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Abstract

The Internet has fundamentally altered how we communicate, access information and who we can interact with. These features are all potentially salient for mate search – but the implications of Internet access for partnership formation are theoretically ambiguous. We examine the association between Internet access and heterosexual and homosexual partnership formation using nationally-representative data from the National Longitudinal Survey of Youth (NLSY) and the Current Population Survey (CPS) from the US. Across both data sources, we find that the association between Internet access and partnership formation (in the NLSY) and partnership status (in the CPS) is age-dependent. While negative at younger ages, the association becomes positive as individuals grow older and reach their mid- to late-20s for both homosexual and heterosexual partnerships. We interpret these results to suggest that the Internet facilitates union formation when individuals approach the stage in their life course when they feel ready to commit to a long-term partnership.

Keywords Internet Access; Technology; Union Formation; Life Course; NLSY97; CPS.**JEL Codes:** J12, O51, Z13

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Introduction

The rapid diffusion of the Internet has been one of the most significant social phenomena of the new millennium. In the US, residential high-speed Internet usage rates grew from 5 to 74 percent between 2000 and 2009 (Dettling 2017). By 2015, the proportion of Internet users among American adults was 86% (Pew Research Centre 2019). The expansion of the technology has had wide-ranging social and economic implications, and has generated a seismic shift in how people access information and communicate with each other (Di Maggio et al 2001). In contrast to other communication technologies such as the telephone, which largely improved communication within existing networks, the Internet has broadened the scope for social interaction by enabling new possibilities for finding and meeting people outside of one's existing social network.

One domain in which the opportunity afforded by the Internet to communicate more freely, access a wider range of information and reach outside of one's network has been particularly significant is in finding new romantic partners. The Internet has been described as "the new social intermediary in the search for mates" (Rosenfeld and Thomas 2012). Drawing on a nationally representative survey of 4,000 adults in the US who were already in relationships, Rosenfeld and Thomas (2012) found that among those that met in 1994-98, 3.9% reported having met online for the first time, which increased to 20% for those who met in 2004-2006. For couples who met in 2017, nearly 40% met online, and by 2013 the Internet became the most common way of meeting a partner, surpassing meeting through friends for heterosexual couples in the US (Rosenfeld et al 2019). Hybrid online/offline modes of meeting partners have also grown at a steady rate, as social networking websites have made reconnecting with offline introductions easier (Thomas 2020).

While Rosenfeld and colleagues (2012, 2019) highlight the significant role of the Internet for those that were coupled, the effect of Internet access on the propensity to partner or transition to committed unions such as marriage is theoretically ambiguous. On one hand, the

greater amount of information on prospective partners and easier communication opportunities that the Internet affords may predict a faster transition to a committed partnership or marriage (Rosenfeld 2017) and better quality and more stable matches (Hitsch et al. 2010, Cacioppo et al. 2013). For example, Internet dating platforms and social networking sites allow users to access a wider pool of partners, but also sort and search for those that meet user-defined criteria and shared interests, which could result in more efficient matching. Conversely, those skeptical of the impact of the Internet have argued that the abundance of choice for potential mates afforded by the Internet may lead to "choice overload" and the inability to commit to a durable partnership (Yang and Chiou 2010, Turkle 2015). The choice overload argument posits that increased choice set of potential partners provided by the Internet may make it harder to determine which is the best choice, and consequently make individuals less likely to commit to any choice. Increased time spent on the Internet on activities unrelated to partner search or communication with prospective partners may also crowd out time spent looking for a partner (Billari et al 2019).

Despite the theoretical speculation about the effect of Internet availability on propensities to form a partnership or to marry, the empirical literature on the question has been relatively limited. An exception here is Bellou (2015), who exploits variation in the timing of broadband diffusion at the county-level in the US to examine its impact on aggregate-level marriage rates. Bellou (2015) found the effect of broadband diffusion on marriage rates to be positive. While Rosenfeld and colleagues (2012, 2019) found that an increasing fraction of couples were likely to meet online, Bellou's findings when combined with those of Rosenfeld and colleagues suggest that the Internet may not just be displacing offline modes of meeting partners (e.g. through friends), but also generating new matches altogether that might not have otherwise occurred. In enabling new types of matches, the role of the Internet is likely to be especially salient for couples who might have had limited opportunity to meet and interact.

Rosenfeld and Thomas (2012) describe this in terms of those seeking matches in "thin markets", such as gays, lesbians and middle-aged heterosexuals.

Our study examines the association between Internet access on the transition to partnership at the individual level, examining its role both for heterosexual and homosexual partnerships in the US. We analyze this relationship across two nationally-representative data sources – the National Longitudinal Study of Youth (NLSY 97) and the Current Population Survey (CPS). While the motivation of our paper is closely aligned with Bellou (2015), we use different data sources and analyze partnership formation, including the formation of co-residential unions rather than marriage only among different couple types. In contrast to Bellou, who uses aggregate-level data to study the relationship between Internet diffusion and marriage rates, we use individual-level data to analyze the association between Internet access and partnership transitions (from the NLSY) and partnership status (from the CPS), controlling for demographic and socioeconomic confounders. An important contribution of our work compared with previous studies is that we examine how Internet access is associated with propensities to enter partnerships for both heterosexual and homosexual couples and how the influence of Internet access varies across the life course at different ages. By drawing on both cohort (longitudinal) data from the NLSY and period (cross-sectional) data from the CPS, we are able to assess whether access to the Internet is associated with partnership outcomes for individuals only for a specific young adult cohort as in the NLSY, or whether the age-specific patterns we find in our longitudinal analysis apply also to different cohorts (aged 15-50) over a longer period of Internet diffusion from 1997 in the CPS analyses. In our analyses, even though we take into account relevant demographic and socioeconomic characteristics, we recognize that the potential endogeneity of Internet access prevents us from making causal claims.

This paper proceeds as follows: in the next section, we reflect on mechanisms through which Internet access can be related to partnership formation and derive hypotheses linked to how we would expect the Internet to be associated to both the propensity to partner, as well as

the age patterns of this association. We then present the data and methods, followed by results and a discussion of our findings.

Theoretical Background and Hypotheses

There are different ways in which the Internet could be associated with partnership formation. Although a growing literature has examined online dating (e.g. Potârcă and Mills 2015, Potârcă, Mills and Neberich 2015, Whyte and Torgler 2017, Rosenfeld 2018, Schwartz and Velotta 2018, Bruch and Newman 2019), the role of Internet access for partnership formation is likely more far-reaching and extends beyond enabling access to online dating websites and apps. Access to the Internet can affect partnership formation by: 1) expanding access to a wider pool of potential partners, 2) providing more information about potential partners, including those that individuals may have first met offline and, 3) facilitating easier and more distinctive forms of communication than those afforded by older technologies like the telephone. While Internet access may affect partnership formation through these different channels, the direction of this relationship is a priori not clear and as we describe in this section, may be positive or negative and vary by different stages of the young adult life course.

Different digital platforms can facilitate the dating and partner search process by expanding access to a wider pool of potential partners, and venues for meeting online have become more numerous and diverse over the years (Cacioppo et al 2013). Through Internet dating websites and mobile apps, social networking platforms, as well as shared discussion groups and posting boards, the Internet provides the chance to meet new people and draw on a wider network of individuals than those encountered in daily routines and interactions, and through existing family and friend networks (Rosenfeld and Thomas 2012, Cacioppo et al 2013, Bellou 2015, Rosenfeld 2017). In this sense, Internet access can be seen to simplify the search for a partner through the ability to screen a larger pool of potential partners. While other modes of online meeting were more popular prior to the mid-2000s, the growth of online dating sites

and apps experiences rapid growth especially with the takeoff of smartphones (Reben 2019). The uptake of Internet dating apps and websites in the US has been remarkable, and a nationally-representative Pew survey from 2019 found that nearly half (48%) of young adults (aged 18-29) and 38% of those aged 30-49 had used online dating apps (Pew Research Center 2020).

The role of Internet access in simplifying partner search may be even more pronounced for sub-groups in "thin markets" for potential partners such as middle-aged heterosexuals, or lesbian, gay and bisexual individuals (Rosenfeld and Thomas 2012, Thomas 2020) or those with personality traits that might disadvantage their ability to meet in other ways (Danielsbacka et al 2019). For example, even though more extroverted individuals have been shown to be more likely to use online dating and social media platforms (Correa et al. 2010, Valkenburg and Peter 2007), in their study using German data, Danielsbacka et al (2019) found that that individuals with less extroverted personality traits were more likely to have met their partner online (Danielsbacka et al 2019). In addition to improved search, online dating and social networking sites afford the opportunity to collect a lot of information and conduct a targeted search for prospective partners relatively quickly. This improved efficiency of the partner search process could hasten the process of partnership formation and increase propensities to partner.

