinal data set, we explored how social network structures and processes influence divorce and vice versa. First, we show that divorce tends to occur in clusters within the network. These results go beyond previous work intimating a person-to-person effect to suggest a person-to-person-to-person effect. Individuals who get divorced may influence not only their friends, but also their friends' friends as the propensity to divorce spreads. Importantly, this effect is not mitigated by geographic distance but does decline with social distance, suggesting that whatever causal mechanism underlies this effect depends on psychological, as opposed to logistical or practical factors that are more likely to require the physical presence of other parties. Moreover, the lack of decay with geographic distance militates against an explanation that relies on local exposures (e.g., to local counseling resources, local churches, or local norms against divorce) that might confound causal inference.

Second, while past work indicated that spouses who share friends are less likely to divorce, we do not replicate this finding in our sample. But we do demonstrate that popular people are less likely to get divorced in the future; however, we also show that divorce exerts a significant impact on the structure of a person's social network and that those who divorce also become less popular. Moreover, divorcees tend to embed themselves in networks where there is greater likelihood that a person's friends are also friends with each other, and they exhibit strong homogeneity in remarriage, often (not surprisingly) choosing other divorcees as new partners.

Third, while past work concentrated on parent-to-child transmission of divorce, we examined the influence of peer-to-peer transfer among friends, siblings, neighbors, and coworkers. The results show significant effects for friends, siblings, and coworkers, and people appear to be more influenced by the people they name as friends than vice versa. Interestingly, while children provide some protection against divorce, they appear to do this not directly, but rather indirectly, by reducing the influence of peers who get divorced.

It is important to note that there are no detectable gender interactions with any of the effects shown (results available on request). Men and women appear to be equally susceptible to splitting up if their friends do it. Moreover, unlike previous analyses of smoking and happiness (Christakis & Fowler 2008; Fowler & Christakis 2008a), the analysis of divorce fails to produce any associations with measures of network centrality. This may relate to the finding that divorce only clusters out to two (and not three) degrees of separation.

A limitation of all social network analyses is that the studies are necessarily bound to their sample, and ties outside the network cannot be discerned in such a sociocentric study. The compact nature of the Framingham population in the period from 1971 to 2003 and the geographic proximity of many of the subjects mitigate this constraint, but we nevertheless considered whether the results might have changed with a larger sample frame that includes all named individuals who were themselves not participants in the Framingham Heart Study. For instance, when we regress the number of contacts a person names outside the study on a person's divorce status, we find an insignificant relationship ($p=0.37$). This result suggests that the sampling frame is not biasing the average risk of divorce in the target individuals we are studying. Another limitation in our analysis related to our sample is its restricted demographic

range (e.g., virtually all the people in the sample are white), and the lack of observed homosexual unions.

Romantic and sexual practices as diverse as contraceptive use, sexual behaviors, and fertility decisions are all strongly influenced by the existence of these behaviors within one's network. So divorce fits in with a pattern wherein such seemingly individualistic and intimate matters are in fact partly determined by collective, social network processes. For example, one study of 8,000 American families followed since 1968 found that the probability that a person will have a child rises substantially in the two years after his or her sibling has a child; the effect is not merely a shift in timing, but a rise in the total number of children a person chooses to have (Kuziemko, 2009). Similar effects have been documented in the developing world where decisions about how many children to have and whether to use contraception spread across social ties (Bloom, 2008). And, as an example of the spread of sexual behaviors, adolescents who believe that their peers would look favorably on being sexually active are more likely to have casual, non-romantic sex (Manning et al., 2005).

Divorce is consequential, and a better understanding of the social processes contributing to this behavior offers the promise of possibly being able to reduce the adverse effects of divorce. For example, one recent study showed that, on average, women's standard of living declines by 27% while men's standard of living increases by 10% following divorce (Peterson, 1996). Divorce also appears to exert a decisive effect on overall mortality; married people have higher longevity than unmarried (Ben-Schlomo et al., 1993; Goldman, 1993; Elwert and Christakis, 2006). These mortality rates typically differ by gender, such that men demonstrate greater effects (Koskenvuo et al., 1986), but unemployed women and unskilled male workers in particular may suffer lower rates of life expectancy in the wake of divorce (Hemstrom, 1996). In addition, divorced people tend to have more health problems (Joung et al., 1997; Murphy et al., 1997; Elwert and Christakis, 2008).

