Disintermediating your friends: How online dating in the United States displaces other ways of meeting

Michael J. Rosenfeld[a,1], Reuben J. Thomas[b], and Sonia Hausen[a]

[a]Department of Sociology, Stanford University, Stanford, CA 94305; and [b]Department of Sociology, University of New Mexico, Albuquerque, NM 87131

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We present data from a nationally representative 2017 survey of American adults. For heterosexual couples in the United States, meeting online has become the most popular way couples meet, eclipsing meeting through friends for the first time around 2013. Moreover, among the couples who meet online, the proportion who have met through the mediation of third persons has declined over time. We find that Internet meeting is displacing the roles that family and friends once played in bringing couples together.

Internet | dating | friends | disintermediation

From the end of World War II until 2013, the most popular way heterosexual Americans met their romantic partners was through the intermediation of friends. One's close friends and family have, probably since the beginning of time, been the essential network foci that enable connections to other people, i.e., the friends of one's friends (1). More distant ties have the potential to create a bridge to a new, previously unknown network of people and information (2). Friends, the close and the not-so-close, have been historically a crucial source of connections to others. The rise of the Internet has allowed individuals in the dating market to disintermediate their friends, i.e., to meet romantic partners without the personal intermediation of their friends and family.

Rosenfeld and Thomas (3) with data from 2009 showed that the percentage of heterosexual couples* who met online had risen from 0% for couples who met before 1995 to about 22% for couples who met in 2009. In the 2009 data, Rosenfeld and Thomas showed that meeting online had grown but was still significantly behind friends as the most prevalent way heterosexual couples met. Furthermore, the 2009 data appeared to show that the rate of meeting online had plateaued for heterosexuals at around 22%. In this paper, we present data from a nationally representative 2017 survey showing that meeting online has continued to grow for heterosexual couples, and meeting through friends has continued its sharp decline. As a result of the continued rise of meeting online and the decline of meeting through friends, online has become the most popular way heterosexual couples in the United States meet.

It was not inevitable that the percentage of heterosexual couples who met online would have continued to grow beyond the previously documented 2005 to 2009 plateau. Unlike gays and lesbians, heterosexuals can assume that most people they meet are heterosexuals also. Heterosexuals, because they constitute the large majority of adults, are usually in thick dating markets, where several potential partners are identifiable. The theorized advantage of face-to-face contact (4) could have limited the growth of online dating.

The traditional system of dating, mediated by friends and family, has long been theorized to be optimal for mate selection. The family system is historically predicated, in part, on catalyzing and promoting the most socially acceptable mating outcomes for the younger generation (5). Meeting through friends and family provided guarantees that any potential partner had been personally vetted and vouched for by trusted alters. Classic work by Bott (6) found that social closure had benefits in terms of relationship quality and duration.

Despite the traditional advantages of meeting face-to-face through connections established by friends and family, the potential technological benefits of online dating are numerous as well (7, 8) and are described below. Our Hypothesis 1 is that the percentage of heterosexual couples meeting online will have continued to grow beyond the previously identified 2005 to 2009 plateau of 22%.

Research on communication technology's impact on social relations finds that technology is more likely to change the efficiency of interactions than to change who interacts with whom (9). The broad dissemination of land line telephones in the United States in the early 20th century made it easier for Americans to stay in touch with relatives from out of town, but it did not change who interacted with whom. Most telephone calls were made to people one already knew (10).

If communication technology reinforces and complements existing face-to-face social networks, hierarchies, and patterns (11–13), then we would expect any rise in Internet dating to reinforce rather than to displace the traditional roles of friends and family as introducers and intermediaries. Online social networks like Facebook allow friends and family to do (more efficiently) what friends and family have always done: facilitate (potentially romantic) direct ties between people who are already connected to the same social network. Even infrequently seen friends can be easily introduced to each other online. Research on technology as reinforcing existing face-to-face social ties leads to our Hypothesis 2: any rise in Internet dating will reinforce rather than displace the intermediary roles of friends and family.

