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Abstract:

I employ a new longitudinal dataset, the How Couples Meet and Stay Together surveys, *N*=3009, to generate the first nationally representative comparison of same-sex couple stability and heterosexual couple stability in the US. I measure the association between marriage (by several definitions of marriage) and couple longevity for same-sex couples in the US. Reports of same-sex relationship instability in the past were due in part to the low rate of marriages among same-sex couples. After controlling for marriage and marriage-like commitments, the break-up rate for same-sex couples is comparable to (and not statistically distinguishable from) the break-up rate for heterosexual couples. I find that same-sex couples who had a marriage-like commitment had stable unions regardless of government recognition. I explore a variety of predictors of relationship dissolution, for heterosexual and for same-sex couples.

Key words:, Marriage; Social Trends; Gay, Lesbian, Bisexual

Among heterosexual couples, marriage has long been associated with couple stability. Because same-sex couples have only recently won government recognition for their marriages in the US and elsewhere, less is known about marital stability among same-sex couples. Family science has much to learn about marital patterns among same-sex couples, and the marital patterns of same-sex couples may offer insights about the changing nature of marriage and couple stability in general. I use the How Couples Meet and Stay Together (HCMST) data to compare couple dissolution rates for heterosexual and same-sex couples for the first time with nationally representative longitudinal data from the US.

Previous research on same-sex couple relationship longevity

Research on same-sex couple longevity using data that predated the era of same-sex marriage generally showed that same-sex couples were less stable than heterosexual couples. Blumstein and Schwartz's (1983) pioneering work *American Couples* suggested that heterosexual married couples were the least likely type of couple to have broken up after 18 months, followed by heterosexual cohabiting couples and gay male couples, while lesbian couples had the highest break-up rate of all couple types (Blumstein and Schwartz 1983). Kurdek (1998, 2004) found that gay male cohabiting couples and lesbian cohabiting couples had similar rates of break-up, both higher than the break-up rate of heterosexual married couples. Balsam et al (2008) followed a cohort of same-sex couples who obtained civil unions in Vermont, matched to comparison groups. Over 3 years, the same-sex couples without civil unions had the highest rate of break-up (9.3%), followed by same-sex couples with civil unions (3.8%) and heterosexual married couples (2.7%). Balsam et al's study is one important demonstration of the association between relationship formalization and couple stability for same-sex couples. Despite the

importance of their work on same-sex couple longevity in the US, neither Kurdek nor Balsam et al nor Blumstein and Schwartz had the beneficial advantages of nationally representative data.

At least four studies have used population-based samples to analyze same-sex couple longevity in Europe. Andersson et al (2006) found that gay male couples with registered partnerships in the 1990s in Sweden had risk of break-up similar to heterosexual married couples, whereas lesbian couples with registered partnerships had rates of break-up two to three times higher than the break-up rate of heterosexual married couples. Kalmijn et al (2007) found same-sex cohabiting couples had odds of break-up 3 times higher than heterosexual cohabiting couples and 11 times higher than heterosexual married couples. Lau (2012) used retrospective cohabiting relationship rosters from two British birth cohort surveys (birth cohorts 1958 and 1970) and showed that same sex couples had substantially higher odds of break-up than heterosexual couples. After Britain established civil partnerships for same-sex couples in 2005, the British Office of National Statistics studied civil partnerships and heterosexual marriages for 2005-2010. Ross et al (2011) found that the break-up rate of same-sex civil partnerships in Britain was *lower* than the break-up rate of heterosexual marriages formed during the same period. In the US, there has been an absence of nationally representative longitudinal data on same-sex relationships. In this paper I deploy the first nationally representative longitudinal study of same-sex couples, and I show that, controlling for marriage-like commitments, same-sex couples and heterosexual couples have similar levels of couple stability.

Marriage and marriage-like unions defined

The definition of marriage for heterosexual couples in the US is straightforward. Marriage is recognized for heterosexual couples in all 50 states and by the federal government,

and heterosexual marriage includes an implicit contract with roots running from American case law to pre-colonial English common law (Weitzman 1981). The long tradition of heterosexual marriage ensures that friends and family understand the contract that binds married couples. Except for bans against polygamy, child marriage, and consanguineal marriage, heterosexual couples face few bars to marriage in the US. For consistency with same-sex couples, I define "marriage-like" relationships among heterosexuals to include domestic partnerships, civil unions, and other formal arrangements that include a strong interpersonal commitment, but whose inherent legal obligations are different from the obligations of marriage (Poortman and Mills 2012). According to the HCMST data, 96% of heterosexuals with "marriage or marriage-like" relationships are legally married, and an additional 4% have legal domestic partnerships or other marriage-like arrangements.

For same-sex couples, the definition of marriage and marriage-like relationships is more complicated. One group of same-sex couples in the US in 2009 had marriages that were recognized by their state of residence, but not by the US federal government. The four waves of HCMST data that are studied here (covering years 2009-2012) all precede the US Supreme Court decision in US v Windsor (2013) that overturned section 3 of the Defense Of Marriage Act (DOMA, see Koppelman 2002). The overturning of DOMA led to US federal recognition of some same-sex marriages for the first time in 2013. A second group of same-sex couples had domestic partnerships or civil unions offered either by their state or by a specific municipality (in municipalities such as Austin, Texas; Atlanta, Georgia; or Madison, Wisconsin). Municipal domestic partnerships often have had no legal power outside of the municipality itself. A third group of same-sex couples had obtained a marriage or domestic partnership in one location, but were living in a state that did not recognize their marriage or domestic partnership. Last, a

substantial number of same-sex couples had made marriage-type interpersonal commitments
(often with a wedding or commitment ceremony, see Lewin 1998, Hull 2006, Reczek et al. 2009)
without having the opportunity to legally formalize their commitment; these couples generally
consider themselves to be married, but the law in their state of residence would have considered
them to be unmarried.

