Appendix of Supporting Information for

"Disintermediating Your Friends"

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with a new Figure S6

Table S1: Descriptive Statistics for heterosexual couples from HCMST 2009 and HCMST 2017

Unweighted sample sizes:	HCMST 2009	HCMST 2017	Both surveys combined
N of heterosexual couples	2,495	2,997	5,492
Year couple met median (min, max)	1994 (1934, 2009)	1996 (1939, 2017)	1995 (1934, 2017)
N of relationships current at time of survey	2,495	2,572	5,067
N of past relationships	N/A	425	425
Weighted percentages, with comparison tests between HCMST 2009 and HCMST 2017:			
% met through friends	36.4	28.6***	32.3
% met through family	18.2	15.0***	16.5
% met online	6.2	9.9***	8.2
mean age	45.9	48.6***	47.3
% respondents female	48.8	53.7***	51.3

Source: Data from HCMST 2009 and HCMST 2017

*** P<0.001; ** P<0.01; * P<0.05, two tailed tests

Table S1 above describes HCMST 2009 and HCMST 2017 datasets with descriptive statistics. Figure S1 below describes a lower bound estimate of the role of smart phone applications (phone apps) in the post-2010 rise in heterosexual couples meeting online.

The impact of the rise of smart phones:

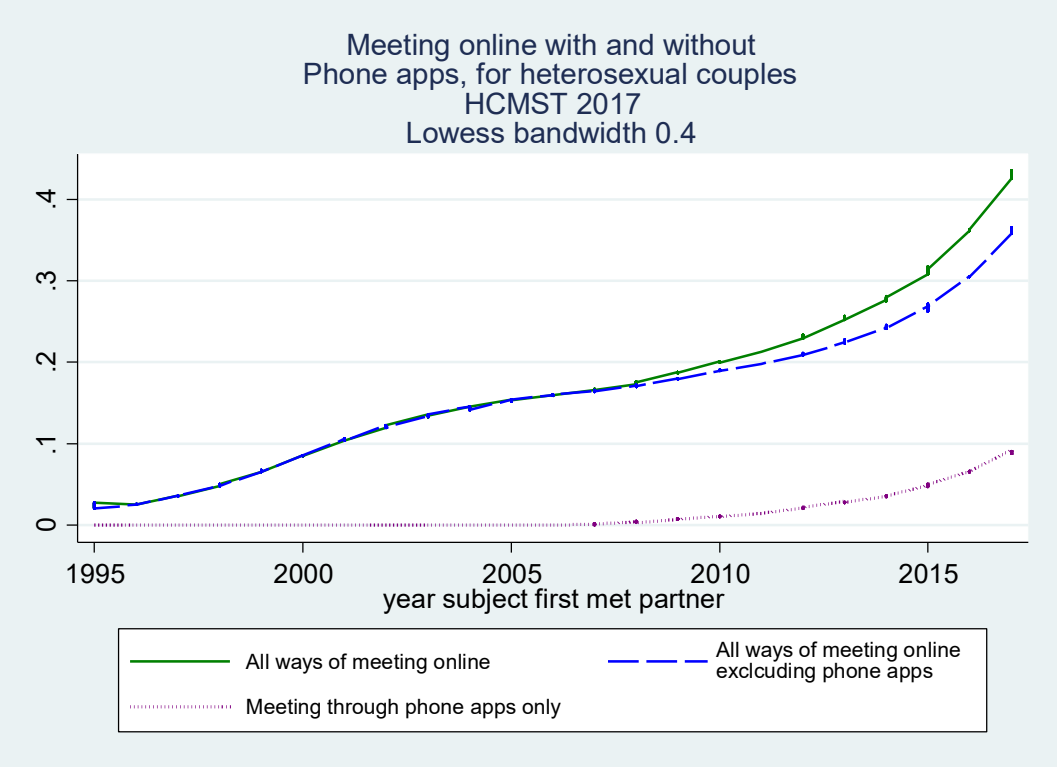

Figure S1

HCMST 2017 had a separate closed-ended question (Q32) about whether couples met using a phone app, distinct from the open-ended question about "how did you meet." The above Figure S1 shows a slightly higher final percentage for couples meeting online in 2017, because it relies on Lowess smoothing, whereas Figure 1 in the paper relies on a moving average for meeting