There are many critics of Internet dating and computer-mediated communication (CMC) more generally. Some scholars

Significance

We show in this paper that meeting online has displaced friends as the main way heterosexual couples in the United States meet. Traditional ways of meeting partners (through family, in church, in the neighborhood) have all been declining since World War II. Meeting through friends has been in decline since roughly 1995.

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Data deposition: The data reported in this paper are publicly available at Stanford University's Social Science Data and Software Social Science Data Collection (https://data.stanford.edu/hcmst and https://data.stanford.edu/hcmst2017).

[1]To whom correspondence may be addressed. Email: mrosenfe@stanford.edu.

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*Our functional definition of couples includes married couples, unmarried couples who have cohabited, and unmarried romantic unions who have never cohabited. The substantive results are the same if we limit the analysis to only the first or the first and second categories of couples (*SI Appendix*, Figs. S3–S5). By "heterosexual couples," we mean male respondents partnered with females and female respondents partnered with males, without regard for the sexual identity of the respondents. Heterosexuality here is the public facing, rather than the private identity.

view CMC as hollowing out our social well-being by substituting attention-seeking devices for more rewarding face-to-face interaction (4). If CMC depersonalizes social interaction compared to face-to-face interaction, we might expect people who date online to compensate by leveraging suggestions from friends or family or leveraging their Facebook network to find friends of friends, as some phone dating apps are designed to do.[†]

Whereas family and friends are the most trusted social relations, Internet dating and hookup apps such as Tinder, Match.Com, and eHarmony are owned by faceless corporations.[‡] Why might individuals increasingly rely on matches suggested by Tinder or Match.Com (Hypothesis 1), and why might any increase in online dating displace rather than amplify the role of dating tips from one's mother,[§] friend, or one's friend's friend (contrary to the expectations of Hypothesis 2)?

There are several potential reasons why the ascendency of Internet dating might displace friends and family, despite the expectations of Hypothesis 2. First, the sets of people connected to Tinder, Match, and eHarmony are larger than the sets of people connected to one's mother or friend. Larger choice sets are valuable to everyone engaged in search (8). Larger choice sets are especially valuable for people who are searching for something unusual or hard-to-find, which is why online dating is even more valuable for gays and lesbians than it is for heterosexuals (3).

Second, individuals might not want to share their dating preferences and activities with their mother or with their friends. Active brokerage of romantic partnerships by a family member or friend would depend on the broker knowing what both individuals desire in a partner. Taking advantage of Facebook to find friends of friends for romantic matches (i.e., passive brokerage by friends) might expose dating habits and choices to too broad an audience. Dating perfect strangers encountered online is potentially more discreet than dating a friend's friend.

A corollary to the discretion inherent in online dating is that the online precursor to face-to-face meeting inserts a layer of physical distance that can have benefits for safety. Messaging starts through the phone app. If the other person sends a text or a picture that is rude or inappropriate, the sender of the rude message can be blocked within the app and they have no recourse to overcome the block. The ability to block people within the apps is useful to anyone who might feel physically vulnerable meeting a stranger face-to-face (15). Once the face-to-face meeting has taken place, the security advantage of the phone apps largely dissipates. It is difficult to block the person sitting next to you at the bar, or to permanently extricate oneself from encounters with a friend's friend. Asynchronous CMC gives people the time and distance to frame questions and answers more carefully, to find communities of interest outside the immediate vicinity, and to share things that might be awkward to share in person (16, 17).

Third, Tinder, eHarmony, Match, and the other Internet dating sites are in the business of having up-to-date information about the people in the dating pool. Mothers and friends may have useful information about a small set of individuals in the dating pool, but how up-to-date is the information? The architecture and ubiquity of the Internet make it easier for Match.com to have up-to-date information on 10 million people, than for a mother or friend to have up-do-date information on 20 people.