Because same-sex couples in the US who consider themselves to be married have
relationships with a wide range of legal and governmental recognition, the relevant question in
this study of couple longevity is which types of same-sex marriages are most stable. The simple
answer is that, to the extent that the HCMST data are able to determine, all same-sex marriages
and marriage-like relationships, regardless of governmental recognition, have similar couple
longevity. Therefore, in this paper I use the phrase "married or marriage-like relationships,"
including marriages that are only recognized at the level of the couple and their friends, without
governmental recognition. I privilege the interpersonal definition of marriage over the legal
definition of marriage because the interpersonal definition of "marriage and marriage-like
relationships" is the definition most relevant to the longevity of same-sex couples in the US.

The Association between Marriage and Couple Stability:

The implicit obligation of marriage and the long term commitment implied by the
marriage contract is one key reason why marriage advocates argue that marriage keeps couples
together and why marriage is associated with greater relationship satisfaction, even in an era of
relatively easy no-fault divorce (Waite and Gallagher 2000). According to Waite and Gallagher's
argument, the public, formal, and binding nature of marriage makes it easier for couples to make
couple-specific, or family-specific investments, such as buying a house together, or jointly

investing in the education of their children. Waite and Gallagher argue that couple-specific investments bind couples together, and raise the barriers to exit from marriage.

In addition to institutionalizing roles within the romantic union and raising barriers to exit, marriage and formal marriage-like commitments generally improve the way a couple is perceived by others (but see also Ocobock 2013). Same-sex couples in civil unions have found, sometimes to their surprise, that their relationship has been strengthened by the recognition and legitimacy that the civil union bestowed upon them (Rothblum et al. 2011).

Other Predictors of Couple Longevity:

The literature on relationship longevity and dissolution (which is mostly a literature on heterosexual marriage and heterosexual divorce) has repeatedly shown that longer marital duration is associated with lower odds of divorce during any subsequent exposure to the risk of divorce (Brines and Joyner 1999, South and Spitze 1986). Couples that have been together for a period of time have already survived risks of break-up during that period. Additionally, the longer couples have been making couple-specific investments, the more costly a break-up will be. There, is, of course, an important selection effect: the least compatible couples do not survive past the first year or two.

Some additional factors that have been cited as affecting marital longevity in previous research include: race (Brines and Joyner 1999, Copen et al. 2012, Cherlin 1992); intermarriage along racial or ethnic lines (Bramlett and Mosher 2002); household income (Bramlett and Mosher 2002); gender role specialization (Becker 1991, Parsons 1949, Kalmijn et al. 2007); the presence of children in the household (South and Spitze 1986); the educational level of the romantic partners (South and Spitze 1986); couple formation early in the life course

(Oppenheimer 1988, South and Spitze 1986); and parental support and approval of the couple (Bott 1957, Sprecher and Felmlee 1992). In my analyses below predicting couple break-up, I control for all of these factors plus self-rated relationship quality. While all the additional predictors of couple longevity have some theoretical importance, none of these additional predictors (except for relationship quality and household income) prove to be significant predictors of couple longevity in the analyses below, after couple longevity and marriage (and marriage-like relationships) are taken into account.

Hypotheses:

As previous studies have found same-sex couples to be less stable than heterosexual couples:

Hypothesis 1) Same-sex couples will be found to have less relationship stability than heterosexual couples, on average.

Marriage and marriage-like commitments are less common among same-sex couples than among heterosexual couples. The higher rate of marriage among heterosexual couples may entirely explain the couple stability advantage of heterosexual couples.

Hypothesis 2) Same-sex couples and heterosexual couples will be found to have similar levels of relationship stability once marriage is controlled for.

If marriage explains the relationship stability advantage of heterosexual couples, we would expect that:

Hypothesis 3) Marriage has a similar positive association with couple longevity for same-sex couples and for heterosexual couples.

METHOD

The How Couples Meet and Stay Together surveys (HCMST, Rosenfeld et al. 2011, Rosenfeld et al. 2014) started with a nationally representative survey of 3,009 couples in 2009, and included longitudinal follow-up with the same couples covering calendar years 2009-2012. The HCMST oversampled same-sex couples, including 471 same-sex couples out of 3,009 total couples.

HCMST has several advantages over previously available data. First, HCMST are nationally representative of US adults. Second, the HCMST data include both formal and informal unions, both coresident and noncoresident couples, and both same-sex and heterosexual couples. Third, HCMST has information not only about gender of both partners in a couple, but HCMST also included a direct question about whether a couple is a same-sex couple, and questions about sexual identity and sexual attraction by gender, to allow more accurate identification of same-sex couples than is possible from currently available US governmental data sources (Black et al. 2007). HCMST was designed to be as free as possible from the problem of classification error in identification of same-sex couples. Fourth, follow-up waves of HCMST asked about partners identified in wave 1 by first name, to ensure that the same relationships were followed over time. Fifth, because "marriage" does not have a single clear definition for same-sex couples in the US, HCMST prompted respondents to "Answer 'yes' (to the marriage question S1) even if the government may not recognize your marriage." Respondents with same-sex partners in HCMST who reported that they were married or had a domestic partnership were asked when and where the wedding or domestic partnership was celebrated.