Social networks can play a role in coping with divorce. One study reported that 67% of adjustment to divorce in men could be explained by social network size, income, family stress and the severity of the divorce, with social network size and severity of the divorce being directly related to outcome. In women, 20% of adjustment could be explained by the severity of the divorce, and the size of social network did *not* seem to exert a decisive effect on post-divorce adjustment, largely because wives had wider social networks, and possibly better social skills, even prior to divorce (Plumber & Koch-Hattemm, 1986). Additional work indicates that lack of social support portends poorly for post-divorce adjustment (Marks, 1996; Ross, 1995).

Given its high prevalence, our study indicates that approaching the epidemiology of divorce from the perspective of an epidemic appears apt in more ways than one. The contagion of divorce can spread through a social network like a rumor, affecting friends up to two degrees removed. Yet adopting a strategy of social isolation so as to avoid being affected (a fanciful idea) does not provide a realistic solution since friendship networks also provide protection against myriad forms of social distress. Rather, it remains important to understand the reciprocal influence between divorce and networks in developing programs designed to provide protection for individuals and children who may suffer social dislocation in the wake of its consequences.

If divorce can be understood as a public and social problem, rather than solely as an individual phenomenon, health interventions based on previous successful public health campaigns may prove beneficial for mitigating its effects, if not its prevalence. After all, alcoholism has come to be conceptualized as an illness and not as a personal failing, and it is largely treated through social interventions. Similarly, social support structures designed to address the particular medical, financial, and psychological risks experienced by divorced individuals might help ameliorate the health and social consequences of those subject to marital

rupture. Successful interventions could, in turn, lower the risk for divorce among progeny of such dissolved marriages.

We have shown that divorce appears to spread through social networks, and, in turn, exerts effects on the structure of the network itself, changing its character. In so doing, we suggest that attending to the health of one's friends' marriages serves to support and enhance the durability of one's own relationship. Depending on one's children to provide such protection remains largely futile. Marriages endure within the context of communities of healthy relationships and within the context of social networks that encourage and support such unions.

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Table 1. Association Between Network Degree and Future Probability of Divorce

	<i>Dependent Variable: Current Divorce Status</i>		
	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>
<i>Previous Number of Inward Friendship Ties</i>	-0.33	0.10	0.00
<i>Previous Number of Outward Friendship Ties</i>	-0.12	0.10	0.23
<i>Previous Number of Family Ties</i>	0.00	0.01	0.64
<i>Age</i>	-0.06	0.00	0.00
<i>Years of Education</i>	0.01	0.02	0.45
<i>Female</i>	0.03	0.08	0.71
<i>Exam 3</i>	0.20	0.10	0.05
<i>Exam 4</i>	-0.39	0.13	0.00
<i>Exam 5</i>	-0.27	0.14	0.06
<i>Exam 6</i>	-0.29	0.16	0.08
<i>Exam 7</i>	-0.54	0.19	0.00
<i>Previous Divorce Status (1 = divorced)</i>	48.49	0.08	0.00
<i>Constant</i>	-0.51	0.36	0.16
<i>Deviance</i>	649		
<i>Null Deviance</i>	2711		
<i>N</i>	25080		

Results for logit regression of ego's current divorce status (1 = divorced), on previous divorce status, number of inward friend ties (people who named ego as a friend), outward friendship ties (people whom the ego named as a friend), and family ties. Models were estimated using a general estimating equation (GEE) with clustering on the ego and an independent working covariance structure (Liang & Zeger 1986; Schildcrout & Heagerty 2005). Models with an exchangeable correlation structure yielded poorer fit. Fit statistics show sum of squared deviance between predicted and observed values for the model and a null model with no covariates (Pan 2002). The main result (coefficient in bold) shows that number of inward friendship nominations is associated with a decreased future likelihood of becoming divorced (outward friendships and family ties are not).