Fourth, the online dating sites have the potential to improve their matching algorithms through data analysis, experiments, and machine learning over time (18, 19). In any business where matching is a core function, the quality of the matching algorithms are vital for the success of the business. Netflix has improved its various algorithms for matching people to movies over time (20). Compared to the 1-way matching problem of matching people to movies, the problem of matching people to each other is a more difficult 2-way matching problem. While there are reasons to be skeptical of the claims that the online dating sites make about the scientific nature of their various matching algorithms (21), the online dating sites have at least the potential for technological advancement, whereas the face-to-face network of friends is a more static technology.

Graphical web browsers (introduced around 1995) and smart phones (introduced around 2007) both opened up new markets for internet dating. In the case of smart phones, there were 2 separate benefits. The first was location-aware apps (such as Grindr for gay men) that could suggest matches in one's immediate area. The second benefit of smart phones was to bring the dating app off the user's desktop and into their pocket, making dating accessible everywhere and at all times. The legacy Internet dating sites that predated the smart phone era eventually added phone app versions to make their services available on smart phones as well as on personal computers.[¶]

The information on Match, Tinder, and eHarmony about the individuals one is interested in could be misleading, of course. Stories abound of online dating scuttled by out-of-date profile photos, misleading relationship statuses, and overly generous self-descriptions (24). It is not clear, however, that false representations are any more common in online dating than they were in the pre-Internet era (25).

Results

Fig. 1 shows updated smoothed graphs (using data from both the How Couples Meet and Stay Together surveys, hereafter, HCMST 2009 and HCMST 2017) of how couples have met by the year of first meeting for heterosexual couples. Same-sex couples were early adopters of Internet services for meeting partners. Because the pattern of how heterosexual couples have met has changed more since 2009, we focus here on the heterosexual couples.

The most traditional ways of meeting for heterosexual couples, i.e., meeting through family, meeting through church, meeting in the neighborhood, and meeting in primary or secondary school, have all been declining sharply since 1940.

The timing of the rapid rise of heterosexual couples meeting online in Fig. 1 corresponds to both of the important technological innovations that helped to spur online dating: the introduction of the graphical web around 1995 and the introduction and widespread adoption of smart phones after 2007. The plateau in couples meeting online around 2005 to 2010, and the subsequent rise, is consistent with increased reliance on smart phones. Separate analyses show that meeting through phone apps was responsible for at least half of the growth in meeting online from 2010 to 2017 (*SI Appendix*, Fig. S1).

In 2009, meeting through friends was by far the most common way heterosexual couples met, and this had been true for 60 y since the immediate post-World War II period. Since 2009, however, meeting through friends has declined sharply, and meeting online has continued to grow. As a result of the decline in meeting through friends and the rise in meeting online, heterosexual couples in the United States are now much more likely to meet online than to meet any other way. We identify 2013 as the approximate year when meeting online surpassed meeting through

[†] Phone dating apps Badoo, Hinge, and Down connect to Facebook and offer matches of friends or friends of friends.

[‡] Tinder and Match, 2 of the most popular online dating platforms, are subsidiaries of the same corporate parent, Match Group, which is majority owned by IAC.

[§] Personal mediation for dating is heavily gendered, as is most social interaction. Mothers introduce far more couples than fathers do (14).

[¶] Legacy Internet dating sites Match.com (founded 1993), Plenty of Fish (founded 2003), and eHarmony (founded 2000) all launched phone app versions in 2010. Across all Internet daters in the United States, the percentage of those who had used a phone app for Internet dating rose from 30% in 2013 to 54% in 2015, from authors' tabulations from 2 surveys from Pew Research (22, 23).