The immediacy and anonymity of communication afforded by the Internet could also predict a faster transition to a partnership. Experimental evidence has suggested that anonymous online meetings promote greater self-disclosure and liking than face-to-face meetings (Bargh, McKenna and Fitzsimmons 2002, McKenna, Green and Gleason 2002). Those who are able to disclose their inner selves over the Internet were also able to transition those relationships to real-life or face-to-face relationships (McKenna, Green and Gleason 2002). Even for those who first meet offline, the greater immediacy, connectivity and privacy afforded by Internet-mediated communication could help with forging intimate bonds faster than in the absence of these technologies. Online communication through texting, chat, email and social media, often conducted via smartphones, enable frequent and fast interactions, as well as both synchronous

and asynchronous forms of communication that older communication technologies such as the landline telephone did not. Communication is also more direct and personalized through the Internet, without the need to encounter any intermediaries. While calling a prospective romantic interest in an era of landlines might have meant calling and having to first talk with their parents or family members, communication in a digital era means unrestricted, unmediated and immediate access to a person of interest. For minority communities, such as lesbian, gay and bisexual individuals who might face greater stigma or resistance towards their romantic interests, this effect is likely to be especially pronounced. For these communities, furthermore, access to online forums, groups and communities may also act as a medium to both recognize and validate their desires. In this way, the role of the Internet on partnership formation for LGBT individuals, may be even stronger through both the search and information seeking mechanisms.

While improved access to prospective partners, information about them, and easier communication with them through the Internet may reduce the time and search costs of partner search, the wider pool of partners provided by the Internet could also make the partner search process longer and imply a postponement in partnership formation. This negative relationship between Internet access and partnership formation can be understood both from the perspectives of search theory (Bellou 2015) and choice overload theories (Yang and Chiou 2010, Turkle 2015, Rosenfeld 2017). Search theory posits that as the probabilities of receiving offers rises, so does the desired reservation quality. Applied to the partner search process, this would imply that increased exposure to potential partners – and the likelihood of receiving offers from them – would lead to a higher set of expectations about the desired partner, which would in turn reduce the probability of transitioning to a partnership. From the perspective of choice overload theory, access to a larger pool of potential partners may create an abundance of choice that may make it harder to 'settle down' in the face of potentially unlimited possibilities to meet other, new romantic partners. Too much choice, from this perspective, can be demotivating because individuals find it harder to determine which is the best choice and having access to multiple

options leads individuals to be less sure of their options and less likely to make any choice. In the context of initial, formative interactions between strangers online on online dating sites, studies suggest that individuals may overinterpret social cues on communication that is mediated online, and this form of communication also lacks some of the experiential richness of face-to-face interaction (Finkel et al 2012).

Another mechanism through which the Internet could negatively affect partnership formation is by crowding out the time spent looking for a partner (Billari et al 2019). Early studies on whether the Internet displaced social activities found that greater time spent on the Internet at home and also on weekends negatively impacted on face-to-face interactions (Nie and Hillygus 2002). Subsequent research however has argued that Internet use has not displaced offline social activities (Robinson and Martin 2010, Robinson 2011). While evidence on the effect of the Internet on offline socializing, may be mixed, it is nevertheless possible that with the diversification of opportunities for leisure, entertainment or work with the technology, these online activities may displace time spent online on activities linked to seeking a partner.

The above discussion suggests that the net effect of Internet access on partnership formation could go in either direction. Whether the relationship is positive or negative however can plausibly vary by age or the stage of the life course of individuals. This dimension of the effect of Internet access has received limited discussion in the literature. Access to the Internet at younger ages may enable individuals to tap into a wider pool of romantic partners, have ready availability and easy communication with prospective partners, and potentially expand their dating opportunities. This ready availability of dates may delay the transition to a durable partnership such as marriage. Alternately, the purposes for which the Internet is used may vary at different ages. While at younger ages the Internet may be used for different purposes other than dating or the pursuit of romantic partnerships, with age individuals may begin to use the internet for partner search as their desire to partner or 'settle down' becomes stronger. This stage in the transition to adulthood - that follows the 'emerging adulthood' phase (Arnett, 2004, 2000;

Schoen et al., 2007; Shanahan, 2000) - coincides with educational and employment transitions, and a period in which an individual's social network expands. In this context, Internet access may facilitate this process, by providing targeted search and information about prospective partners, as well as easier modes of communication. These benefits can accrue to both those who meet partners online, but also those who first meet offline but use the Internet to communicate and learn more about their partner (e.g. through social media). This discussion suggests that at younger ages, we may find that Internet access is likely to be negatively associated with the propensity to partner or a postponement of the partnership transition. The improved search, efficiency, and communication afforded by the Internet, may consequently result in a positive association between Internet access and partnership formation age individuals grow older.

Empirical Analysis

Longitudinal analysis using NSLY97

Data and Methods

Our first set of analyses is conducted using the National Longitudinal Survey of Youth 1997 (NLSY97). This survey includes a representative sample of young adults in the United States, who are born between 1980 and 1984. They were interviewed for the first time in 1997 (when they were between 12 and 16), and then every year after that until 2011[3]. The NLSY97 collects data on socio-demographic characteristics, school and employment history, and partnership history (i.e. marriage and cohabitation, as information on dating history is either incomplete or limited). Importantly for our analysis, from 2003 the survey includes questions about Internet access. In particular, from 2003 to 2011, the respondents are asked if they had access to the Internet, and from 2003 to 2008 they were asked from where they could access it

[3] There are three more recent round of the NLSY collected in 2013, 2015, and 2017. However, since there is a gap of a year between these rounds, we decided to stop the analysis in 2011. Moreover, after 2011, the question about access to Internet was changed to a question on frequency of Internet use, which limits a direct comparison with previous years.

(e.g. home, school, work, library, etc.). Our key independent variable is based on the question "Do you currently have access to the Internet?", and it is coded as 1 if the answer is "yes", and 0 otherwise. We recognize that this measure of Internet access is clearly limited in being able to capture *how* the Internet is used by the survey respondents. Using a different dataset, Thomas (2020) found that those with Internet access at home were more likely to have met their partner online, which suggests that this variable likely captures the use of the Internet for partner search. In general, however, we were able to find few, nationally-representative individual-level data sources in the public domain that include detailed information on Internet use over the period of Internet diffusion from the late-1990s/early 2000s, along with demographic information on partnership/marital history, sex of the partners and/or sexual orientation within a longitudinal data structure that enables us to track changes in Internet use and partnership simultaneously. This is a limitation for this literature in general, and one that we will return to later in the paper.

Our main outcome of interest is partnership formation, and we are also interested in who the individuals partnered with to distinguish between heterosexual and homosexual relationships. In order to study whether Internet access is associated with partnership formation, we use both the residential household roster, and the non-residential roster. During the interview, the respondent is asked to answer questions about household members (co-residential household roster), and also questions about non-resident relatives (non-resident roster). The respondents identify the relationship with the household members, and we categorize them as "in a partnership" if they name a wife/husband or a lover/partner as a residential or non-residential member of the household. Additionally, the respondents are asked the sex of these household members/relatives. Using this information and the sex of the respondent we are able to identify whether a partnership is heterosexual or homosexual. Our dependent variable is a categorical variable equal to 0 if the respondent is not in a partnership, 1 if he/she is in a heterosexual relationship, and equal to 2 if in a homosexual relationship. Since these questions

are included in the survey every year, the partnership status (i.e. in a partnership or not) and the type of partnership (i.e. heterosexual or homosexual) can vary over time.

Our sample includes individuals who are interviewed every year from 2003 to 2011, given that we need data on Internet access (only available from 2003 onwards), and we also need information of partnership formation and dissolution over time. Hence, we have a sample of 5,729 individuals (from 8,984 in 1997). In terms of confounding variables, we need to take into account sociodemographic characteristics that can influence both the risk of partnership formation and the probability of having access to Internet. Hence, other than age (and age^2), gender, we include *race* (White, Black, Hispanic, and Other), and *region of residence* (Northeast, North Central, South, and West). We include two additional family background characteristics: *parental level of education* (less than high school, high school, or more than high school), and *family income in 1997*. Being from a higher social class, not only increases the probability of achieving higher education, having a better job and a better income in adulthood, but also has a positive influence on the probability of forming a coresidential union (Sassler and Miller 2017; Tillman et al. 2019).

We further consider other socioeconomic and demographic variables that likely have a direct correlation with partnership formation (Schwartz 2013; Tillman et al. 2019) and the probability of having Internet access. These include whether respondents live in a *rural* or *urban*[4] area – as urban areas provide larger partner markets, and also provide easier access to an internet connection , as well as their economic attractiveness and exposure to wider networks, such as the *level of education* (less than high school, high school, some college, college degree or more) and if *enrolled in school*, *income from work for the past year* (log scale), and the *number of weeks of unemployment* each year. Finally, in order to consider factors that might influence the use of the Internet for

[4] Areas are identified as urban or rural by the Census Bureau. According to the Census Bureau, about 25 percent of the U.S. population lives in rural areas. In rounds 1-7, using the 1990 Census standards, urban places were those in "urbanized areas" or "places" with a population of at least 2,500; all other areas were rural. Beginning in round 8, the definition of urban areas was changed to follow the new 2000 Census Bureau standards, which defined all territory within an urban cluster or urbanized area as "urban."

online dating or for the search of partners, we consider if the respondents have been *previously married* or have *previously cohabited* (before 2003), and the *number of children living in the household*. The final sample size – excluding those who do not have information for the control variables – is of 5,513 respondents, of which 52.6% are women and 47.4% are men.