Table 2. Association Between Probability of Divorce and Future Network Degree

	<i>Dependent Variable:</i>								
	<i>Current Inward Friendship Ties</i>			<i>Current Outward Friendship Ties</i>			<i>Current Family Ties</i>		
	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>
<i>Previous Divorce Status</i>	-0.01	0.00	0.00	-0.02	0.00	0.00	-0.04	0.01	0.00
<i>Previous Inward Friendship Ties</i>	0.90	0.01	0.00	0.02	0.00	0.00	-0.01	0.01	0.36
<i>Previous Outward Friendship Ties</i>	0.01	0.00	0.14	0.84	0.01	0.00	-0.02	0.01	0.00
<i>Previous Family Ties</i>	0.00	0.00	0.08	0.00	0.00	0.00	0.95	0.00	0.00
<i>Age</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Years of Education</i>	0.00	0.00	0.08	0.00	0.00	0.49	0.00	0.00	0.02
<i>Female</i>	0.01	0.00	0.00	0.00	0.00	0.72	0.00	0.01	0.67
<i>Exam 3</i>	0.03	0.00	0.00	0.03	0.00	0.00	-0.22	0.01	0.00
<i>Exam 4</i>	0.03	0.00	0.00	0.01	0.00	0.00	-0.19	0.01	0.00
<i>Exam 5</i>	-0.01	0.00	0.00	-0.02	0.00	0.00	-0.22	0.01	0.00
<i>Exam 6</i>	0.00	0.00	0.95	0.00	0.00	0.67	-0.28	0.01	0.00
<i>Exam 7</i>	0.00	0.00	0.91	0.00	0.00	0.99	-0.24	0.01	0.00
<i>Constant</i>	0.06	0.01	0.00	0.09	0.01	0.00	0.14	0.02	0.00
<i>Deviance</i>	1344			1350			4636		
<i>Null Deviance</i>	7167			5146			284104		
<i>N</i>	25080			25080			25080		

Results for linear regression of ego's current friendship and family ties on previous divorce status, number of inward friendship ties (people who named ego as a friend), outward friendship ties (people whom the ego named as a friend), and family ties. Models were estimated using a general estimating equation (GEE) with clustering on the ego and an independent working covariance structure (Liang & Zeger 1986; Schildcrout & Heagerty 2005). Models with an exchangeable correlation structure yielded poorer fit. Fit statistics show sum of squared deviance between predicted and observed values for the model and a null model with no covariates (Pan 2002). The main results (coefficients in bold) show that previous divorce status is weakly associated with a future decrease in inward friendship ties and strongly associated with a future decrease in outward friendship and family ties.

Table 3. Association Between Divorce and Transitivity

	<i>Dependent Variable:</i>					
	<i>Current Transitivity</i>			<i>Current Divorce Status</i>		
	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>
<i>Previous Transitivity</i>						
<i>(probability that two contacts are in contact with one another)</i>	0.87	0.00	0.00	0.12	0.14	0.37
<i>Previous Divorce Status</i>	0.02	0.01	0.00	48.21	0.08	0.00
<i>Previous Degree (total number of contacts)</i>	0.00	0.00	0.00	0.00	0.01	0.69
<i>Age</i>	0.00	0.00	0.00	-0.04	0.00	0.00
<i>Years of Education</i>	0.00	0.00	0.12	-0.02	0.03	0.54
<i>Female</i>	-0.01	0.00	0.03	-0.01	0.10	0.89
<i>Exam 3</i>	0.03	0.01	0.00	-0.19	0.13	0.15
<i>Exam 4</i>	0.02	0.01	0.02	-0.64	0.17	0.00
<i>Exam 5</i>	0.03	0.01	0.00	-0.69	0.19	0.00
<i>Exam 6</i>	0.04	0.01	0.00	-0.86	0.23	0.00
<i>Exam 7</i>	0.04	0.01	0.00	-0.71	0.23	0.00
<i>Constant</i>	0.13	0.02	0.00	-0.86	0.49	0.08
<i>Deviance</i>	480			377		
<i>Null Deviance</i>	1753			1465		
<i>N</i>	11550			11550		

Results for linear regression of ego's current transitivity (i.e. the probability that two contacts are in contact with one another) and logit regression of ego's current divorce status (1 = divorced) on previous transitivity and divorce status, total number of social contacts, and other covariates. Models were estimated using a general estimating equation (GEE) with clustering on the ego and an independent working covariance structure (Liang & Zeger 1986; Schildcrout & Heagerty 2005). Models with an exchangeable correlation structure yielded poorer fit. Fit statistics show sum of squared deviance between predicted and observed values for the model and a null model with no covariates (Pan 2002). The main results (coefficients in bold) show that the networks of people who get divorced tend to become more transitive over time, but increased transitivity is not similarly related to a future increase in the likelihood of divorce.