Limitations include the modest sample size and therefore modest statistical power of HCMST, along with the inability to control for individual selection into marriage. The issue of selection bias into marriage is a general limitation common to studies of relationships and marriage. Couples are not randomized into marriage; rather, couples choose marriage for their own (unobserved) reasons. HCMST includes respondent's assessment of relationship quality at wave 1, so that the bias inherent in the measure of the association between marriage and couple longevity can be attenuated. The statistical power for comparisons of heterosexual couples to same-sex couples is improved by the oversample of same-sex couples in HCSMT; power calculations are provided below.

HCMST is a representative sample of existing relationships at one moment in time (at wave 1 in 2009), rather than a roster of previous relationships. HCMST did not collect histories of prior relationships, because in-depth interview data collected to supplement the HCMST suggested that survey respondents provide more accurate data about the current relationship than about prior relationships. Every partnered respondent in HCMST began at wave 1 with relationship duration of greater than zero, though care was taken to ask for and include even the newest relationships. Respondents who reported not having a spouse, or a girlfriend, or a boyfriend, were asked (question S2) whether they had "a romantic partner who is not yet a sexual partner." Only respondents who affirmed that "No, I am single, with no boyfriend, no girlfriend, and no romantic or sexual partner" were considered to be without partners. Of the 3,009 partnered respondents, 29 respondents had relationships that had started within a month of the wave 1 main survey. An additional 53 respondents reported that their relationships were 1-3 months old.

The HCMST wave 1 survey was an Internet survey, and waves 2-4 were Internet and phone surveys, implemented by Knowledge Networks/GfK (KN). Unlike most Internet surveys whose participants are composed of a self-selected or opt-in sample of volunteers, the KN panel participants were initially recruited into the panel through a nationally representative random digit dialing (RDD) telephone survey, so the KN sample is nationally representative (Chang and Krosnick 2009, Rosenfeld and Thomas 2012). Seventy one percent of KN panelists contacted for the HCMST survey consented to participate. Including the initial RDD phone contact and agreement to join the panel (participation rate 32.6%), and the respondents' completion of the initial demographic survey (56.8% completion), the composite overall response rate for the wave 1 HCMST survey is a much lower .71*.326*.568= 13% (Callegaro and DiSogra 2008). Despite the lower overall response rate of KN surveys compared to RDD surveys, the quality of data derived from the KN panel has been shown to equal or exceed the quality of data derived from industry standard RDD surveys (Fricker et al. 2005, Chang and Krosnick 2009).

Among subjects eligible for follow-up, the response rate was 85% at wave 2, 73% at wave 3, and 60% at wave 4. Across the 3 follow-up waves, 89% of the originally eligible respondents were followed-up at least once. The total number of couple-years of follow-up in 2009-2012 was 8,172. The key determinants of response to the HCMST follow-up surveys were not any factor that predicts couple longevity (such as relationship duration or marriage), but whether the respondent was still in the KN panel at the time of the follow-up survey. Respondents still in the KN panel (the majority of subjects) were reached online and had response rates of 93% across 3 follow-up surveys. Respondents who had retired or withdrawn from the KN panel had a much lower response rate (34%) across three follow-up surveys. The main determinant of response rate in the follow-up surveys of HCMST is therefore whether the

subject remained in the KN panel, which is a variable that is not correlated with relationship dissolution, and therefore does not bias the analyses. Heckman (1979) two stage selection models (available from the author) show that the selection into response and non-response to the follow-up surveys does not bias the analysis of the predictors of break-up in the HCMST data.

For the event history models predicting couple dissolution, HCMST data include time-varying measures of respondent education, coresidence with children, marital status, coresidence with partner, and household income. Time invariant variables that were measured only at wave 1 include respondents' reported relationship satisfaction, the approval of respondents' parents, and variables that rely on attributes of the partner such as partner race and education.

In the multivariate analyses, I perform unweighted discrete time event history logistic regressions predicting the yearly rate of break-up (Yamaguchi 1991). Because of the specific way the weights in HCSMT were designed, unweighted regression are recommended when same-sex couples are to be compared to heterosexual couples, as they are here (Knowledge Networks and Rosenfeld 2012). Independent variable predictors of the weights are included in the models in order to reduce the potential bias of deriving coefficients from the unweighted data (Winship and Radbill 1994). Following Winship and Radbill (1994), I interact the weight variable (weight2) with all the predictors in each regression model to test (using a Wald test) whether the lack of weights biases the regressions. The discrete time event history model can be described as:

$$Ln\left(\frac{P_i}{1-P_i}\right) = a_i + \sum_k b_k X_k$$

Where P_i is each couple's predicted probability of experiencing break-up during period i, meaning P_i is the probability of each couple breaking up in their ith year together, conditional on

having started the year as a couple (and therefore having survived without breaking up for all the years before i). The X_k are covariates, some of which are time varying and some of which are time invariant. In the HCMST study, the transition from couplehood to break-up is a one-way transition; respondents were dropped from subsequent follow-up surveys in HCMST after having reported divorce or break-up with the partner identified in wave 1.