After presenting some descriptive statistics on the sample used in the analysis, we implement discrete-time event history analysis regression models with competing risks (Allison, 1982) to study the association between Internet access and being either in an heterosexual or homosexual relationship (i.e. the competing events). Our models are multilevel models, in which partnership episodes are nested within individuals (Barber et al., 2000). Multilevel event history models allow us to introduce random effects, which represent individual-specific unobservables. We follow individuals in the sample over time, and current events give a two-level hierarchical structure: episodes – i.e. partnership formation – are clustered into individuals.

Descriptive Findings

Respondents in our sample were born between 1980 and 1984. Therefore from 2003 to 2011 they were between 19-23 and 27-31. This is the age span in which most people enter significant relationships, and possibly get married. As we can see in Table 1, the proportion of respondents in a relationship increases substantially over time, from 28% in 2003 to 71.6% in 2011. This increase can be observed for both heterosexual and homosexual partnerships, which showed a 61% and 57.1% positive change over 9 years respectively. The number of respondents in homosexual relationships is considerably lower (ranging between 36 and 84 people over time) than those in heterosexual relationships.

Table 1. Partnership Status and Internet Access (NLSY97)

	In a heterosexual partnership		In a homosexual partnership		Total in a partnership		Access to Internet		Access to Internet at Home	
Year	N	%	N	%	N	%	N	%	N	%
2003	1,508	27.4	36	0.7	1,544	28.0	4,450	80.7	3,388	61.5
2004	1,957	35.5	39	0.7	1,996	36.2	4,409	80.0	3,352	60.8
2005	2,342	42.5	48	0.9	2,390	43.4	4,507	81.8	3,475	63.0
2006	2,705	49.1	60	1.1	2,765	50.2	4,640	84.2	3,625	65.8
2007	3,037	55.1	68	1.2	3,105	56.3	4,745	86.1	3,806	69.0
2008	3,311	60.1	76	1.4	3,387	61.4	4,547	82.5	3,952	71.7
2009	3,519	63.8	74	1.3	3,593	65.2	4,593	83.3		
2010	3,732	67.7	77	1.4	3,809	69.1	4,651	84.4		
2011	3,866	70.1	84	1.5	3,950	71.6	4,804	87.1		

N=5,513

In the same time span, we observe an increase in the percentage of young adults in the sample having access to Internet. Table 1 shows that in 2003 80.7% of the sample had access to Internet, and in 2011 this figure increased to 87.7%. The same growth can be seen in the proportion of those having Internet access at home: from 61.5% in 2003 to 71.7% in 2011.

In Table 2 we report descriptive statistics for the other variables used in the analysis. Half of the sample is white, while 27% is Black, and 20% is Hispanic. One third of the respondents' parents have a high school diploma and almost half of them have some college education. The family income was $46,427 in 1997 when the survey started and the respondents were between 13 and 17 years old. The proportion of those who experienced a cohabitation before 2003 is 28.4% and 12.2% have been married before 2003. Looking at time-varying covariates, the mean age increases from 21 to 29. The geographical distribution of the respondents and their urban/rural location remains quite stable over time. As expected, the proportion of people in school decreases, from 38.1% in 2003 to 12.2% in 2011, and the average level of education increases steadily. Also, the average income from work increases yearly, together with the average number of weeks spent in unemployment and the average number of children in the household.

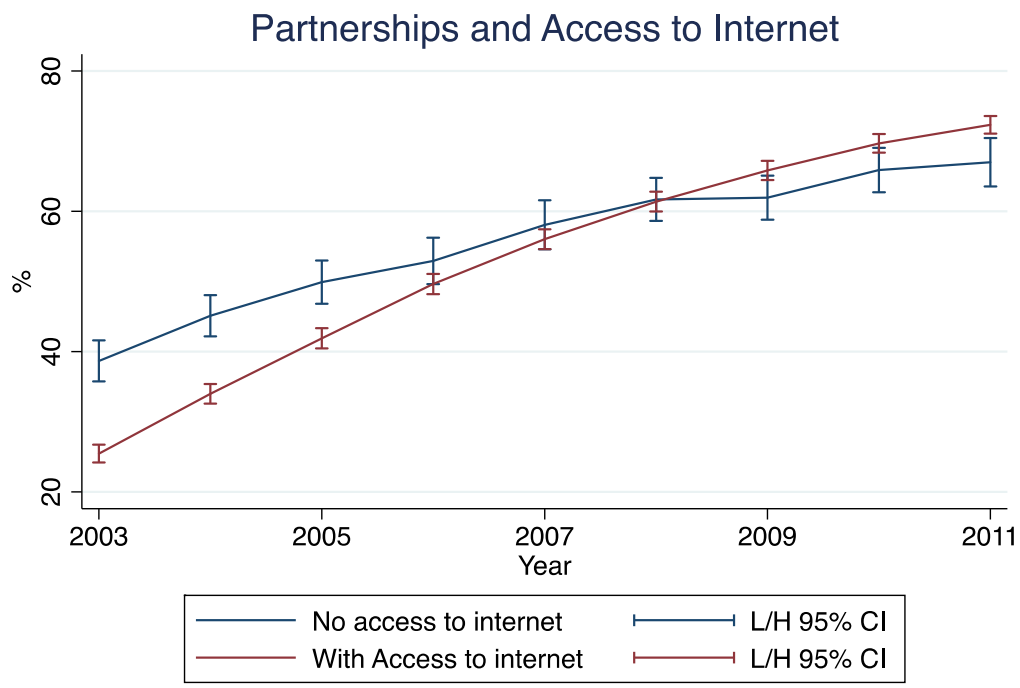
Given that our main interest is the relationship between having access to the Internet and partnership formation, we look at the correlation between these two variables over time (Figure 1). The proportion of respondents in partnerships is lower among those who do have access to Internet until 2006 (age 22-26). In 2007 and 2008 the two groups almost overlap, and from 2009 onwards having access to Internet is associated with a higher proportion of people being in a partnership. Hence, Internet access begins to show a positive influence as respondents get older. The figure also shows that Internet access might work in the same direction as higher education and socioeconomic status in terms of postponement of partnership formation, followed by recuperation.

Table 2. Control Variables (NLSY97)

Time Constant									
% Female	52.6								
Race (%)									
White	49.5								
Black	27.0								
Hispanic	20.0								
Other	3.56								
Parents' Education (%)									
Less than High School	16.5								
High School Diploma	33.8								
More than High School	49.7								
Family Income 1997, Avg. USD	46,427								
% Had Cohabitated Before 2003	28.4								
% Had been Married Before 2003	12.2								
Year	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Mean Age	20.9	21.9	22.9	23.9	24.8	25.8	26.7	27.8	28.7
Region (%)									
North East	16.2	16.0	15.6	15.5	15.3	15.3	15.2	15.5	15.4
North Central	23.4	23.2	23.0	22.7	22.3	22.1	21.9	21.8	21.8
South	38.5	38.9	39.3	39.2	39.7	39.7	40.1	40.1	39.9
West	21.9	22.0	22.1	22.6	22.6	22.8	22.7	22.7	22.9
% Urban	78.8	80.6	81.3	80.9	80.9	81.3	80.9	79.0	78.9
Level of Education (%)									
Less than High School	20.5	18.3	18.0	17.8	17.6	17.6	17.5	17.4	17.3
High School Diploma	73.3	69.0	63.1	58.0	52.9	50.5	48.8	47.2	46.2
Some College	2.2	4.2	5.2	5.8	6.4	6.6	7.0	7.4	7.7
College Degree or More	3.9	8.6	13.7	18.3	23.1	25.3	26.8	28.0	28.8
% in School	38.1	31.1	25.4	20.3	16.5	15.0	14.5	13.7	12.2
Income from Job Past Year, Avg. USD (if working)	10,344	13,120	15,833	18,919	22,786	26,230	29,087	30,727	33,026
Weeks Unemployed per Year, Avg. (if>0)	11.2	11.4	10.7	10.6	10.6	12.5	17.1	18.5	17.6
Number of Children in the Household, Avg.	0.28	0.35	0.43	0.51	0.59	0.68	0.75	0.84	0.91

N=5,513

Figure 1. Proportion of respondents in a partnership by internet access (NLSY97)



Multilevel Multinomial Logistic Regression Analysis

Figure 1 does not take into account any possible confounders, and the association between Internet access and partnership formation could be driven by other individual characteristics that change over time. With the greater diffusion of the technology, we may expect users with different socioeconomic characteristics (e.g. less educated or lower socioeconomic status) to adopt its use, and their different characteristics with regards to partnering behavior may result in the patterns we observe in Figure 1.

The multinomial logistic regression models that control for potential confounders are presented in Table 3. Our reference group is 'not in a partnership', and the two outcome groups are 'in a heterosexual relationship' and 'in a homosexual relationship'. Model (1) includes Internet access, age and age^2, gender, race, region of residence, and urban vs rural location. In Model (2) we include socioeconomic characteristics and additional demographic variables: level of

education, parental level of education, the 1997 family income quintile, the past year inme from work, the number of weeks unemployed per year, the nmber of children in the household, and pevious marriage and cohabitation (before 2003). Finally, in Model (3) we include the interaction between Internet access and age, given that we hypothesize the positive role of Internet access to become more relevant as the respondents get older.