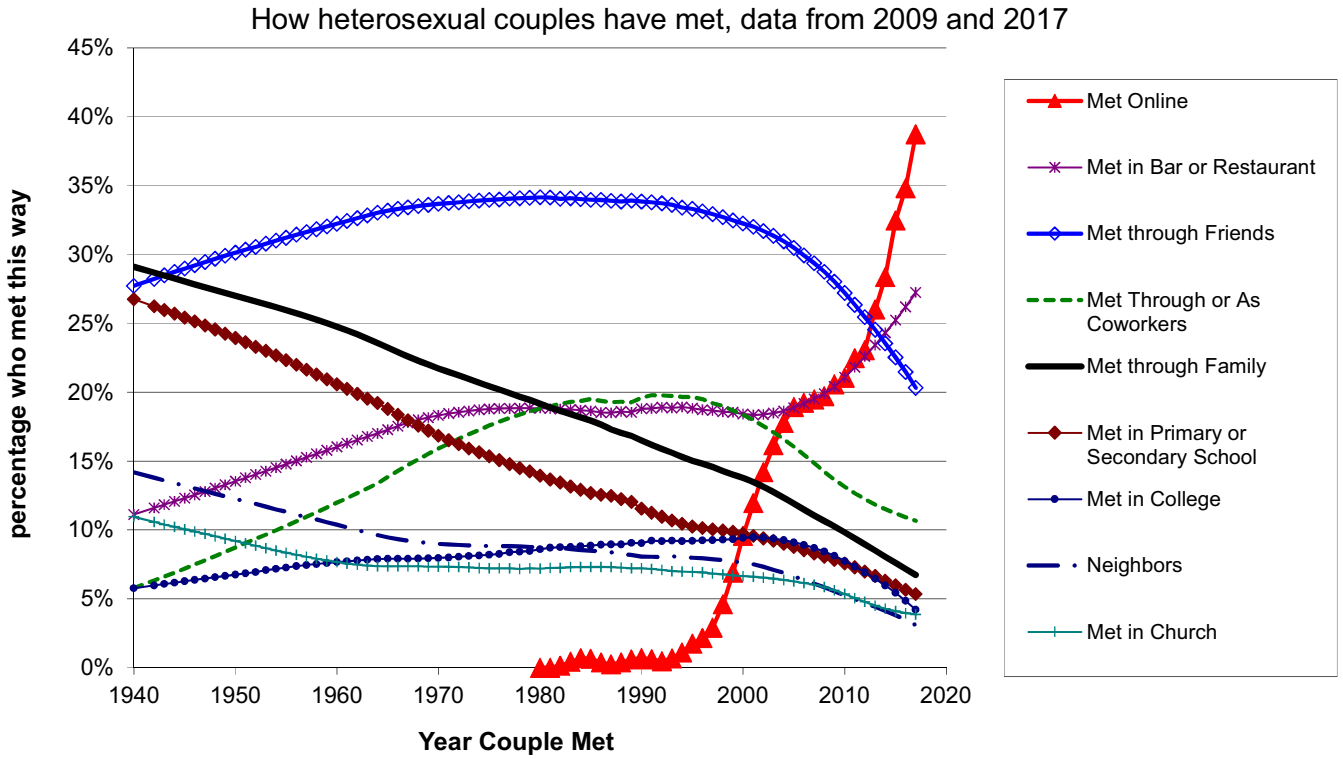

Fig. 1. Source: HCMST 2009 and HCMST 2017 waves. Consistent with Rosenfeld and Thomas (3), all trends are from unweighted Lowess regression with bandwidth 0.8 (39), except for meeting online, which is a 5-y moving average because meeting online takes place in the more recent and data-rich part of the data (N = 2,473 for HCMST 2009 and N = 2,997 for HCMST 2017). Friends, family, and coworkers can belong to either respondent or partner. Percentages do not add to 100% because the categories are not mutually exclusive; more than one category can apply.

friends for heterosexual couples in the United States. Previous research with the longitudinal follow-ups after HCMST 2009 showed that neither breakup rates nor relationship quality were influenced by how couples met, so the retrospective nature of the HCMST "how did you meet" question should not introduce couple survivor bias (3, 8).[#] Once couples are in a relationship, how they met does not determine relationship quality or longevity.[‖]