RESULTS

Table 1 presents unweighted summary statistics for the HCMST data. There are several significant differences between heterosexual and same-sex couples. Among these significant differences, the most relevant for couple stability is the difference in marriage: 74.8% of heterosexual couples were married or had marriage-like relationships at wave 1, compared to 35% of same-sex couples who were in marriages or marriage-like relationships. Table 1 shows that heterosexual couples have longer relationship longevity (18.7 years compared to 12.6 years) at wave 1, and a lower mean yearly break-up rate (4.9% compared to 8.3%). I show below that the difference in break-up rate between heterosexual couples and same-sex couples is explained by the higher rate of marriage among heterosexual couples.

Table 1 documents other significant differences between heterosexual couples and same-sex couples that are consistent with census data for coresident couples, including fewer children in the households of same-sex couples and higher educational attainment of respondents with same-sex partners (Rosenfeld 2010, U.S. Bureau of the Census 2003). Same-sex couples and heterosexual couples have a similar rate of coresidence. Cohabiting heterosexual couples advance to marriage more quickly and regularly than do cohabiting same-sex couples. Self-reported relationship quality, which is an important predictor of relationship stability, does not

vary significantly between heterosexual and same-sex couples, or between lesbian couples and gay male couples.

The power of HCMST to reject null hypotheses of differences in break-up between heterosexual and same-sex couples is as follows. Heterosexual couples regardless of marital status have a break-up rate of 4.9% per year, and the power would be 99.9%, or near certainty to reject a null hypothesis of no difference in break-up rates between same-sex couples and heterosexual couples if same-sex couples would theoretically be twice as likely to break up as heterosexuals (assuming an alpha of 0.05 and two-tailed tests). Among married couples only, HCMST has lower power to distinguish heterosexual from same-sex married break-up rates, because of the limited number of same-sex married couples. Starting with a heterosexual married break-up rate of 1.5% per year, and examining only the married couples, the power would be 52% to reject a null hypothesis of no difference if same-sex married couples were twice as likely to break up, and the power would be 91% to reject a null hypothesis if same-sex couples were 3 times more likely to break up (assuming an alpha of 0.05 and two-tailed tests).

In comparing lesbian couples to gay male couples, Table 1 shows there are a few significant differences. First, and consistent with reports from state marriage and domestic partner registries (Gates et al. 2008, Carpenter and Gates 2008), lesbian couples in the US in 2009 had a higher rate of marriage or marriage-like relationships compared to gay male couples, 41% compared to 29%. Lesbian couples were also more likely to be coresident than gay male couples, 82% compared to 73%.

Many different definitions of marriage are possible for same-sex couples in the US. For the purposes of studying couple longevity, the specific association between marriage and break-up rates is relevant. Table 1 shows that among the 542 couple-years of exposure to the risk of

break-up among same-sex couples who were married or who had any type of marriage-like union, there were only 14 break-ups, for an annual break-up rate of 2.6%. The fact that only 14 break-ups were recorded among same-sex couples who were married or who had marriage-like commitments means that the HCMST data have limited power to distinguish between the break-up rates of same-sex marriage-like unions with different degrees of governmental recognition.

The types of formal unions and rates of break-up for same-sex couples are as follows: there were 212 years of exposure in 2009-2012 for couples with state or local domestic partnerships and who lived in the state where the domestic partnership was recognized, with 8 break-ups for an annual break-up rate of 3.8%. There were 66 years of exposure for same-sex couples with legal marriages who lived in the state where the marriage was recognized, with 1 break-up, for a break-up rate of 1.5%. For same-sex couples who considered themselves married but had no state recognition (either because their formal union was celebrated in a state other than their state of residence, or because they never had had a state sanctioned formal union) there were 264 years of exposure to the risk of break-up, with 5 break-ups for a break-up rate of 1.9%.

Given the low rate of break-up and the small number of break-ups across all types of marriage-like unions for same-sex couples in HCMST, the three sub-types of marriage-like unions cannot be distinguished statistically in HCMST. The test for differences in the break-up rate across the 3 types of marriage-like unions for same-sex couples yields a chisquare test of 1.95 on 2 degrees of freedom, with a tail P value of 38%, thus failing to reject the null hypothesis of no difference between the subgroups. In contrast to the similarity of break-up rates across the types of marriage-like unions for same-sex couples, the difference in break-up rates between married and unmarried couples is stark. Same-sex couples who were married or who had marriage-like unions had a much lower break-up rate of 2.6% compared to the 12.8% annual

break-up rate of same-sex couples without marriage-like unions, and this difference is highly

significant, with a chisquare value of 47.2 on 1 degree of freedom, corresponding to a P value of

6.4×10^{-12}. The main division that predicts break-up rate for same-sex couples is the division

between "married and marriage-like" relationships on the one hand versus the unmarried couples

on the other hand. In subsequent analyses I combine the marriages and marriage-like

relationships into one category, and contrast them with the unmarried couples.

[Figure 1 Here]

Break-Up Rate as a Function of Couple Longevity and Marriage

Relationship duration is one of the most important predictors of break-up. In simple

terms, the longer a couple has already been together, the less likely they are to break up in any

given time period. Figure 1 presents the smoothed (by fractional polynomial smoothing, see

Sauerbrei and Royston 1999) annual probability of break-up (the proportion of couples together

at the beginning of their ith year as a couple who have broken up by the end of the ith year)

where i is the number of years since the relationship began, for heterosexual and same-sex

couples, married (and marriage-like unions) contrasted with unmarried couples.