The results show that there is a negative association between Internet access and entering a partnership, both for heterosexual (OR=0.632, $p<0.01$) and homosexual (OR=0.698, $p<0.05$) partnerships. The probability of being in a relationship increases with age, and it is higher for women than for men. Once we include the socioeconomic and demographic characteristics in Model (2), we see how the association between access to Internet and being in a partnership becomes positive among both those in a heterosexual partnership (OR=1.225, $p<0.05$), and those transitioning to a homosexual partnership (OR=1.304, $p<0.1$). Being enrolled in school is negatively associated with being in a relationship, and a higher level of education (among those in a heterosexual partnership) has a positive association with being in a union.

Finally, in Model (3), including the interaction term between age and access to Internet, we see how the main coefficient of Internet access becomes negative and that of age is still positive. Most importantly, the interaction term is greater than 1 and significant for both heterosexual and homosexual partnerships, 1.223 ($p<0.01$) and 1.177 ($p<0.01$) respectively. This shows how the association between Internet access and partnership formation is negative at younger ages, but it becomes positive as age increases.

Table 3. Multinomial multilevel regression models (NLSY97)

Y = being in a partnership (Ref: No)	Heterosexual Partnership			Homosexual Partnership		
	(1)	(2)	(3)	(1)	(2)	(3)
Internet Access	**0.632*** **	**1.225** **	**0.339*** **	**0.698** **	**1.304***	**0.474** **
	(0.058)	**(0.109)**	**(0.068)**	**(0.102)**	**(0.197)**	**(0.180)**
Age	**7.855*** **	**7.595*** **	**6.635*** **	**7.262*** **	**7.550*** **	**6.772*** **
	(0.421)	**(0.451)**	**(0.408)**	**(0.660)**	**(0.718)**	**(0.683)**
Age^2	**0.946*** **	**0.944*** **	**0.943*** **	**0.947*** **	**0.945*** **	**0.944*** **
	(0.003)	**(0.003)**	**(0.003)**	**(0.006)**	**(0.006)**	**(0.006)**
Female	3.679***	1.666***	1.759***	3.039***	2.140***	2.255***
	(0.581)	(0.230)	(0.232)	(0.543)	(0.352)	(0.359)
Race (Ref: White)						
Black	0.032***	0.027***	0.028***	0.039***	0.031***	0.032***
	(0.007)	(0.005)	(0.005)	(0.009)	(0.007)	(0.007)
Hispanic	0.654**	0.154***	0.137***	0.692*	0.177***	0.158***
	(0.123)	(0.030)	(0.026)	(0.151)	(0.041)	(0.035)
Other	0.020***	0.354***	0.299***	0.013***	0.189***	0.160***
	(0.011)	(0.106)	(0.119)	(0.009)	(0.084)	(0.082)
Region (Ref: Northeast)						
North Central	6.136***	0.991	1.035	2.473***	0.453***	0.473***
	(1.497)	(0.213)	(0.202)	(0.681)	(0.113)	(0.110)
South	4.495***	1.198	1.082	2.143***	0.673*	0.608**
	(0.795)	(0.225)	(0.193)	(0.444)	(0.146)	(0.127)
West	3.693***	1.149	1.339	1.656**	0.538**	0.625**
	(0.702)	(0.265)	(0.270)	(0.378)	(0.141)	(0.148)
Urban Area	1.244**	1.521***	1.478***	2.127***	2.316***	2.256***
	(0.114)	(0.148)	(0.142)	(0.330)	(0.369)	(0.357)
Enrolled In School		0.468***	0.480***		0.593***	0.605***
		(0.038)	(0.039)		(0.083)	(0.085)
Level of Education (Ref: < High School)						
High School Diploma		1.265	1.157		0.978	0.895
		(0.194)	(0.169)		(0.186)	(0.166)
Some College		2.470***	2.181***		0.89	0.788
		(0.658)	(0.556)		(0.322)	(0.279)
College Degree or more		2.115***	1.950***		0.751	0.698
		(0.411)	(0.361)		(0.192)	(0.173)
Parents Education (Ref: < High School)						
High School Diploma		2.247***	2.425***		1.153	1.247
		(0.413)	(0.435)		(0.259)	(0.276)
More than High School		0.884	0.869		0.788	0.777
		(0.156)	(0.152)		(0.171)	(0.167)

Family Income in 1997 (Ref: 1st Quintile)						
2nd Quintile		0.656*	0.797		1.437	1.740**
		(0.153)	(0.175)		(0.403)	(0.468)
3rd Quintile		1.518*	1.671**		1.53	1.679*
		(0.347)	(0.372)		(0.453)	(0.490)
4th Quintile		2.774***	3.393***		2.791***	3.408***
		(0.659)	(0.742)		(0.854)	(0.994)
5th Quintile		1.023	1.171		1.868*	2.132**
		(0.274)	(0.279)		(0.604)	(0.639)
Income missing		0.551***	0.676*		1.033	1.267
		(0.126)	(0.141)		(0.284)	(0.328)
Log(Income from Job Past Year)		1.091***	1.088***		1.059***	1.057***
		(0.011)	(0.010)		(0.016)	(0.016)
Weeks Unemployed per Year		0.995	0.997		1.006	1.007
		(0.003)	(0.003)		(0.005)	(0.005)
Number of own children in household		4.168***	4.098***		1.970***	1.941***
		(0.293)	(0.302)		(0.192)	(0.194)
Previously Cohabited (before 2003)		12247.075***	13774.096***		8728.990***	9820.461***
		(2591.975)	(2869.178)		(2015.080)	(2236.723)
Previously Married (before 2003)		61813.109***	51167.482***		11877.824***	9833.857***
		(17587.348)	(13785.589)		(4273.972)	(3422.230)
Internet Access*Age			**1.223*** **			**1.177*** **
			(0.034)			**(0.059)**
Constant	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Random Intercept Variance	27.9	26.4	26.6	27.9	26.4	26.6
	(0.716)	(0.761)	(0.768)	(0.716)	(0.761)	(0.768)
N	49,617 (5,513 individuals over 9 years)					

* p<0.10, ** p<0.05, *** p<0.01

Cross-sectional Analysis Using CPS Data

Data and Methods

Our second set of analyses is performed using the Current Population Survey (CPS) data. The CPS is a cross-sectional household survey that collects monthly data in the US on several different topics, including demographic and socioeconomic information. Since 1997 the CPS started collecting data on computer use and Internet access in a 'Computer and Internet Use' supplement, and this information is available for the years 1997, 1998, 2000, 2001, 2003, 2007, 2009, 2010, 2011, 2012, 2013, and 2015. In this supplement, all the respondents in the household are asked whether they have access to Internet at home and if the household has an Internet connection. For the purpose of our analysis, we use this information to build our independent variable, i.e. having access to Internet at home. This variable is equal to 1 if the household has an Internet connection or – when the answer to that question is missing – if a member of the household has access to Internet from home.

The partnership status of the main respondent is established using the household roster, and the presence of a spouse or an unmarried partner in the same household. In the same way as for the NLSY data, we can distinguish between heterosexual and homosexual unions based on the sex of the household head and of the partner (if present). Therefore, our dependent variable using the CPS data is the same as for the NLSY analysis, and it is equal to 0 if the respondent is not in a partnership, 1 if he/she is in a heterosexual relationship, and equal to 2 if in a homosexual relationship. Unlike the NLSY, however, the CPS is a cross-sectional dataset and we are unable to capture transitions into a partnership. However, the CPS provides us repeated cross-sections over a longer duration (from 1997 onwards) over the course of Internet diffusion, as well as a broader range of ages (cohorts) to analyze the association to compare the NLSY findings.

The sample includes individuals that are interviewed in the 'Computer and Internet use' supplement and that have answered the questions on Internet access. We start with a sample of

952,892 individuals, 15 years old and older, over the 12 years, and we are left with 619,158 of them after we exclude those who do not report data on Internet access. We include several control variables, trying to include the same variables used in the NLSY analyses: *age* at interview (and age^2), *gender*, *ethnicity* (White, Black, Hispanic, Asian, American Indian, and Other/Mixed), *state*, if *living in a metro area*, the *level of education* (less than high school, high school, some college, college degree or more), *family income* (< $25,000, $25,000-49,999, $50,000-74,999, $75,000 and over), *weekly earnings at current job*, the *number of weeks of continuous unemployment*, and the *number of children in the household*. We present some descriptive statistics on the partnership status of the respondent, access to Internet and control variables over the years in our selected sample, and then we run multinomial logistic regressions to investigate the relationship between Internet access and partnership status, distinguishing between heterosexual and homosexual unions.

Descriptive Findings

Table 4 reports the proportion of individuals in the CPS data that are in a coresidential union and distinguishes between heterosexual and homosexual partnerships. This proportion declines slightly over time for heterosexual unions, from 56.4% in 1997 to 53.2% in 2015, but increases for homosexual unions, from 45 couples in 1997 (0.09% of the total sample) to 313 couples in 2015 (0.63%).