The coding of the "how did you meet" question coded as many categories as could be identified in every open-ended response. None of the categories are mutually exclusive. Some respondents met online and also met through friends; for instance, if the friend had made the introduction online or if the friend forwarded an online profile. Some people who met online met through a friend-mediated online social-networking website such as Facebook or Myspace. Some respondents had their Internet dating profiles created and curated by their friends. In all of these cases, meeting online and meeting through friends were both coded. Meeting online could have grown without displacing the intermediation of friends (as previous literature and Hypothesis 2 would lead one to expect). Fig. 1 shows, however, that the growth of meeting online has strongly displaced meeting through friends.

Fig. 1's apparent post-2010 rise in meeting through bars and restaurants for heterosexual couples is due entirely to couples who met online and subsequently had a first in-person meeting at a bar or restaurant or other establishment where people gather and socialize. If we exclude the couples who first met online from the bar/restaurant category, the bar/restaurant category was significantly declining after 1995 as a venue for heterosexual couples to meet.

Table 1 shows that the rise of meeting online and the decline of meeting through friends among heterosexual couples in the United States were both highly significant trends. The Z scores represent tests of whether a line through the data from 1995 to 2017 for each way of meeting had a slope significantly different from zero, tested with logistic regressions. More specifically, the Z scores represent the significance level of the coefficient β_i in the equation $\text{Ln}\left(\frac{P_{i,j}}{1-P_{i,j}}\right)=\beta_i Y_j$, where $P_{i,j}$ is the predicted probability that a heterosexual couple meeting in year j would meet in the ith way; Y_j = (year of meeting – 1995) if year of meeting $\geq$ 1995 and Y_j = 0 if year of meeting $<$ 1995. All changes (from 1995 to 2017) in how heterosexual couples met in Fig. 1 were statistically significant, except for the apparent decline in meeting in college.

We use 1995 as one temporal endpoint for the tests in Table 1 for empirical and historical reasons. Fig. 1 shows 1995 to be the beginning of a sharp increase in the percentage of couples who met online. The historical rationale for 1995 as the starting point is that the first popular graphical web browsers, Netscape and Internet Explorer, were introduced in 1994 and 1995. The rise of the graphical web beginning in 1995 created a potential new market for Internet dating.

Some of the ways of meeting partners are life stage-specific (e.g., meeting in college, meeting in primary or secondary school). In *SI Appendix*, Table S3, we show that the rise in meeting online and the declines over time in meeting through friends,

[#] Rosenfeld (8) and Rosenfeld and Thomas (3) both used HCMST 2009's prospective longitudinal data on couple breakup, based on follow-up with partnered subjects. HCMST 2017 has as of yet only retrospective data on couple breakup. Analysis of the HCMST 2017 retrospective breakup data show, consistent with prior results from HCMST 2009 and its longitudinal follow-ups, that how couples met had no significant effect on the hazard of breakup once decade of meeting was controlled for (*SI Appendix*, Table S4).

[‖] The only difference we have found in relationships that is correlated with how couples met is the speed of transition to marriage. Heterosexual couples who met online transition to marriage faster (8).

Table 1. Changes in how heterosexual couples in the United States met in the Internet era

How couples met	1995, %	2017, %	Z score	Significance
Online	2	39	23.43	***
Through friends	33	20	−4.55	***
Through family	15	7	−8.47	***
Through or as coworkers	19	11	−5.16	***
In a bar or restaurant	19	27	2.38	*
In primary or secondary school	10	5	−6.62	***
In church	7	4	−2.52	*
Through or as neighbors	8	3	−4.54	***
In college	9	4	−1.17	

Source: HCMST 2009 and 2017. Heterosexual couples only (N = 5,421). The 1995 and 2017 columns are point values for smoothed observed probabilities. *$P < 0.05$; ***$P < 0.001$ (2-tailed tests).

meeting through family, meeting through or as coworkers, and meeting through or as neighbors all remained statistically significant when controlling for age at which subject met partner and subject gender.