In order to show the married and unmarried in the same figure, Figure 1 has an X-axis of

relationship duration, rather than marital duration. Note that while there are heterosexual married

couples in HCMST whose relationship duration is shorter than 1 year, the curve in Figure 1 for

the annual break-up rate of married same-sex couples starts at relationship duration of five years.

There is an insufficient sample of same-sex married couples (or couples with marriage-like

commitments) with relationship duration of less than 5 years in HCMST to accurately estimate their break-up rate. Same-sex couples who marry tend to marry later in their relationships, and same-sex couples are less likely to be married than heterosexual couples.

The graphs of smoothed annual rates of break-up (smoothed by logistic regressions on powers of relationship longevity) show that marriage is fundamentally important to couple longevity. Figure 1 shows that the annual break-up rate for married same-sex couples is low, falling quickly from about 8% for same-sex couples who have been together for 5 years, to less than 1% for married same-sex couples who have been together for more than 20 years. At couple duration of 20 years, the smoothed break-up rate of married same-sex couples drops to essentially zero. Same-sex married couples with couple longevity of greater than 20 years had 176 couple-years of exposure to the risk of break-up in the HCMST data in the 2009-2012 period, with zero break-ups.

Except for the rare relationships that start with marriage (such as arranged marriages that occur in some immigrant communities in the US), all romantic relationships in the modern US start as unmarried relationships. Of the unmarried couples whose relationship duration was shorter than 2 months at wave 1, 60% had broken up by the next yearly wave of the survey. The longer a couple stays together, the more hurdles they cross together, the more time and effort they have jointly invested into the relationship, the more bound together they are (Waite and Gallagher 2000). As couples build relationship-specific capital and make social connections as a couple rather than as individuals, it becomes more difficult to exit the relationship. Couples who survive the initial risks of break-up travel together down the curve of lower break-up risk and more commitment over time.

Over the course of 20 years of couplehood, unmarried heterosexual couples drive their annual break-up rate down from nearly 60% to about 10% in the regression smoothed graph of Figure 1. After 20 years of relationship duration, the annual break-up rate of unmarried heterosexuals declines to 10%, but subsequent years of relationship duration do not improve this break-up rate any further. Once heterosexuals make the transition from unmarried to married, they dramatically reduce their annual break up rate from as low as 10% to 2%, and then 1% as relationship duration increases.

Figure 1 demonstrates the importance of marriage and relationship duration as key predictors of couple longevity. When relationship duration and marriage are controlled for, as they are in Figure 1, same-sex couples and heterosexual couples have similar couple survival rates. Figure 1 therefore supports Hypotheses 2 and 3, that marriage has a similar protective effect for both same-sex and heterosexual couples, and that controlling for predictors of couple longevity such as prior duration and marriage would diminish the apparent relationship longevity advantage of heterosexual over same-sex couples.

[Table 2 here]

Multivariate predictors of break-up:

Table 2 introduces results from a discrete time event history model, in logistic form. The models in Table 2 all include the terms that predict individual weight: age, age squared, metropolitan residence, having one's own Internet access at home, and recruitment source for Wave 1, in order to reduce the potential bias of using unweighted data in the regression (Winship

and Radbill 1994). Weighted regressions (available from the author), show similar substantive results.

Model 1 shows that, with no other controls accounted for, same-sex couples have significantly higher log odds of break up in any given period compared to heterosexuals, with a coefficient of 0.67 yielding an odds ratio of $e^{0.67}$=1.95. Controlling for no other factors other than the factors that predict the weights, same-sex couples were significantly more likely to break up than the heterosexual couples, confirming Hypothesis 1, and reconfirming the comparison of raw yearly break-up rates from Table 1.

Model 2 adds a single term, a dichotomous control for marriage or marriage-like unions (compared to unmarried couples). The control for marriage dramatically improves the fit of the model, yielding a chisquare test of 685.5-190.3=492.5 on 1 degree of freedom, a massive improvement in goodness of fit (associated with a p value of approximately 10^{-108}) because marriage is such an essential predictor of relationship stability, as Figure 1 above also showed. In Model 2, which does not yet control for couple longevity, the odds of break-up in any given period are $e^{-2.62}$=0.07 times as high for married couples compared to unmarried couples (meaning the odds of break-up are about 13 times higher for unmarried couples).

The other key finding from Model 2 is that once marriage (and marriage-like unions) are controlled for (as they are in Model 2), same-sex couples actually have a significantly lower rate of break-up compared to heterosexual couples. Table 1 showed that same-sex married couples had a slightly higher break-up rate than heterosexual married couples, but same-sex unmarried couples had a lower break-up rate than heterosexual unmarried couples. If same-sex couples had the same rate of marriage as heterosexual couples, Model 2 suggests that same-sex couples might

be more stable than heterosexual couples, though the advantage that same-sex couples appear to have in Model 2 is not robust to the inclusion of additional controls.