Table 4. Association Between Ego and Alter Divorce Status Among Newlyweds

	<i>Dependent Variable:</i> <i>Ego Divorce Status</i>		
	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>
<i>Alter Divorced Since Previous Exam</i>	6.67	0.55	0.00
<i>Alter Divorced Prior to Previous Exam</i>	5.49	0.69	0.00
<i>Alter Age</i>	-0.01	0.02	0.69
<i>Alter Years of Education</i>	0.02	0.06	0.78
<i>Alter Female</i>	0.24	0.27	0.38
<i>Exam 3</i>	-0.02	0.34	0.95
<i>Exam 4</i>	0.32	0.49	0.51
<i>Exam 5</i>	0.60	0.51	0.24
<i>Exam 6</i>	1.99	0.81	0.01
<i>Exam 7</i>	0.43	0.63	0.49
<i>Constant</i>	-6.48	1.41	0.00
<i>Deviance</i>	57		
<i>Null Deviance</i>	127		
<i>N</i>	2597		

Regression of ego divorce status on alter divorce status and control variables among all newly married spouses. The results show that divorcees are much more likely to marry divorcees than are singles or widowers.

Table 5. Association of Ego Divorce Status and Alter Divorce Status, By Alter Type

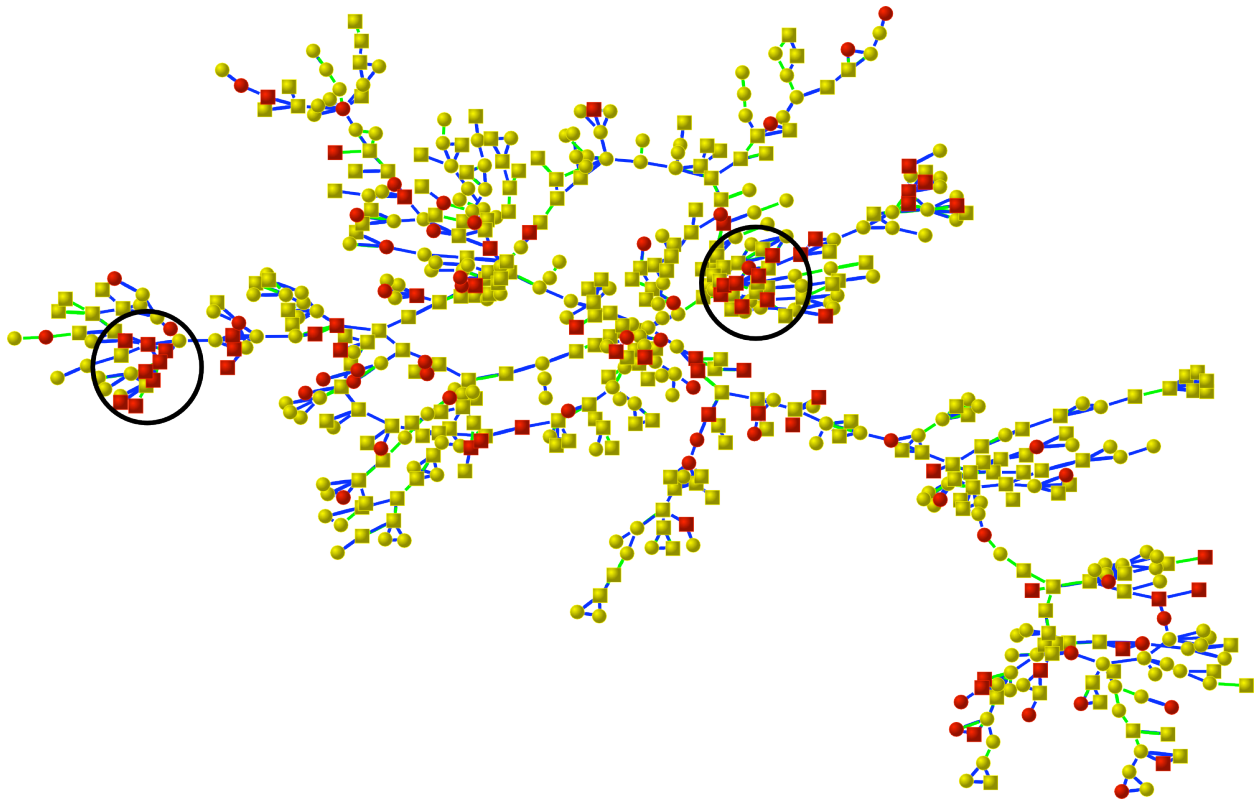
<i>Dependent Variable: Current Ego Divorce Status</i>					