Table 2 shows the decline over time in personal intermediation for couples who met online from the 2009 and 2017 HCMST surveys. In the 2009 HCMST survey, 11.2% of the couples who met online met through some form of third-person intervention. In the 2017 HCMST survey, only 3.7% of couples who met online met through the intervention or mediation of a friend or other third person. Eighty-nine percent of couples who met online from the 2017 survey were previously strangers, meaning there was no personal connection between the respondent and partner before they met online. Of the couples who met online, the percentage of those who were perfect strangers increased significantly not only across survey years (shown in Table 2) but also and significantly as a function of later years of meeting (*SI Appendix*, Table S5).

Stories from HCMST 2017 that reflect online meeting without personal intermediation include: "We found each other through [dating site]. We met in person at a local grocery store. We then proceeded to hang out with each other every single day for the next few months," and "We met online. We had drinks one night and were friends for a while then got into a serious relationship." An example of an online meeting brokered by a third person from HCMST 2017 starts this way: "We first met on Facebook. I was asked by his then girlfriend to join his new group. About a week later, he and his girlfriend had a falling out... He messaged me... I took my vacation time from work, drove across the country where I met the love of my life!"

The results reflect support of Hypothesis 1, as the percentage of heterosexual couples meeting online has surged in the post-2009 smart phone era. Because the results show that meeting online has displaced meeting through friends and meeting through family, we find evidence to reject Hypothesis 2, which led us to expect that online dating would reinforce existing face-to-face social networks.

Discussion. The apparent displacement of meeting through friends by meeting online suggests a process of technology-driven disintermediation. Individuals used to need personal intermediaries, usually friends or family members, to introduce them to new people. Now that the Internet makes a large choice set of potential partners available, the intermediation of friends and family is relied upon less. The role of family as matchmaker had been already in decline for most of the late 20th century, as later age at first marriage and the independence of young adults has removed dating and matchmaking from the oversight of parents (5).

The rapid adoption of smart phones in the United States (26) has spurred the increase in adoption of online dating. Tinder, the leading United States phone dating app, was first released in 2012. Grindr, the leading dating and hookup app for gay men, was released in 2009, helping to initiate the phone app phase of Internet dating. As people have come to know others who found partners through online dating, the stigma against online dating has waned (27). As the number of users of the online dating sites has increased, the primary advantage of the online dating sites (i.e., a large choice set of potential partners) has also increased.

Contrary to the scholarship about how previous technologies have reinforced face-to-face social networks, and contrary to Hypothesis 2, Internet dating has displaced friends and family from their former roles as key intermediaries in the formation of new unions. Disintermediation, i.e., the removal or subordination of the human intermediary between 2 parties, is a fundamental social outcome of the Internet. Human travel agents used to be necessary to book hotel and airline flights, until the Internet travel brokers disintermediated the human travel agents (28). Despite the disintermediation of friends and family from the matchmaker role, friends and family of course have many other important functions. Friends and family are likely to remain important even if other intermediaries, such as human travel agents, see their roles and numbers diminish.

Data and Methods. We use the HCMST 2017 (29) dataset along with wave 1 of HCMST 2009 (30). Both HCMST surveys were nationally representative surveys of English literate adults in the United States (see *SI Appendix*, Table S1 for some summary statistics). In both HCMST surveys, subjects were asked an open-ended question, "Please write the story of how you and [partner name] first met and got to know one another, and be sure to describe 'how' and 'where' you first met." Subjects who wrote too little were prompted several times to write more. There were 2,495 answers from subjects with heterosexual partners to the "how did you meet" in HCMST 2009 and an additional 2,997 from HCMST 2017, with no duplication of respondents between the two surveys. The HCMST surveys are the only nationally representative surveys that we know of that include open text questions about how couples met.