Model 3 introduces a dichotomous term for couple coresidence, which, not surprisingly, has a significant and strongly negative effect on log odds of break-up, along with two terms to fit the pattern of break-up by relationship duration: relationship duration, and relationship duration raised to the power of -0.5. The latter term helps to fit the part of the curve for unmarried couples with relationships shorter than 5 years, during which period the annual rate of break-up declines sharply (see Figure 1). Starting with Model 3, and continuing with the further controls in models 4-6, the coefficient for same-sex couples is not statistically significant, meaning same-sex couples have a break-up rate that cannot be distinguished from the break-up rate of heterosexual couples given each set of controls in models 3-6, which supports Hypothesis 2 (that same-sex couples and heterosexual couples would have similar rates of break-up once marriage was controlled for).

Model 4 adds a single term for the interaction between marriage and same-sex unions, and the term is decidedly insignificant (Z=0.089/0.36=0.25; two-tailed p=80%). Model 4 shows that (controlling for coresidence and relationship duration) marriage is associated with a similar increase in couple longevity for same-sex couples as for heterosexual couples, thus confirming Hypothesis 3. Model 5 adds respondent's self-reported relationship quality at wave 1 as a highly significant predictor. Each additional point on the 5 point relationship value scale reduces the predicted odds of break-up by a factor of $e^{-0.74}$=0.48. What is important about Model 5 is not the finding that higher self-rated relationship quality is associated with lower odds of break-up (which is not surprising), but rather the finding that controlling for relationship quality does nothing to diminish the association between marriage and couple longevity. In Model 3, before

relationship quality was controlled for, the coefficient for marriage was -1.21. In Model 5, after controlling for relationship quality, marriage has a coefficient of -1.23, indicating that marriage is associated with couple longevity across all levels of relationship quality. Using Model 5, and starting with the actual yearly break-up rate of 1.5% for married heterosexuals, the 95% confidence interval for annual break-up rate for married same-sex couples (holding constant all the other variables in Model 5) would be 1.2% to 2.7%.

Model 6 adds many of the variables that are supposed, according to various sociological theories, to have an important influence over relationship stability. Many supposedly important predictors of break-up turn out, in the HCMST data, to have limited or no predictive value after couple longevity, marriage, and relationship quality are taken into account. The factors which do *not* predict break-up (after other key factors are accounted for) include race, children in the household, parental approval, interraciality, equal earnings (though equal earnings have a different effect on same-sex and on heterosexual couples, see Weisshaar 2012), respondent's college degree, and couples whose relationship began when the respondent was a teenager. Higher household incomes are associated with slightly greater longevity, and long term unmarried heterosexual couples are more likely than other unmarried heterosexual couples to break up (as Figure 1 also showed).

Model 7 replicates Model 6, but divides the same-sex couples into two groups by gender. Model 7 shows that lesbian couples have a significantly higher rate of break-up compared to heterosexual couples, while gay male couples have a break-up rate that is not distinguishable from the break-up rate of heterosexual couples. The gap between the break-up rates of lesbian couples and gay male couples emerges after marriage and couple coresidence are controlled for,

however the gender divide in break-up rate among same-sex couples is not mediated by or explained by any other variables in HCMST.

DISCUSSION

In this paper I show that while same-sex couples in the US are more likely to break up than heterosexual couples (Hypothesis 1), the difference in couple longevity is explained by the lower rate of marriage among same-sex couples. Once marriage (and marriage-like unions) are controlled for, same-sex couples and heterosexual couples have statistically indistinguishable rates of break-up, confirming Hypothesis 2. Despite the fact that none of the same-sex couples in the US in the 2009-2012 period enjoyed the same legal benefits and federal recognition as heterosexual married couples (because of the Defense of Marriage Act of 1996), the association between marriage and couple stability was similar for same-sex couples and for heterosexual couples, confirming Hypothesis 3.

Same-sex married couples in HCMST data have similarly stable unions whether or not their marriages are recognized by the state, though sample size limitations limit the power to identify modest differences in break-up rate between, for instance, couples with municipal domestic partnerships (that provide few rights or benefits), and couples with state-recognized marriages. Although the stability associated with marriage appears not to depend on state recognition of the marriage, state recognition of same-sex marriage opens a pathway to higher marriage rates among same-sex couples. In the HCMST first wave survey of 2009, the percentage of same-sex couples who were married was 42% in states that recognized same-sex couples (in any way), compared to a 28% rate of marriage for same-sex couples who lived in

states that did not recognize formal unions for same-sex couples (and the difference in marriage rates is statistically significant).

Several factors that have been described in the sociological literature as important to couple longevity appear to not be significant predictors of couple longevity in HCMST in the multivariate context, including race, teen relationships, the presence of minor children, respondent education, and interraciality. The factors found to be insignificant may have had their effect mediated by marriage, or by relationship quality. Additionally, because HCMST is a survey of modest sample size, HCMST has less power to detect differences in break-up rate, especially among racial minorities, than would be found in a larger dataset of heterosexual couples such as the National Survey of Family Growth (Copen et al. 2012).

While lesbian couples and gay male couples have similar levels of couple stability in the HCMST data (see Table 1), lesbian couples are more likely than gay male couples to be married, and lesbian couples are more likely to be coresident. Controlling for marriage and coresidence, lesbian couples have significantly less stability than heterosexual couples or gay male couples (see Table 2). Other studies of same-sex couple longevity have reported a greater break-up rate of lesbian couples as compared to gay male couples (Andersson et al. 2006, Blumstein and Schwartz 1983, Ross et al. 2011), but the reasons for the gender gap in same-sex couple longevity are not clear.