online, which tends to treat endpoints of the series more conservatively. The 2005-2009 plateau is visible in Figure S1, as it is in Figure 1 in the paper, with different smoothing methods and in Figure S1 with the HCMST 2017 data exclusively. Figure S1 understates the impact of the phone dating apps substantially, because we code interaction with the legacy Internet dating sites (those formed before the smart phone boom) as *not* meeting through phone apps, even though the legacy Internet dating sites all developed phone app versions, and anecdotal evidence suggests that mobile logins eclipsed PC logins to the legacy dating sites well before 2017 (1). We do not have a way in HCMST to distinguish between mobile users and PC users of legacy online dating platforms like Match.com, so we categorize them as not having met through the phone app.

On the consistency of HCMST 2009 and HCMST 2017:

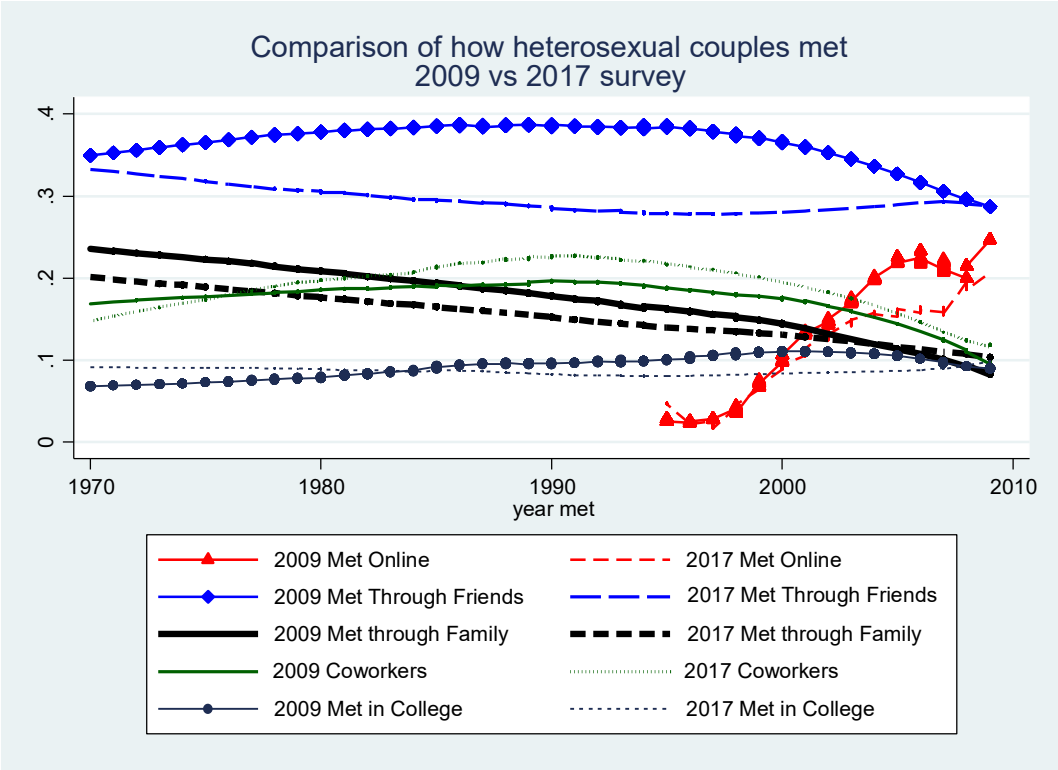

Figure S2

Figure S2 shows that for all categories except meeting through friends (for 1980-2000), the 2009 and 2017 surveys yield consistent results. Why does the more recent HCMST 2017 show a lower rate of meeting through friends in the 1980s and 1990s than the HCMST 2009? HCMST 2009 has a higher estimate of couples meeting through friends, 37% to 29%, with the two surveys converging by 2009 at about 28%. The data show that reporting on the intermediation of friends declines with the length of time between the meeting and the survey, a difference we also found in comparing HCMST 2009 to the National Health and Social Life Survey of 1992 (2; Table 4).