The "how did you meet" question is retrospective because the question can only be asked about relationships that have already formed. In HCMST 2009, the "how did you meet" question was asked only of subjects who were partnered at the time of the survey. In HCMST 2017, the "how did you meet" question was

Table 2. Couples who met online increasingly did so without third-person intermediaries

Role of others in online meeting	Survey year 2009	Survey year 2017
Previously strangers	81%	89.5%
Mediated by friend	11.2%	3.7%
Reconnected	7.8%	6.8%
Total	100%	100%
N	179	323
Median year of meeting	2005	2012
Test for independence		χ^2 = 10.6** on 2 degrees of freedom

Source: HCMST, 2009 and 2017. Heterosexual couples only. "Previously strangers" means that before online meeting, subject and partner did not know each other. "Mediated by friend" means subject and partner were brought together online by a friend or other third person. "Reconnected" means subject had known partner in the past and reconnected online. **$P < 0.01$.

asked of both partnered respondents and unpartnered respondents. Unpartnered respondents in HCMST 2017 were asked about their most recent past partner. Subjects were also asked when they first met the partner in question. The year of meeting forms the x axis of Fig. 1.

Codes for the open text answers to "how did you meet" were built up inductively and collaboratively by principal investigator M.J.R., R.J.T., Ariane Fisher, and Rachel Lindenberg in 2009. A coding rubric was developed and published along with data (https://data.stanford.edu/hcmst). In 2017, S.H. used the original rubric from 2009 to code the 2017 "how did you meet" text answers. S.H. also recoded a random subsample of 569 of the original 2009 stories so as to allow for measures of interrater reliability between the HCMST 2009 and HCMST 2017 coders. For the 9 categories of how couples met that are described in Fig. 1, κ values for interrater reliability ranged from a high of 0.98 for meeting online, to 0.89 for meeting through friends, to a low of 0.83 for meeting in a bar, restaurant, or public place. According to Landis and Koch (31), κ values of greater than 0.81 constitute nearly perfect agreement. We are confident, therefore, that the 2009 and 2017 stories were coded in a sufficiently similar way.

Answers to the "how did you meet" question were longer on average in 2009 (67 words) than in 2017 (37 words). The average total number of codes recorded (across the 9 codes we report on below) was 1.29 codes per story in 2009, and 1.21 codes per story in 2017.**

HCMST 2009 and 2017 were internet surveys, conducted by the survey firm GfK (formerly Knowledge Networks), using subjects who were regular survey subjects in an established panel. Subjects were recruited into the GfK panel by random digit dialing and by address-based sampling. Subjects who did not have Internet access at home were given Internet access and a device with which to answer regular surveys. The quality of representative Internet surveys such as the GfK panel has been shown to equal or exceed the quality of the best representative phone surveys (33, 34). Response rates were 71% in HCMST 2009 and 60% in HCMST 2017. Considering historical data on the rate at which subjects answered initial requests to join the GfK panel at some prior time, and the rate at which subjects completed their initial demographic surveys (35), the cumulative response rate is 13% for HCMST 2009 and 11% for HCMST 2017.†† Survey response rates have declined over time for GfK, as they have for other survey companies and all survey modes (37, 38).

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**For a comparison of how couples met in the 1970 to 2009 period, when separate information is available from both HCMST 2009 and HCMST 2017, see *SI Appendix*. We show a bias in the data against recollection of friendships from the past, a bias that is known in the literature on ego network generation (32). As our results show a sharp decline in meeting through friends in the most recent years, our results and the recall bias against the recollection of friends are in opposite directions.

††Cumulative response rate is a product of the recruitment rate of subjects into the panel years ago, and the rate at which these subjects completed an initial profile survey, multiplied by the completion rates of the HCMST surveys. See American Association of Public Opinion Research (36). An additional factor in the lower response rate of HCMST 2017 compared with HCMST 2009 is that HCMST 2009 was in the field for 4 wk, whereas HCMST 2017 was in the field for 2.5 wk.

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