Across all types of couples, couple stability appears to be primarily a function of the couple's own history, their relationship longevity, and their marital commitment. Longer duration of unmarried couplehood drives down the annual break-up rate, but only up to a point. Married couples are dramatically more likely to stay together than unmarried couples, at all levels of relationship quality and at all relationship durations. Despite the declining universality

of marriage in the US for heterosexual couples (Amato et al. 2007, Cherlin 2004), marriage is a

uniquely important predictor of couple stability, for both heterosexual and for same-sex couples.

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Table 1: Comparison of Heterosexual Couples, same-sex couples, married (including marriage-like relationships) and unmarried couples

	Hetero-sexual married couples	Hetero-sexual unmarried couples	All Hetero-sexual Couples	Same-sex married couples	Same-sex unmarried couples	gay male couples	lesbian couples	All Same-Sex Couples	contrast married/ non-married	contrast Lesbian/ Gay	contrast hetero-sexual/ same-sex couples
Pct of Respondents previously married	25.2%	37.1%	28.2%	29%	24%	20%	31%	25.5%	***	**	NS
Mean Relationship duration (years)	22.9	6.0	18.7	16	11	12.8	12.5	12.6	***	NS	***
Pct Coresident	94.5%	31.7%	78.7%	97%	67%	73%	82%	77.7%	***	*	NS
Pct households with Minor Children	33.4%	23.2%	30.9%	4%	8%	5%	8%	6.4%	***	NS	***
Respondent Education (years)	13.6	13.5	13.5	16	15	15.5	15.6	15.5	***	NS	***
Respondent Age (years)	48.4	39.1	46.0	51	48	50.3	47.6	49.0	***	*	***
Mean Self-Reported Relationship Quality at wave 1 (scale 1-5; 5 is best)	4.52	4.29	4.46	4.6	4.4	4.4	4.5	4.45	***	NS	NS
Pct parental approval	89.0%	63.0%	81.5%	78%	52%	56%	65%	60.5%	***	NS	***
N of couples at wave 1	1,899	639	2,538	165	306	242	229	471	N/A	N/A	N/A
Pct married or in marriage-like unions	100%	0%	74.8%	100%	0%	29%	41%	35.0%	N/A	**	***
N of couples followed up at least once	1,695	559	2,254	137	266	201	202	403	N/A	N/A	N/A
N of couple-years of follow-up 2009-2012	5,793	1,151	6,944	542	686	610	618	1,228	N/A	N/A	N/A
N of observed break-ups 2009-2012	87	250	337	14	88	45	57	102	N/A	N/A	N/A
Annual break-up rate	1.5%	21.7%	4.9%	2.6%	12.8%	7.4%	9.2%	8.3%	***	NS	***

Source: All values are unweighted from HCMST wave 1 in 2009, except for *N* of couple-years of follow-up, *N* of observed break-ups, and break-up rate which are derived from waves 2, 3, and 4 covering 2009-2012. Note that couples can transition from unmarried to married during the follow-up waves. Parental approval is calculated only for respondents who had at least one living parent. Household is respondent's household if respondent and partner were not coresident. Significance determined by separate OLS regressions (for continuous dependent variables) or logistic regressions (for dichotomous dependent variables). *** $p<0.001$; ** $p<0.01$; * $p<0.05$ two-tailed tests. NS means not significant, N/A means not applicable, no test was performed.

Table 2: Predicting Break-up in HCMST, coefficients (and standard errors) from unweighted discrete time event history logistic regressions, with additional controls to predict weights

	M1	M2	M3	M4	M5	M6	M7
Same-Sex Couples (ref: heterosexuals)	0.67*** (0.20)	-0.49* (0.20)	0.19 (0.22)	0.17 (0.23)	0.18 (0.22)	0.28 (0.22)	
Gay Male Couples							-0.11 (0.26)
Lesbian Couples							0.65** (0.25)
Married (or marriage-like)		-2.62*** (0.13)	-1.21*** (0.16)	-1.23*** (0.18)	-1.23*** (0.16)	-1.08*** (0.17)	-1.08*** (0.17)
Married× same-sex				0.089 (0.36)			
Coresident			-1.73*** (0.14)	-1.73*** (0.14)	-1.53*** (0.14)	-1.52*** (0.14)	-1.55*** (0.14)
Relationship Duration, years			-0.025** (0.008)	-0.025** (0.008)	-0.029*** (0.009)	-0.036*** (0.01)	-0.035*** (0.01)
Relationship Duration ^(-1/2)			0.56*** (0.10)	0.56*** (0.10)	0.59*** (0.10)	0.56*** (0.10)	0.57*** (0.10)
Relationship Quality at Wave 1 (5 pt scale, 5 is best)					-0.74*** (0.07)	-0.73*** (0.07)	-0.74*** (0.07)
hetero couple, unmarried, together >17 yrs						0.88* (0.38)	0.86* (0.38)
ln of household income						-0.18* (0.07)	-0.17* (0.07)
Further non-significant predictors of couple stability (11 *df*)	no	no	no	no	no	yes	yes
Additional Factors that predict individual weights (7df)	yes	yes	yes	yes	yes	yes	yes
N of person years	8043	8043	8043	8043	8043	8043	8043
df (including additional factors that predict the weights)	8	9	12	13	13	26	27
LR χ^2 (compared to constant only)	193.0	685.5	978.1	978.1	1091.8	1116.8	1126.2
p value for wald test for weight2×(all predictors)	0.70	0.15	0.06	0.04*	0.14	0.13	0.18

Source: How Couples Meet and Stay Together, waves 1-4

* *p*<.05; ** *p*<.01; *** *p*<.001, two tailed tests. "Married" means "Married or in Marriage-Like commitment."