	<i>Alter Type</i>				
	<i>Friend</i>	<i>Alter- Perceived Friend</i>	<i>Sibling</i>	<i>Same Block Neighbor</i>	<i>Small Firm Coworker</i>
<i>Alter Currently Divorced</i>	0.86 (0.38)	0.11 (0.45)	0.20 (0.10)	0.20 (0.20)	0.42 (0.20)
<i>Ego Age</i>	-0.04 (0.01)	-0.06 (0.02)	-0.02 (0.01)	-0.04 (0.01)	-0.04 (0.02)
<i>Ego Female</i>	0.14 (0.25)	0.17 (0.31)	-0.07 (0.11)	0.13 (0.23)	0.10 (0.33)
<i>Ego Education</i>	-0.05 (0.05)	0.05 (0.08)	-0.02 (0.03)	-0.09 (0.06)	-0.11 (0.09)
<i>Exam 3</i>	-0.31 (0.30)	-0.23 (0.41)	-0.61 (0.14)	-0.46 (0.33)	-0.57 (0.41)
<i>Exam 4</i>	-1.62 (0.47)	-0.24 (0.45)	-1.17 (0.18)	-1.20 (0.38)	-0.55 (0.46)
<i>Exam 5</i>	-1.62 (0.63)	-1.05 (0.65)	-1.25 (0.20)	-1.28 (0.48)	-0.94 (0.60)
<i>Exam 6</i>	-1.87 (0.63)	-1.42 (0.84)	-1.24 (0.24)	-0.29 (0.58)	-40.59 (0.44)
<i>Exam 7</i>	-1.69 (0.67)	-0.33 (0.82)	-1.26 (0.25)	-1.20 (0.72)	-1.37 (0.83)
<i>Constant</i>	-0.31 (1.01)	-1.08 (1.45)	-1.00 (0.50)	0.38 (1.04)	0.73 (1.58)
<i>Deviance</i>	76	49	1066	208	161
<i>Null Deviance</i>	79	49	1089	214	164
<i>N</i>	2823	2597	23815	5123	4709