Our analyses showed that the more time had passed between when the couple met and the survey, the less likely the survey respondent was to mention friends as the way they met their partner. We believe the answer is recall bias. Recall bias against naming friends as the way couples met arises because friendships themselves are not as stable a category as family, school, and coworkers. A person who was your friend 20 years ago might not be your friend today, and recall bias might lead one to describe that person (in retrospect) as something other than a friend. Even if one changes jobs, the former coworkers remain fixed in one's mind as the former coworkers. Friends are a uniquely fragile category, subject to post-hoc reassessment. The literature on ego network generation in surveys recognizes the erosion over time in identifying friend networks, but the time scale studied in the literature is usually shorter than the decade time scale that may be at work here (3).

Table S1 shows that the longer the time between when the couple first met and when the survey was fielded, the less likely were subjects to describe friends as having played a role introducing the couple.

Table S2: Log odds ratio coefficients predicting met through friends in HCMST 2009 and 2017 from logistic regression:

Predictor	Coefficient	Z-score
Year met after 1995	-0.05	-6.54***
Year met squared	-0.0004	-4.18***
Years between first meeting and survey	**-0.038**	**-5.09*** **
Respondent female	0.14	2.44*
Constant	-0.06	-0.46

Source: HCMST 2009 and HCMST 2017. n=5421

* P<0.05; *** P<0.001, two tailed tests

Remembering the past diminishes the role of friends, which should appear to make friends more common in the most recently formed relationships. But the data show the opposite trend: meeting through friends appears much less common in the present than in the past. The potential recall bias is therefore in a conservative direction, and we do not believe it undermines our results.

Controlling for age at meeting, and subject gender:

Table S3 below replicates Table 1 in the paper, with additional controls for respondent gender and respondent's age when they met their partner.

Table S3: Changes in How Heterosexual Couples Met in the Internet era

How couple met	1995	2017	Z-score		Z-score with additional controls
Online	2%	39%	23.43	***	21.23***
Through Friends	33%	20%	-5.02	***	-2.86**
Through Family	15%	7%	-8.47	***	-7.18***
Through or as coworkers	19%	11%	-5.16	***	-6.48***
In a bar/restaurant	19%	27%	2.38	*	-0.38
In Primary or Secondary school	10%	5%	-6.62	***	1.12
In church	7%	4%	-2.52	*	-1.56
Through or as neighbors	8%	3%	-4.54	***	-3.55***
In college	9%	4%	-1.17		2.43*

Source: How Couples Meet and Stay Together 2009 and 2017 waves, heterosexual couples only, N=5421.

* P<0.05; ** P<0.01; *** P<0.001, two tailed tests

Z-scores represent tests of whether the log odds of the probability of each way of meeting has a slope significantly different from zero, from 1995 to 2017, through separate logistic regressions, taking all years of meeting into account. The 1995 and 2017 columns are point values for the observed probabilities of how couples met at the beginning and end of the 1995-2017 period. Additional controls refer to respondent gender and respondent's age when respondent first met partner.

Results are robust to different definitions of couple:

We show below, in figures S3, S4, and S5, that the definition of couple does not affect the substantive trend analysis of how heterosexual couples have met over time.