Models include 8,043 out of a possible 8,172 person-years (remainder dropped using listwise deletion for

missing values for any variable in the full model). Additional factors that predict weight are: respondent age,

age squared, living in metropolitan area, having own Internet access at home, and recruitment source from

Wave 1. The "additional potential predictors of couple stability" were all not significant in the final model, and

include: respondent has college degree, respondent lives with minor children, respondent's relationship with

partner started when respondent was a teenager, respondent and partner are an interracial couple, respondent

and partner have equal earnings, respondent race (4 *df*) and parental approval (2 *df*).

Figure 1:

Annual Rate of Break-up
Data Smoothed by Logistic Regressions
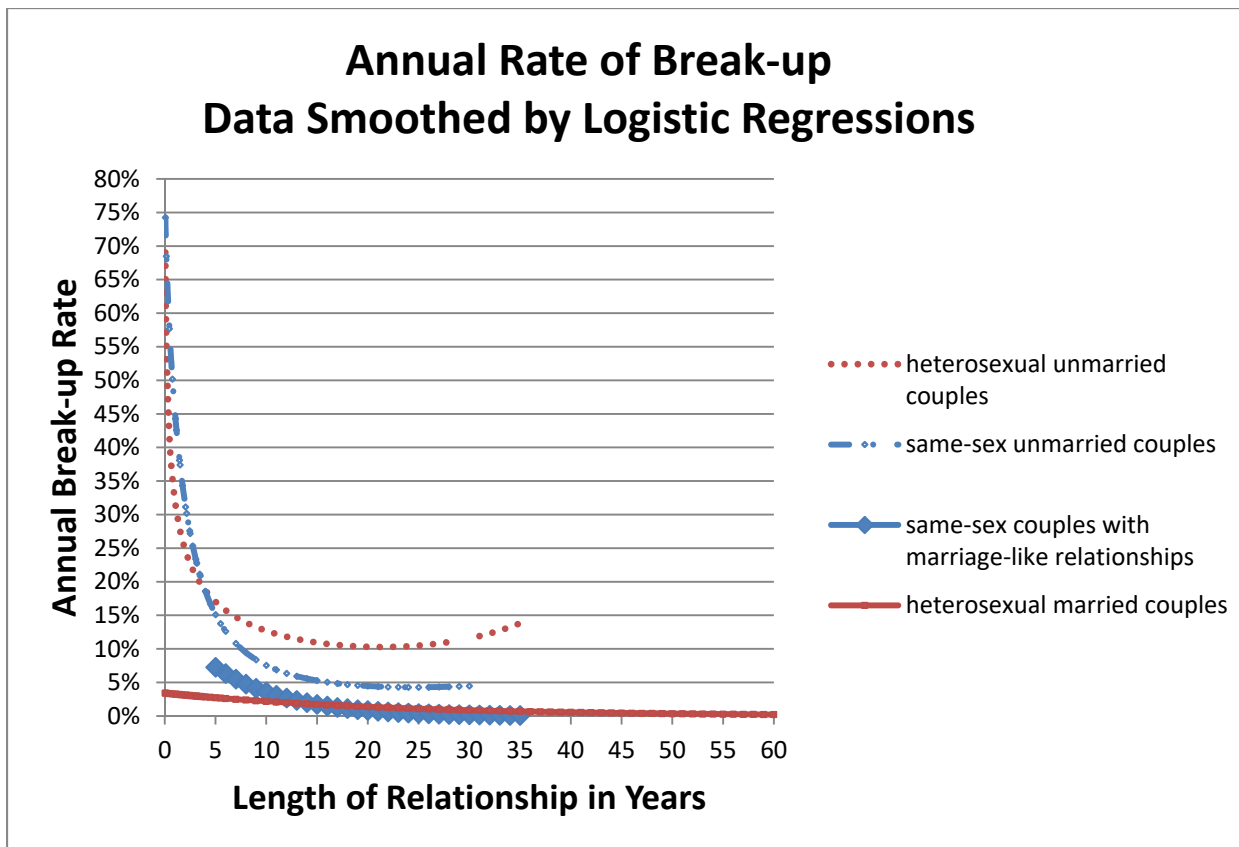
Source: How Couples Meet and Stay Together, waves 1-4, covering years 2009-2012. Data smoothed by

unweighted logistic regressions of break-up rate on relationship duration. The annual rate of break-up in

relationship year X is the probability of break-up in a twelve month period beginning in year X for couples who

are intact at year X. Sample sizes are as follows (in couple-years of exposure to the risk of break-up): 539 for

same-sex couples with marriage-like unions, 5755 for married heterosexual couples, 682 for same-sex couples

not in marriage-like unions, and 1141 for unmarried heterosexual couples. The powers of relationship duration

that were used in the generation of the best fit smoothed curves were determined by fractional polynomial

regression smoothing, and were as follows, with X meaning relationship duration: for same-sex couples with

marriage-like unions, X; for married heterosexual couples, X; for unmarried heterosexual couples, $\ln(X)$ and

X^3; for same-sex couples without marriage-like unions, X and $X^{0.5}$. The curves are truncated at both

extremes of relationship duration where the data is sparse and the confidence intervals are too wide.