Also in Table 4, we can see the proportion of households with an Internet connection.

Table 4. Partnership Status and Internet Access (CPS)

	In a heterosexual partnership		In a homosexual partnership		Total in a partnership		Access to Internet at Home	
Year	N	Weighted %	N	Weighted %	N	Weighted %	N	Weighted %
1997	27,251	56.4	45	0.09	27,296	56.5	8,620	18.1
1998	27,229	56.2	50	0.10	27,279	56.3	12,709	26.4
2000	27,093	56.5	53	0.10	27,146	56.6	19,924	41.6
2001	31,908	55.8	96	0.18	32,004	55.9	28,864	50.5
2003	31,574	55.9	109	0.19	31,683	56.1	30,911	54.8
2007	29,786	54.4	148	0.26	29,934	54.6	33,930	61.9
2009	29,789	54.0	166	0.30	29,955	54.3	37,539	68.7
2010	29,635	54.0	206	0.34	29,841	54.3	38,804	71.1
2011	29,264	54.3	245	0.44	29,509	54.7	37,898	70.5
2012	29,156	53.8	239	0.41	29,395	54.2	40,462	74.8
2013	21,632	53.6	194	0.45	21,826	54.0	29,933	74.2
2015	28,106	53.2	313	0.63	28,419	53.8	38,462	73.4
Total	342,423	54.8	1,864	0.30	344,287	55.1	358,056	57.9

N=619,158

The pattern shows an increase in the prevalence of Internet access over time, since the percentage increases from 18.1% to 73.4% between 1997 and 2015, with a very sharp increase between 1997 and 2009 and a slower growth between 2010 and 2015.

Table 5 includes descriptive statistics for the control variables in our analysis. The racial composition of the sample becomes more heterogeneous over time, with 75.3% the respondents being white, 12.1% Blacks and 9.0% Hispanics in 1997, and 66.9%, 12.7% and 13.6% in 2015, respectively. The geographical distribution of the respondents across regions remains rather stable over time, while the proportion not living in a metro area decreases. The average level of education increases over the years, together with family income, the average weekly earnings (if working), and the average number of weeks of continuous unemployment. The average number of children in the household decreases over time. Figure 2 replicates Figure 1 using the CPS data, and shows the relationship between access to Internet and partnership status over age. Unlike NLSY, which is limited to young adults, the CPS provides a sample that covers older ages as well (15 years old and older). In the figures, we report the results up until age 50 for ease of

visualization and interpretation. We observe how the predicted probability of being in a coresidential union is lower for those who have Internet access at home at younger ages (until age 22-24), but becomes higher after age 25 and it remains higher. Figures 3 reports the same association across different years, and it shows how the association between Internet access and partnership formation is consistent over the different periods for which the CPS data are available.

Table 5. Control Variables, Weighted (CPS)

Year	1997	1998	2000	2001	2003	2007	2009	2010	2011	2012	2013	2015	Total
% Female	40.0	41.8	44.5	46.2	46.7	48.7	48.6	49.4	49.2	49.6	49.6	49.3	47.1
Mean Age	48.2	48.4	48.7	48.7	48.4	49.0	49.6	49.8	50.0	50.3	50.5	50.8	49.4
Race (%)													
White	75.3	75.1	74.4	73.8	72.1	70.3	69.7	69.6	69.5	68.2	68.0	66.9	71.0
Black	12.1	12.1	11.9	12.0	11.8	12.3	12.5	12.4	12.4	12.4	12.4	12.7	12.3
Hispanic	9.0	9.0	9.3	9.7	10.8	11.9	12.0	12.2	12.3	13.1	13.0	13.6	11.4
Asian	2.8	-	-	-	3.5	3.8	3.9	3.9	4.0	4.3	4.5	4.6	3.0
American Indian	0.7	0.8	0.8	0.8	0.5	0.5	0.7	0.6	0.6	0.7	0.7	0.6	0.7
Other/Mixed	-	3.1	3.6	3.7	1.2	1.3	1.2	1.3	1.3	1.4	1.5	1.6	1.7
Region (%)													
North East	19.4	19.0	19.3	19.4	19.1	18.3	18.3	18.2	18.0	17.8	17.8	17.6	18.5
North Central	23.4	23.6	23.1	23.5	23.1	22.7	22.3	22.3	22.3	22.3	22.0	21.8	22.7
South	35.7	36.0	36.2	35.9	36.0	36.7	37.1	37.2	37.5	37.7	37.8	38.0	36.8
West	21.5	21.5	21.4	21.3	21.8	22.4	22.4	22.3	22.2	22.3	22.5	22.6	22.0
% Not in metro area	19.5	19.4	19.4	19.1	18.8	15.9	15.8	16.0	15.9	15.5	15.6	14.1	17.0
Level of Education (%)													
Less than High School	17.6	17.4	16.6	16.0	15.0	12.8	12.5	12.0	11.8	11.4	11.1	10.4	13.6
High School	31.7	31.3	30.7	30.7	30.4	29.9	29.3	29.2	29.3	28.5	28.4	27.4	29.7
Some College	26.0	25.9	26.4	26.9	26.8	28.1	28.2	28.5	28.5	28.8	28.6	29.2	27.7
College Degree or more	24.7	25.4	26.4	26.4	27.8	29.2	30.0	30.3	30.4	31.4	31.9	33.0	29.0
Family Income (%)													
< $25,000	34.9	31.2	27.1	26.1	24.4	20.9	22.2	28.9	28.4	27.9	27.2	24.7	26.9
$25,000-49,999	27.4	27.0	25.3	24.5	24.0	21.6	21.8	27.5	27.1	26.7	26.0	25.8	25.4
$50,000-74,999	14.2	14.6	14.7	14.9	14.6	14.6	14.7	17.8	18.1	17.9	18.0	18.3	16.1
$75,000 and over	11.7	13.5	16.4	17.5	17.6	20.4	21.0	25.9	26.4	27.5	28.8	31.3	21.7
Missing	11.9	13.6	16.5	17.0	19.4	22.5	20.3	-	-	-	-	-	10.0
Avg. Earnings per Week (if working)	619.4	658.7	707.0	719.6	760.3	846.3	867.0	870.5	888.8	908.7	924.8	961.6	814.7
Avg. # Weeks Consecutive Unemployment (if >0)	18.6	15.6	15.0	14.6	21.3	18.5	29.2	37.7	39.3	39.1	34.1	25.6	28.8
Number of Children in the HH	0.82	0.81	0.79	0.78	0.77	0.74	0.74	0.74	0.76	0.73	0.73	0.72	0.76

N=619,158

Figure 2. Predicted probability of being in a partnership by internet access (CPS)

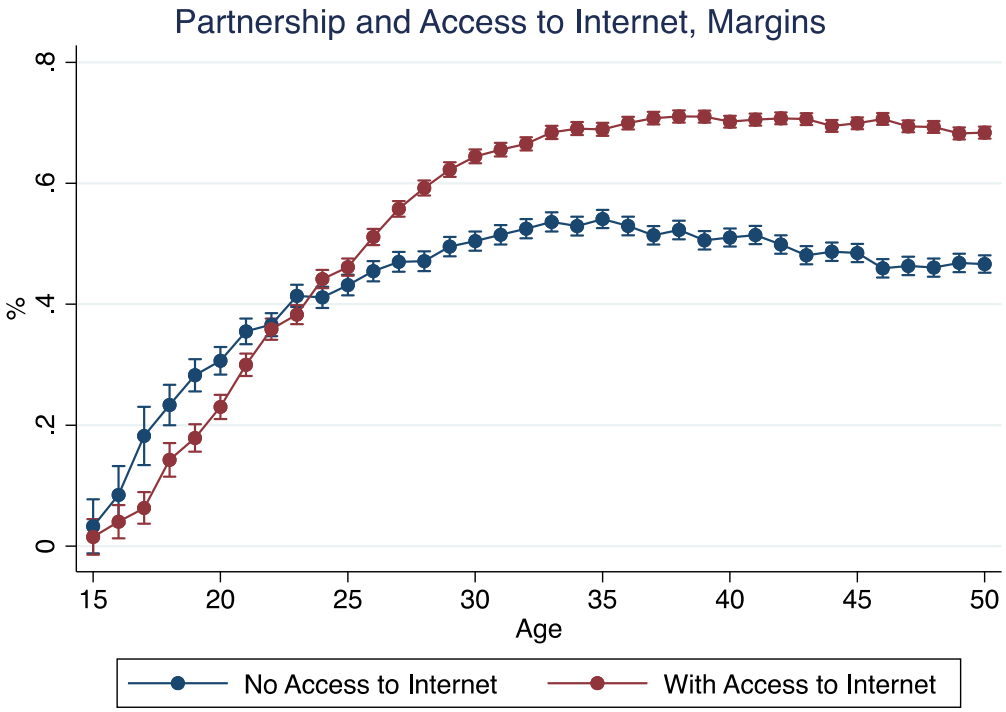
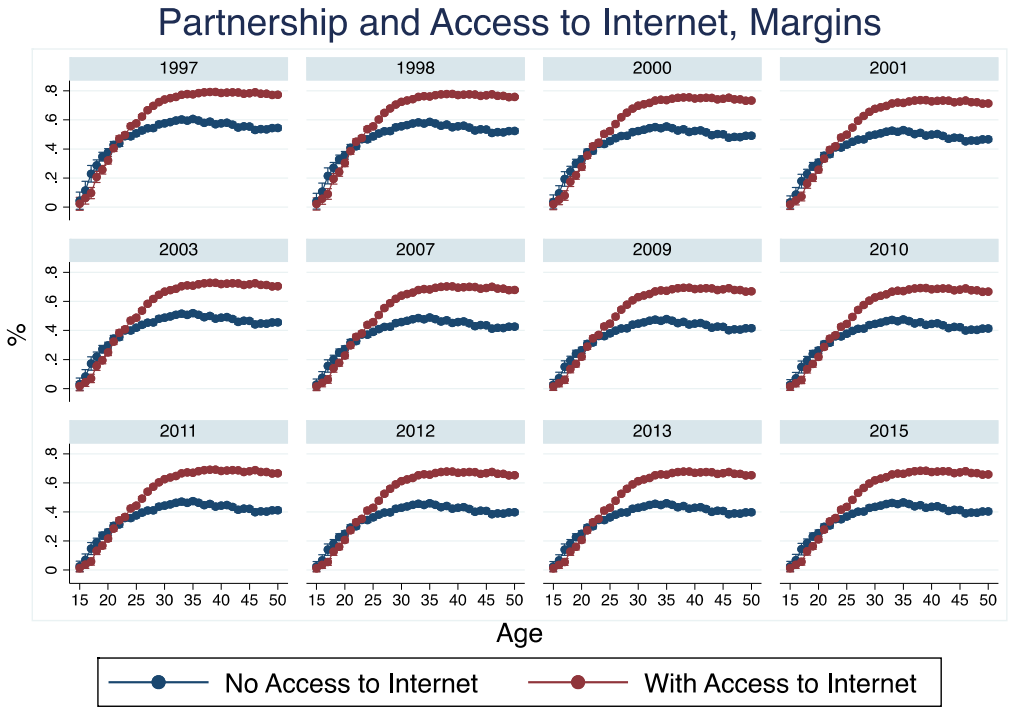