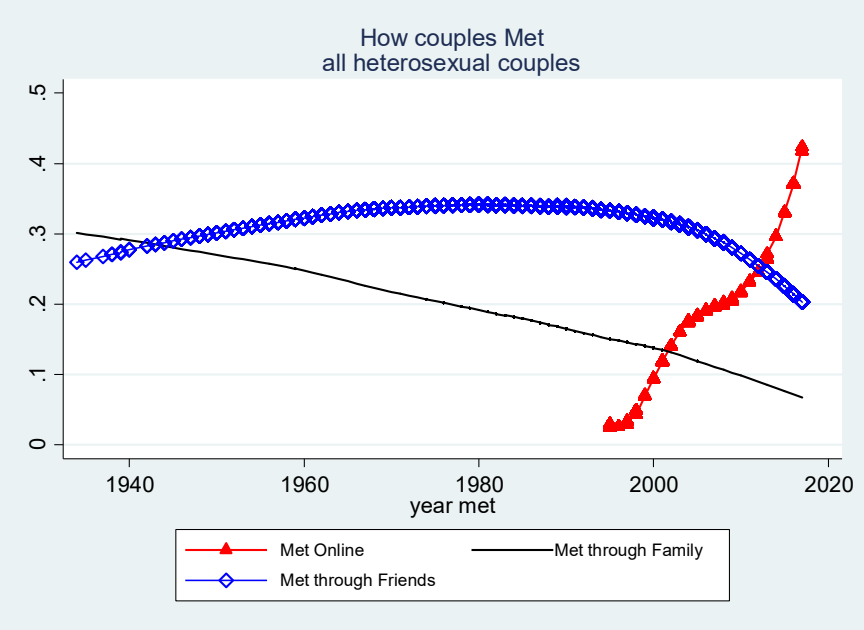

Figure S3

Source: HCMST 2009 and HCMST 2017. Data smoothed by Lowess regressions, bandwidth 0.8 for friends and family, bandwidth 0.4 for met online. N=5,492

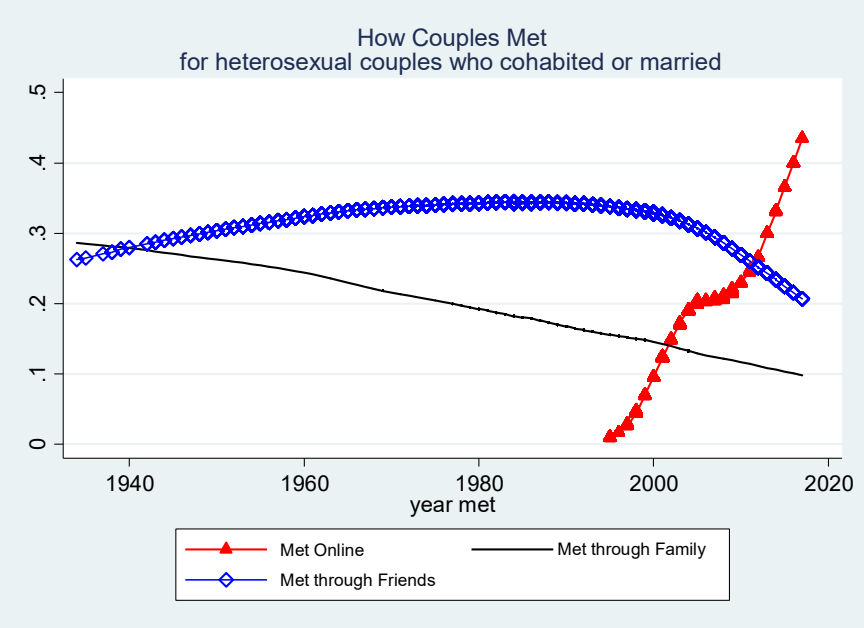

Figure S4

Source: HCMST 2009 and HCMST 2017. Data smoothed by Lowess regressions, bandwidth 0.8 for friends and family, bandwidth 0.4 for met online. N=4,685