Coefficients and standard errors in parenthesis for logit regression of ego divorce status on alter divorce status among all egos who were not divorced at the previous exam. Observations for each model are restricted by type of relationship (*e.g.*, the leftmost model includes only observations in which the alter is a friend named by the ego). Same block neighbors live within 25 meters, and small firm coworkers are those at firms where 10 or fewer FHS subjects work. Models were estimated using a general estimating equation with clustering on the ego and an independent working covariance structure (Liang & Zeger 1986; Schildcrout & Heagerty 2005). Models with an exchangeable correlation structure yielded poorer fit. Fit statistics show sum of squared deviance between predicted and observed values for the model and a null model with no covariates (Pan 2002). The main results (coefficients in bold) suggest that ego's likelihood of divorce is influenced by the divorce status of friends, siblings, and small firm coworkers.

Table 6. The Number of Children Decreases Influence from Friends

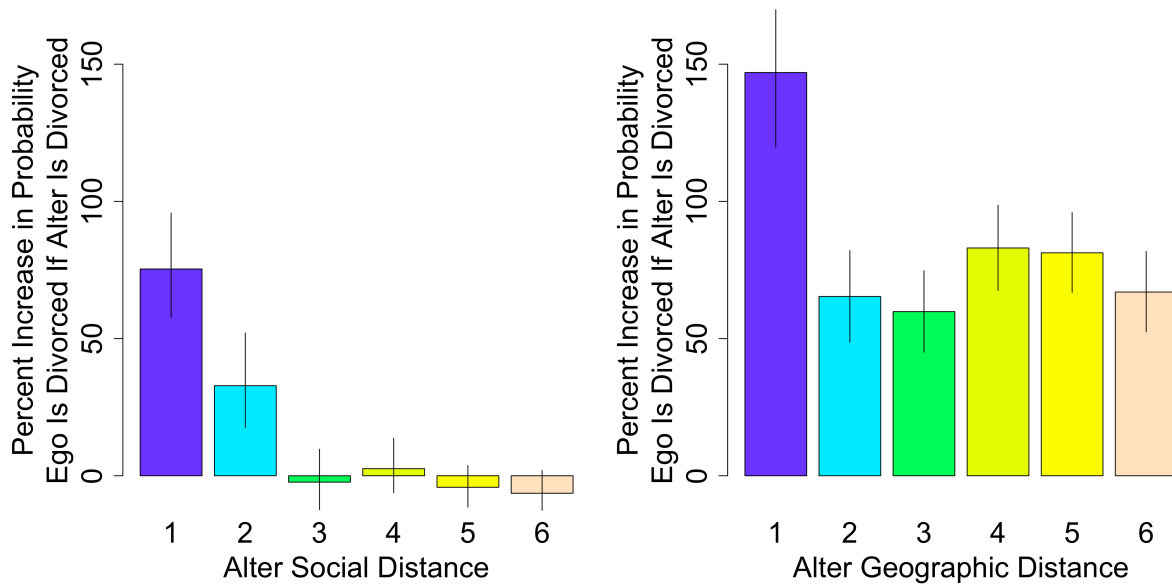
	<i>Dependent Variable:</i> <i>Current Ego Divorce Status</i>		
	<i>Coef.</i>	<i>S.E.</i>	<i>p</i>
<i>Alter Currently Divorced</i>	1.86	0.57	0.00
<i>Alter Currently Divorced x Ego Number of Children</i>	-0.45	0.23	0.05
<i>Ego Number of Children</i>	0.13	0.09	0.13
<i>Ego Age</i>	-0.04	0.01	0.00
<i>Ego Years of Education</i>	-0.05	0.05	0.35
<i>Ego Female</i>	0.07	0.26	0.79
<i>Exam 3</i>	-0.22	0.31	0.47
<i>Exam 4</i>	-1.51	0.47	0.00
<i>Exam 5</i>	-1.47	0.64	0.02
<i>Exam 6</i>	-1.73	0.64	0.01
<i>Exam 7</i>	-1.54	0.68	0.02
<i>Constant</i>	-0.50	1.03	0.63
<i>Deviance</i>	74		
<i>Null Deviance</i>	77		
<i>N</i>	2821		

Coefficients and standard errors in parenthesis for logit regression of ego divorce status on alter divorce status among all egos who were not divorced at the previous exam. Observations are restricted to alters named by the ego as a friend. Models were estimated using a general estimating equation with clustering on the ego and an independent working covariance structure (Liang & Zeger 1986; Schildcrout & Heagerty 2005). Models with an exchangeable correlation structure yielded poorer fit. Fit statistics show sum of squared deviance between predicted and observed values for the model and a null model with no covariates (Pan 2002). The main results (coefficients in bold) show that each additional child significantly reduces the effect of alter's divorce status on ego's divorce status.