Figure 3. Predicted probability of being in a partnership by internet access and year (CPS)



Multinomial Logistic Regression Analysis

We run multinomial logistic regression models in order to consider confounders that could influence the association between Internet access and partnership status, and to distinguish between heterosexual and homosexual unions. Table 6 reports the results of three different specifications: Model (1) includes Internet access, age and age^2 (all ages are included), gender, ethnicity, if living in a metro area, state and year dummies; Model (2) adds level of education. family income, weekly earnings from current job, number of weeks of continuous unemployment, and the number of children in the household; Model (3) includes the interaction term between age and Internet access.

The results are very similar to what we find using the NLSY97, except that the odds ratios for the main Internet access effect are greater than one for both heterosexual and homosexual unions, given the higher proportion of people who are 25 years old and older in the CPS sample. The results remain similar also when we include the socioeconomic and demographic confounders, with slightly smaller odds ratios. When we include the interaction between age and Internet access, we observe that the odds ratio becomes smaller for heterosexual unions (OR=1.215, $p<0.01$) but still greater than one, while it becomes lower than one for homosexual unions (OR=0.482, $p<0.01$). The interaction term is greater than one and significant for both heterosexual and homosexual partnerships (OR= 1.007, $p<0.01$ and OR=1.036, $p<0.01$).

The multinomial logistic regression models confirm that there is an interaction between age and Internet access, and that the predicted probability of being in a union is higher for those who do have access to the Internet after a specific age (after 25 on average, but it changes slightly by year). To have a better visual picture of this interaction, and make sure that it holds for every year, in Figure 4 we replicate Figure 3 including the same covariates included in the multinomial logistic regression models (and capping the age at 50)

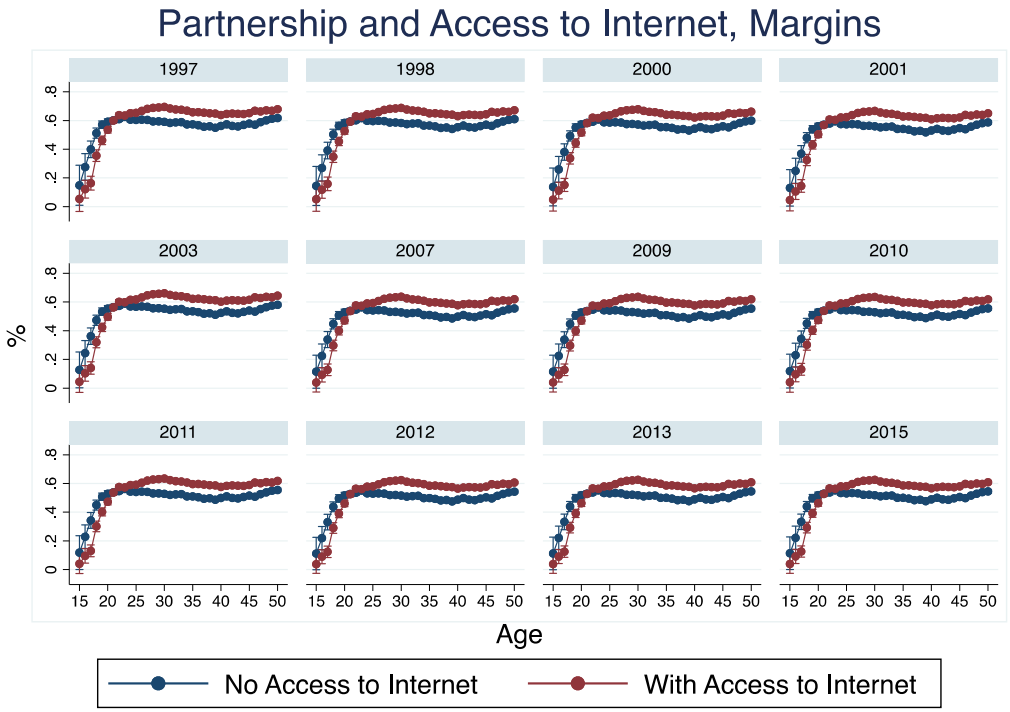
Table 6. Multinomial multilevel regression models (CPS)

Y = being in a partnership (Ref: No)	Heterosexual Partnership			Homosexual Partnership		
	(1)	(2)	(3)	(1)	(2)	(3)
Internet Access	**2.488*** **	**1.699*** **	**1.215*** **	**3.661*** **	**2.477*** **	**0.482*** **
	(0.016)	**(0.013)**	**(0.024)**	**(0.262)**	**(0.187)**	**(0.109)**
Age	**1.106*** **	**1.053*** **	**1.045*** **	**1.172*** **	**1.178*** **	**1.139*** **
	(0.001)	**(0.001)**	**(0.001)**	**(0.012)**	**(0.013)**	**(0.014)**
Age^2	**0.999*** **	**1.000*** **	**1.000*** **	**0.998*** **	**0.998*** **	**0.998*** **
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
Female	0.375***	0.344***	0.344***	0.783***	0.843***	0.847***
	(0.002)	(0.002)	(0.002)	(0.037)	(0.040)	(0.040)
Race (Ref: White)						
Black	0.512***	0.510***	0.508***	0.236***	0.327***	0.325***
	(0.005)	(0.006)	(0.006)	(0.027)	(0.037)	(0.037)
Hispanic	1.337***	1.229***	1.216***	0.627***	0.946	0.917
	(0.014)	(0.015)	(0.015)	(0.058)	(0.090)	(0.087)
Asian	1.293***	1.293***	1.305***	0.385***	0.405***	0.414***
	(0.024)	(0.026)	(0.026)	(0.065)	(0.069)	(0.070)
American Indian	0.729***	0.696***	0.692***	0.611	0.79	0.786
	(0.021)	(0.022)	(0.022)	(0.188)	(0.243)	(0.241)
Other/Mixed	0.929***	0.973	0.976	0.692**	0.82	0.825
	(0.020)	(0.023)	(0.023)	(0.125)	(0.148)	(0.148)
Metro Area (Ref: Not in Metro Area)						
Central city	0.566***	0.545***	0.546***	1.866***	1.418***	1.430***
	(0.005)	(0.006)	(0.006)	(0.164)	(0.127)	(0.128)
Outside central city	0.952***	0.777***	0.777***	1.274***	1.013	1.014
	(0.008)	(0.007)	(0.007)	(0.112)	(0.090)	(0.090)
Missing/Unknown	0.868***	0.813***	0.813***	1.243**	1.107	1.109
	(0.008)	(0.008)	(0.008)	(0.109)	(0.098)	(0.098)
Level of Education (Ref: < High School)						
High School Diploma		0.981*	0.971***		0.865	0.838
		(0.010)	(0.010)		(0.110)	(0.106)
Some College		0.772***	0.765***		1.032	0.999
		(0.008)	(0.008)		(0.128)	(0.124)
College Degree or more		0.649***	0.644***		1.246*	1.211
		(0.008)	(0.008)		(0.155)	(0.150)
Family Income in 1997 (Ref: < $25,000)						
$25,000-49,999		2.361***	2.355***		1.474***	1.461***
		(0.020)	(0.020)		(0.122)	(0.121)
$50,000-74,999		4.385***	4.383***		2.278***	2.261***
		(0.045)	(0.045)		(0.199)	(0.197)
$75,000 and over		8.764***	8.774***		5.249***	5.186***
		(0.098)	(0.098)		(0.428)	(0.423)
Missing		2.362***	2.368***		0.998	0.997
		(0.027)	(0.027)		(0.144)	(0.144)
Weekly earnings, current job		1.000***	1.000***		1.000***	1.000***
		(0.000)	(0.000)		(0.000)	(0.000)
Continuous weeks unemployed		1.000	1.000		1.006***	1.006***
		(0.000)	(0.000)		(0.002)	(0.002)

Number of own children in household		1.916***	1.912***		0.676***	0.671***
		(0.007)	(0.007)		(0.026)	(0.025)
Internet Access*Age			**1.007*** **			**1.036*** **
			(0.000)			**(0.005)**
Constant	0.252***	0.274***	0.358***	0.000***	0.000***	0.000***
	(0.009)	(0.011)	(0.015)	(0.000)	(0.000)	(0.000)
N	619,158					

* p<0.10, ** p<0.05, *** p<0.01. All the specifications include dummies for State and Year.