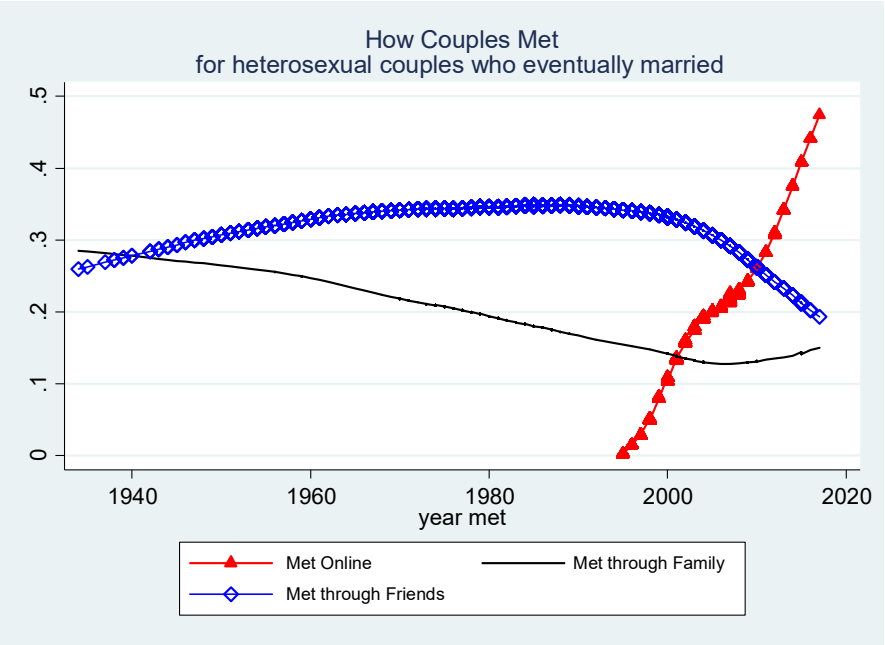

Figure S5

Source: HCMST 2009 and HCMST 2017. Data smoothed by Lowess regressions, bandwidth 0.8 for friends and family, bandwidth 0.4 for met online. N=3,987

On breakup rates and couple dissolution bias:

If couple dissolution rates were dependent on how couples met, then the retrospective HCMST data on how couples met would be biased. Using the longitudinal follow-ups from HCMST 2009 we found no relationship between couple longevity and how couples met (2, 4). The HCMST 2017 data have information on past relationships for subjects who did not have a current relationship. We examined the HCMST 2017 past relationships with survival analysis tools to look for evidence of association between couple breakup and how couples met, but we found no such evidence. The hazard ratios of breakup based on how couples met were all insignificantly different from 1, see Table S4 below.

Table S4: Hazard ratios of couple breakup with confidence intervals, from Cox regression

Predictor	Hazard Ratio	95% CI
Met Online	1.00	[0.70,1.40]
Met through family	0.80	[0.54,1.16]
Met through friend	0.91	[0.70, 1.18]
Ever Married	0.12***	[0.08, 0.17]
Ever Lived Together	0.21***	[0.16,0.28]

Source: HCMST 2017. n=2889 couples, with 309 breakups with non-missing data. Additional controls: decade of meeting. *** P<0.001, two tailed tests

On the declining role of personal intermediation for couples who meet online

We show in Table 2 in the paper that, among heterosexual couples who met online, the percentage who met perfect strangers increased and the percentage who met through intermediation of a third person decreased between the 2009 and the 2017 surveys. Here we show that, taking both surveys together, among those who met online, the chance of meeting someone who was a perfect stranger increased significantly over time.

Table S5: The Rise of relationships with perfect strangers among heterosexuals who met their partner online, from logistic regression

Predictor	Coefficient	Z-score	Sig	95% CI
Yearly change in log odds of meeting a perfect stranger	0.064	4.61	***	[0.037, 0.091]

Source: HCMST 2009 and 2017. n=543, heterosexual couples who met online, online meeting based on q24 and q32. Yearly change is yearly change since 1995, based on year couple met. *** P<0.001, two tailed tests.