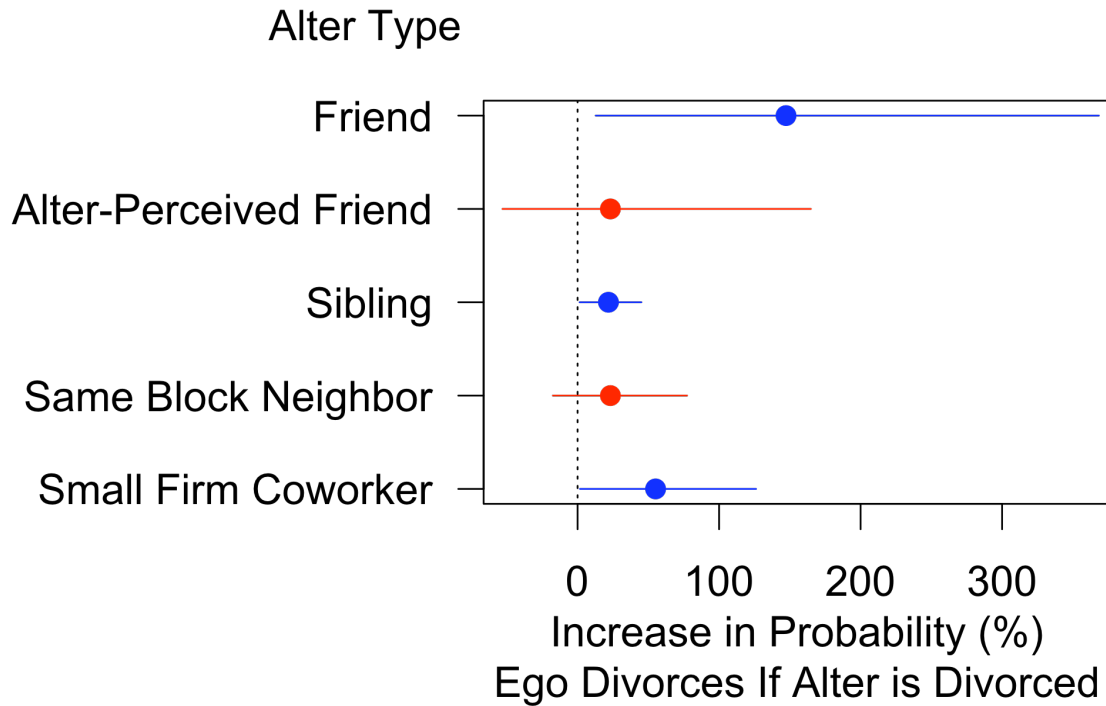
Figure 1. Divorce in the Framingham Heart Study Social Network

This graph shows the largest connected set of friends and siblings at exam 7 (centered on the year 2000). There are 631 individuals shown. Each node represents a participant and its shape denotes gender (circles are female, squares are male). Lines between nodes indicate relationship (blue for siblings, green for friends). Node color denotes which subjects have ever been divorced (red for divorced, yellow for never divorced). The graph suggests social clustering of people who experience divorce (as noted in the two circled regions), which is confirmed by statistical models discussed in the main text.

Figure 2. Mediating Relationship of Social and Geographic Distance on Association in Divorce Status Between Connected Persons



Panels show the effect of social and geographic distance from divorced alters on the probability that an ego is divorced in the Framingham Heart Study Social Network. A divorced subject is someone who has been divorced at least once. The effects were derived by comparing the conditional probability of being divorced in the observed network with an identical network (with topology preserved) in which the same number of divorcees is randomly distributed. In the panel on the left, alter social distance refers to closest social distance (or degree of separation) between the alter and ego (e.g. direct friend = distance 1, friend's friend = distance 2, etc.). The association between ego and alter divorce status remains significant up to two degrees of separation. In the panel on the right, we ranked all physical distances between homes of directly connected egos and alters (*i.e.*, just those pairs at one degree of separation) and created six equally sized groups (1 = closest, 6 = farthest). The average distances for these six groups are: 1 = 0 miles; 2 = 0.26 miles; 3 = 1.5 miles; 4 = 3.4 miles; 5 = 9.3 miles; and 6 = 471 miles. There is no trend across physical distance except a significant increase in effect size for those who live in the same residence (category 1). Error bars show 95% confidence intervals based on 1,000 simulations.

Figure 3. Influence Effect of Ego Divorce Status on Alter Divorce Status

This figure shows that friends, siblings, and coworkers significantly influence divorce status. Circles indicate estimates and bars indicate 95% confidence intervals (significant estimates shown in blue, insignificant in red). Estimates derived using generalized estimating equation (GEE) logit models on several different sub-samples of the Framingham Social Network; see Table 5.

APPENDIX

Table A-1. Survey Waves and Sample Sizes of the Framingham Offspring Cohort

<i>Survey Wave/ Physical Exam</i>	<i>Time period</i>	<i>N alive</i>	<i>Number Alive and 18+</i>	<i>N examined</i>	<i>% of adults participating</i>
<i>Exam 1</i>	1971-75	5124	4914	5,124	100.0
<i>Exam 2</i>	1979-82	5053	5037	3,863	76.7
<i>Exam 3</i>	1984-87	4974	4973	3,873	77.9
<i>Exam 4</i>	1987-90	4903	4903	4,019	82.0
<i>Exam 5</i>	1991-95	4793	4793	3,799	79.3
<i>Exam 6</i>	1996-98	4630	4630	3,532	76.3
<i>Exam 7</i>	1998-01	4486	4486	3,539	78.9