Figure 4. Predicted probability of being in a partnership by Internet access and by year – with confounders (CPS)



Robustness Checks

For both datasets we perform additional analyses, as robustness checks, to make sure that the results described so far are not driven by specific subgroups of the population in our sample or by the type of variables we selected and included in the analysis.

The first robustness check refers to gender, and we replicated the regression analysis for both NLSY97 and CPS separately for men and women. The results are reported in the Appendix. The general pattern is very similar across gender. As for the CPS analyses, two things need to be noted: First, the predicted probability of being in a union (Figure A1) is higher among men than

among women at all ages, independently of Internet access; Second, the critical age at which Internet access is associated with a higher probability of being in a union is later for men than for women (25-27 among men and 21-24 among women). This result seems to be in line with the fact that women enter unions earlier than men, and possibly that they are ready to settle down earlier, using the Internet to help find a partner. The positive association at 'older' ages fades among women when they approach age 50, but it stays positive among men. When we replicate the regression analyses stratifying by gender and homosexual vs. heterosexual relationships (Tables A1 and A2) the results show similar findings as in the aggregate analysis, except for the fact that the main effect of Internet access in Model (3) is not significant anymore among men in homosexual relationships. The same is true when we stratify the analysis in the NLSY, even though in this case we couldn't distinguish between homosexual and heterosexual partnerships given the much smaller sample size. The results (Table A3) show similar findings as in the aggregate analysis, with a negative coefficient for the main effect and a positive interaction between age and Internet access.

We perform two additional robustness checks[5], different for the CPS and for the NLSY97 given the different nature of the datasets. The CPS one has to do with the way in which respondents access the Internet. So far, all the analyses have been carried out using Internet access from home (either they answer that they have access to Internet at home or they answer that the household has an Internet connection). Individuals might access the Internet outside the household and – especially for more recent years – they can have Internet connections through their mobile phone. It is possible that by considering only Internet access at home we are not picking up those who still use the Internet, but do not have a household connection. To

[5] We also replicated the existing analysis separately for different types of coresidential unions, i.e. cohabitation and marriage. In the CPS sample we need to note that the proportion of respondents who are cohabiting (4.8% of the whole sample) compared to those who are married (50.8% of the whole sample) is much lower, especially for older birth cohorts. As expected, the picture for marriage resembles very closely the general results, given that 91.4% of the coresidential partnerships recorded in our sample are marriages. As for cohabitation shows that the predicted probability of being in a cohabitation increases until age 23-24 and then consistently declines at older ages, predominantly because people move into marriages. However, we still observe an interaction between age and Internet access in the same direction (although this loses statistical significance): the predicted probability of being in a cohabitation is higher for those with no Internet access at younger ages (up until age 20) and then it becomes higher for those who do have access to the Internet until age 30. In the NLSY97, given the younger age of the sample, the proportion of people cohabiting is similar to those who are in a marriage. The regression results show that the findings are similar among those who marry and those who cohabit, except for non-significant results for homosexual cohabiting relationships (results for both the CPS and the NLSY analyses are available upon request).

overcome this limitation, we repeat the analysis reported in Figure 4 using all the available information on Internet access. In particular we use the following variables: whether the *household* has Internet connection, whether the respondent accesses Internet at *home*, whether the respondent accesses the Internet at *any location*, whether someone in household accesses the Internet *outside of the home*, whether the respondent uses the Internet at *someone else's house*, whether the respondent accesses the Internet at a *public library*, whether the respondent accesses the Internet at *school*. The results (reported in Figure A2 in the Appendix), show that independently on how the respondents in our sample access the Internet, the association with being in a partnership and the age interaction do not change. Also, the results are consistent across different years. The only differences worth noticing are that the predicted probability of being in a union is higher for those with Internet access after age 27, later than when using Internet access at home, and that the difference between the two groups at older ages is less marked than in the analysis with only Internet access at home.

The last robustness check for the NLSY97 is driven by the longitudinal nature of the data. In order to consider the possibility that the transition into a partnership and access to Internet may occur with a lag, and that we are interested in the role of internet access *prior to* partnership formation, we replicated the main analysis using a lagged version of Internet access. This check also addresses potential concerns linked to reverse causality, in case Internet access is enabled through partnership formation. In this way we measure Internet access prior to partnership formation and evaluate the association between access to the internet at *t-1* and partnership formation at time *t*. The results (Table A4 in the Appendix) show very similar findings as the main analysis, except for the fact that the main effect of internet access in Model (3) is not significant anymore among those in homosexual relationships.

Discussion

The digital revolution has fundamentally altered our lives, and this paper contributes to a burgeoning literature (e.g. Rosenfeld and Thomas 2012, Bellou 2015, Rosenfeld 2017, Dettling

2017, Billari et al 2019) that highlights the significant implications of the Internet for family and life course outcomes. We analyze the relationship between Internet access and the transition to partnership using longitudinal NLSY data, and the probability of being partnered using the CPS data. We use individual-level data from the NLSY97, which contains data on Internet access starting 2003 and partnership histories, as well as other socio-demographic (control) variables. The NLSY allows us to follow a cohort and examine how Internet access is associated with partnership transitions as the cohort grows older. We also analyze data from the CPS, which although cross-sectional in design, enables us to analyze the relationship between Internet access and partnership status for multiple periods (cross-sections) starting at an earlier stage of Internet diffusion from 1997 onward. Although the potential role of the Internet for partnership formation has theoretical plausibility and has attracted significant both scholarly and public interest, nationally-representative data sources that ask questions on Internet access, digital behaviors, and partnership history are surprisingly limited. Our work explores this interesting and important question by drawing on multiple data sources, and by examining this association with similar controls for socioeconomic and demographic confounders across different data sources, we assess if the associations are consistent across them.

Our findings suggest that those with Internet access are less likely to transition into a partnership for both heterosexual and homosexual partnerships at younger ages relative to those without access to the Internet, net of a wide-range of socio-demographic confounders. After the mid-20s, however, the relationship between Internet access and the transition to partnerships begins to change to a positive one. This association emerges for both the transition to homosexual and heterosexual partnerships. These results are found in both the NLSY and CPS analyses. We interpret these findings to suggest that access to the Internet is associated with a 'postponement effect', consistent with the idea that while at younger ages Internet access provides the opportunity to expand one's network and meet new people, it does not encourage young people to enter partnerships. An alternate explanation is that at younger ages Internet access is used for purposes other than partner seeking, or that Internet use linked to romantic

and sexual behaviors may vary by age. As individuals grow older and by their mid-twenties[6], Internet access is associated positively with their propensity to partner, which is consistent with ideas that emphasize the role of the Internet in facilitating an efficient partner search. Existing work suggests the effect of the Internet in facilitating partnership formation is likely to be stronger for those in 'thin markets', such as gays and lesbians. Our analyses from the CPS point in this direction, as the observed effect sizes are larger for homosexual partnerships, but findings from the NLSY are not larger among homosexual partnerships than those for heterosexual partnerships. We believe this may be driven by the small number of homosexual partnerships that we observe in the NLSY. The fact that our findings are similar across the NLSY and CPS controlling for a set similar set of confounders suggest that the association between Internet access and partnership outcomes is not restricted to a specific cohort or set of cohorts. The age patterns in the association between Internet access and partnership status features across different periods in the CPS, suggesting that Internet access is a period change that occurs among different cohorts as Internet diffusion increases.

We acknowledge that our study suffers from a number of limitations. A significant limitation is that the data do not allow us to measure exactly how individuals use the Internet, and as a result, we cannot examine the different hypothesized mechanisms (e.g. linked to access to a wider pool of partners, improved information availability, or more frequent or intimate communication) through which Internet access is associated with partnership outcomes. Both of the data sources also do not collect enough information on dating histories to be able to examine mechanisms linked to expanded partner pools (e.g. increased dating frequency). As the CPS data are cross-sectional, we cannot distinguish the order of Internet access and partnership status. It could be that partnership formation, by pooling income, enables access to the Internet for some individuals rather than the other way around. In contrast, with the longitudinal data structure of the NLSY, we are able to analyze transitions in Internet access and partnership status

[6] As we discuss in the results section, the age at which the Internet access association with partnership formation changes from negative to positive varies for men and women. It is later for men than women.