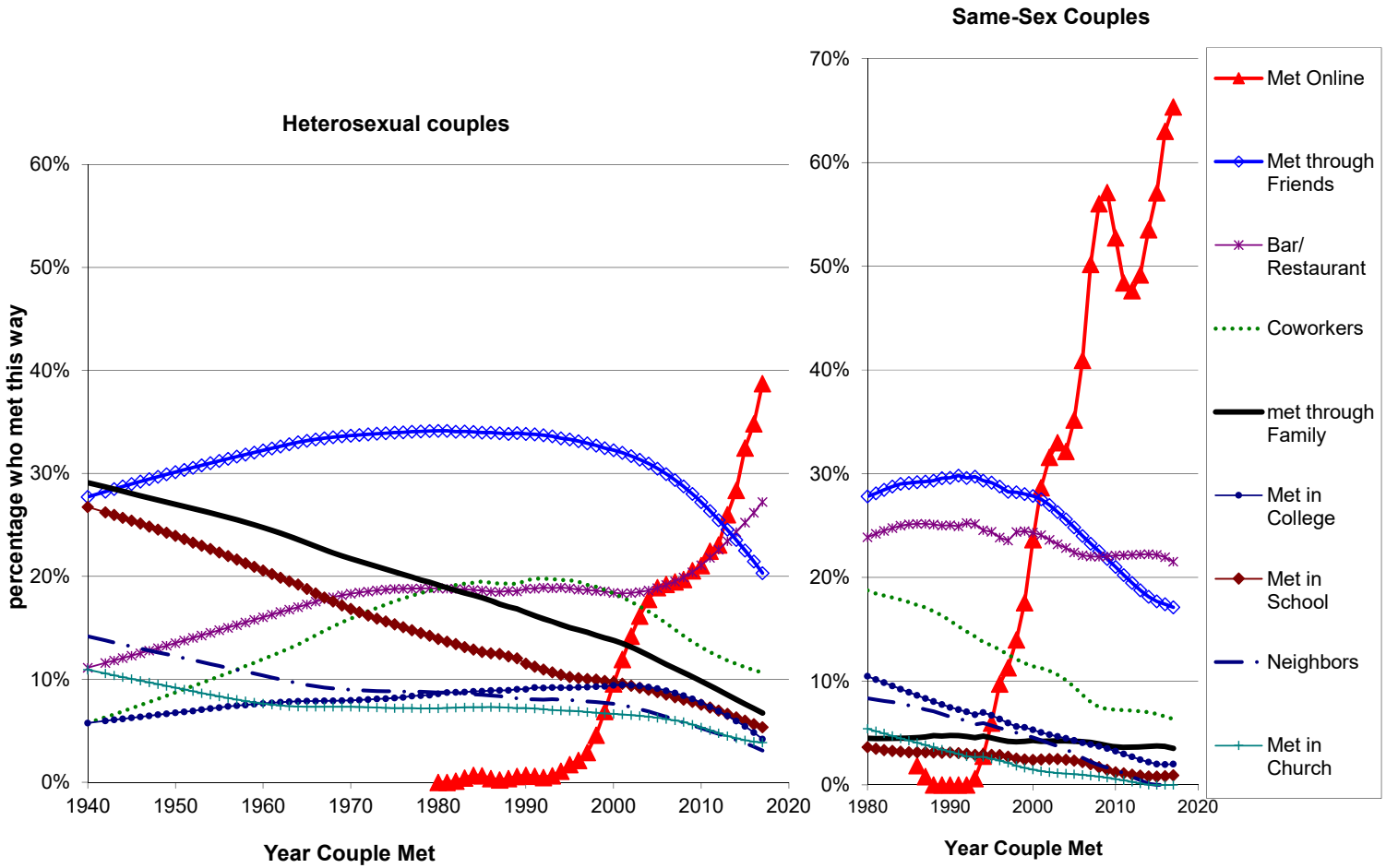

Figure S6: A comparison of how couples met for heterosexual and same-sex couples

Source: HCMST 2009 and HCMST 2017 data, smoothed by unweighted lowess regressions and for meeting online, smoothed by 5 year moving average. The left panel is the same as Figure 1 from the paper, N=5442. For the same-sex couples, N=760. Self-identified LGB people are oversampled in both HCMST 2009 and HCMST 2017.

References:

1. De Lacey M (2013) Internet Dating Boss admits most of the women on his site 'looking for no-strings sex' are actually Men. The Daily Mail, May 22.
2. Rosenfeld MJ & Thomas RJ (2012) Searching for a Mate: The Rise of the Internet as a Social Intermediary. *American Sociological Review* 77(4):523-547.
3. Bell DC, Belli-McQueen B, & Haider A (2007) Partner naming and forgetting: Recall of network members. *Social Networks* 29:279-299.
4. Rosenfeld MJ (2017) Marriage, Choice and Couplehood in the Age of the Internet. *Sociological Science* 4:490-510.