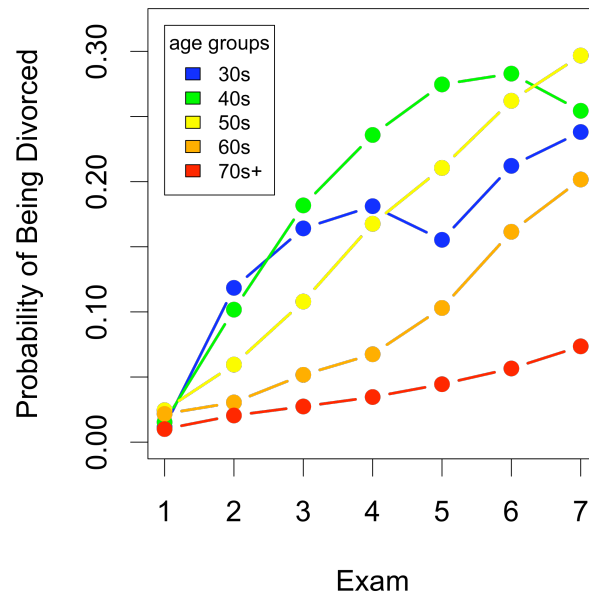
Table A-2. Summary Statistics

<i>Variable</i>	<i>Mean</i>	<i>S.D.</i>	<i>Min.</i>	<i>Max</i>
<i>Divorced</i>	0.09	0.28	0	1
<i>Number of Friends</i>	0.24	0.55	0	8
<i>Number of Family</i>	2.42	3.24	0	29
<i>Transitivity</i>	0.59	0.40	0	1
<i>Female</i>	0.52	0.50	0	1
<i>Years of Education</i>	12.34	3.26	0	17
<i>Age</i>	55.89	15.5	18	103

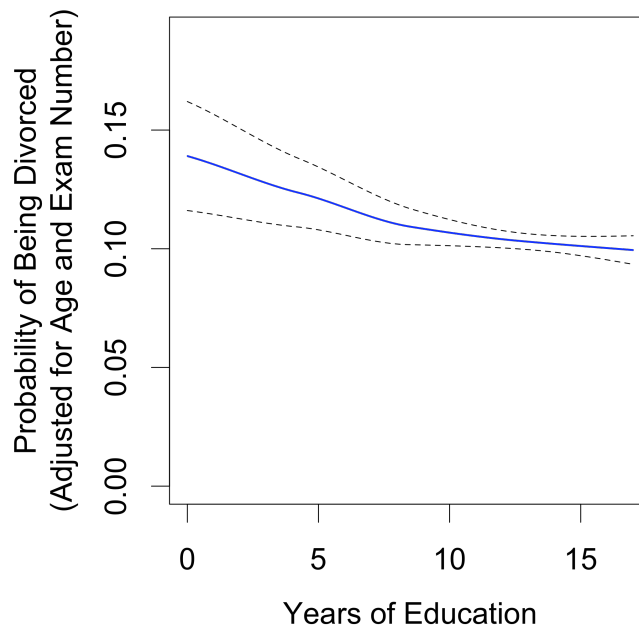
Table A-3. Distribution of Number of Divorces Observed

<i>Variable</i>	<i>All</i>	<i>Men</i>	<i>Women</i>
Divorced Once	863	413	450
Divorced Twice	70	34	36
Divorced Thrice	3	2	1

Note: These numbers only reflect divorces that occurred after the inception of exam 1. The number of male and female divorces are not equal because some divorced spouses did not participate in the Framingham Heart Study. For the data in this study, we also counted individuals as divorced if they claimed to be divorced when asked at the first exam, but since those divorces were not observed, they are not included in this table.

Figure A-1. Probability of Being Divorced at Each Exam by Age Cohort

This figure shows that the probability of divorce tends to go up across exams within each age group (30s = subjects aged 30 to 39, 40s = 40 to 49, and so on).

Figure A-2. Probability of Being Divorced by Years of Education

Note: smoothed LOESS plots of probability of being divorced, by education. Divorce rate adjusted for age and exam number. Dotted lines show 95% confidence intervals.