– as well as analyze lagged Internet access variables which enable us to control for Internet access occurring prior to partnership formation. Nevertheless, a limitation of the NLSY data is that we are unable to capture the diffusion of the Internet as the Internet access question is only asked from 2003 onwards, when a significant fraction of the users already have access. While we control for a number of socio-demographic confounders in our analyses to compare non-Internet users with Internet users, it is plausible that the non-Internet users are a select group on other unmeasured or unobservable characteristics (e.g. personality traits) with implications for partnership formation. To the best of our knowledge, a dataset that tracks individual change in access to the Internet in a longitudinal perspective, including from when the technology had more limited use, and captures partnership transitions does not exist. In all of our analyses, we attempt to control for several relevant demographic and socioeconomic confounders, but ultimately, we recognize the potential of omitted variable bias and potential endogeneity of the Internet access variable precludes us from making causal claims.

Despite these limitations, we believe our findings provide support for hypotheses about the importance of the Internet for partnership formation. Although the effect of Internet dating has been considered in the literature, we have argued that the channels through which Internet access can affect partnership formation are more wide-ranging, including improved information about partners and the ability to have more immediate and private communication. Work by Bellou (2015) and Rosenfeld (2017) have shown a positive association between the Internet and partnership formation. While Bellou (2015) finds higher marriage rates in US counties that have better broadband availability, Rosenfeld (2017) finds that the transition to partnership is faster for heterosexual couples who met online compared to those who met offline. Using different data than ours, Rosenfeld and Thomas (2012) also report the probability of being partnered is higher for those with Internet access after controlling for other factors. Our findings are consistent with these studies, but our analysis further highlights the important dimension of age when considering the role of Internet access. Theoretically, we may expect that these effects may work differently over the life course as individuals enter different phases of life and we find

empirical support for this. We find that at younger ages in the life course, those with Internet access experience delayed partnership formation, which is consistent with our theoretical expectations. We find that the Internet access is positively associated with partnership propensities with age, presumably at a time in the life course when individuals feel ready to settle down.

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Appendix

Table A1. Multinomial multilevel regression models - MEN (CPS)

Y = being in a partnership (Ref: No)	Heterosexual Partnership			Homosexual Partnership		
	(1)	(2)	(3)	(1)	(2)	(3)
Internet Access	2.824***	1.930***	1.164***	4.355***	2.807***	0.560
	(0.026)	(0.021)	(0.034)	(0.483)	(0.327)	(0.216)
Age	1.109***	1.037***	1.025***	1.228***	1.249***	1.206***
	(0.002)	(0.002)	(0.002)	(0.021)	(0.024)	(0.024)
Age²	0.999***	1.000***	1.000	0.998***	0.998***	0.998***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
		(0.001)	(0.001)		(0.003)	(0.003)
Internet Access*Age			1.010***			1.035***
			(0.001)			(0.009)
N	325,442					

* p<0.10, ** p<0.05, *** p<0.01. All the specifications include dummies for State and Year. Model (1) controls for gender, ethnicity, state, metro area; Model (2): (1) + education, family income + weekly earnings + weeks of continuous unemployment + number children in the household; Model (3): (2) + Internet access * age.

Table A2. Multinomial multilevel regression models - WOMEN (CPS)

Y = being in a partnership (Ref: No)	Heterosexual Partnership			Homosexual Partnership		
	(1)	(2)	(3)	(1)	(2)	(3)
Internet Access	2.122***	1.469***	1.130***	3.208***	2.236***	0.480***
	(0.020)	(0.016)	(0.032)	(0.301)	(0.222)	(0.132)
Age	1.108***	1.057***	1.051***	1.132***	1.126***	1.092***
	(0.002)	(0.002)	(0.002)	(0.015)	(0.016)	(0.016)
Age²	0.999***	0.999***	0.999***	0.998***	0.998***	0.998***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
		(0.011)	(0.011)		(0.113)	(0.109)
Internet Access*Age			1.005***			1.035***
			(0.001)			(0.006)
N	293,716					

* p<0.10, ** p<0.05, *** p<0.01. All the specifications include dummies for State and Year. Model (1) controls for gender, ethnicity, state, metro area; Model (2): (1) + education, family income + weekly earnings + weeks of continuous unemployment + number children in the household; Model (3): (2) + Internet access * age.

Table A3. Multinomial multilevel regression models (NLSY97) - By Gender

Y = being in a partnership (Ref: No)	Men			Women		
	(1)	(2)	(3)	(1)	(2)	(3)
Internet Access	1.062	1.671***	0.095***	0.795***	1.103	0.011***
	(0.055)	(0.116)	(0.017)	(0.042)	(0.081)	(0.002)
Age	149.961***	244.105***	222.410***	130.914***	829.474***	693.626***
	(13.765)	(22.602)	(20.337)	(10.477)	(90.218)	(74.612)
Age^2	0.893***	0.879***	0.860***	0.877***	0.805***	0.783***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)
Internet Access*Age			1.419***			2.154***
			(0.036)			(0.047)
N	23,517 (2,613 men over 9 years)			26,100 (2,900 women over 9 years)		

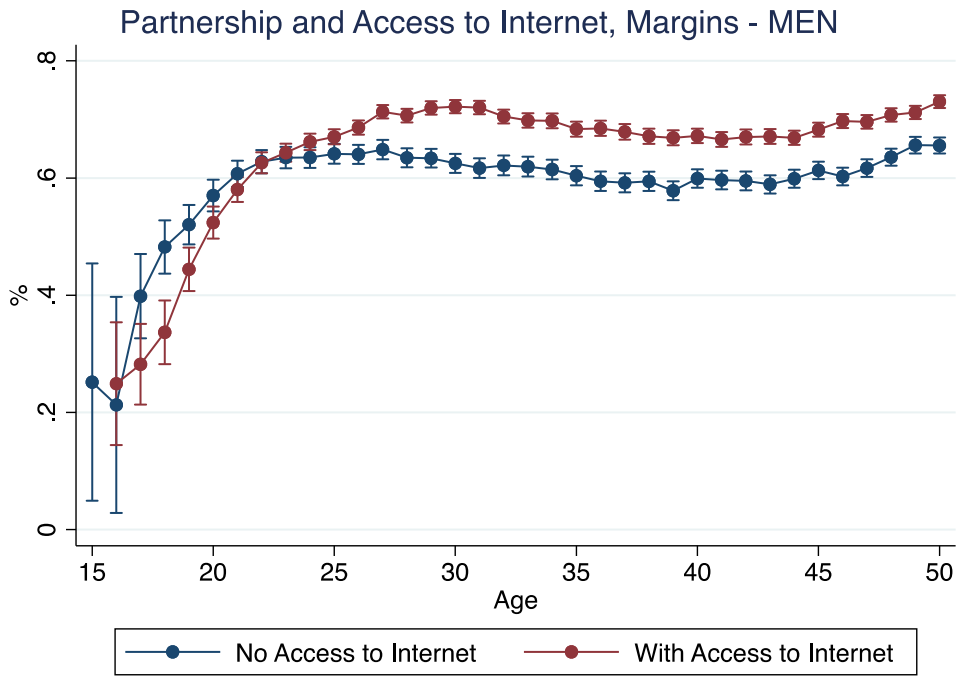
* p<0.10, ** p<0.05, *** p<0.01. Model (1) controls for gender, ethnicity, region, urban; Model (2): (1) + education, parents' education, family income, income from work, weeks of unemployment, previously married, previously cohabited, number of children in the household; Model (3): (2) + Internet access * age.

Table A4. Multinomial multilevel regression models (NLSY97) - Internet Access at t-1

Y = being in a partnership (Ref: No)	Heterosexual Partnership			Homosexual Partnership		
	(1)	(2)	(3)	(1)	(2)	(3)
Internet Access [t-1]	0.565***	1.064	0.518***	0.589***	1.051	0.544
	(0.054)	(0.104)	(0.128)	(0.088)	(0.165)	(0.238)
Age	7.673***	6.355***	5.916***	7.384***	6.849***	6.410***
	(0.499)	(0.454)	(0.442)	(0.828)	(0.796)	(0.786)
Age^2	0.949***	0.956***	0.956***	0.949***	0.953***	0.952***
	(0.004)	(0.004)	(0.004)	(0.007)	(0.007)	(0.007)
Internet Access [t-1]*Age			1.110***			1.101*
			(0.037)			(0.062)
N	44,104 (5,513 individuals over 8 years)					

* p<0.10, ** p<0.05, *** p<0.01. Model (1) controls for gender, ethnicity, region, urban; Model (2): (1) + education, parents' education, family income, income from work, weeks of unemployment, previously married, previously cohabited, number of children in the household; Model (3): (2) + Internet access * age.

Figure A1. Predicted probability of being in a partnership by Internet access and gender - with confounders (CPS)



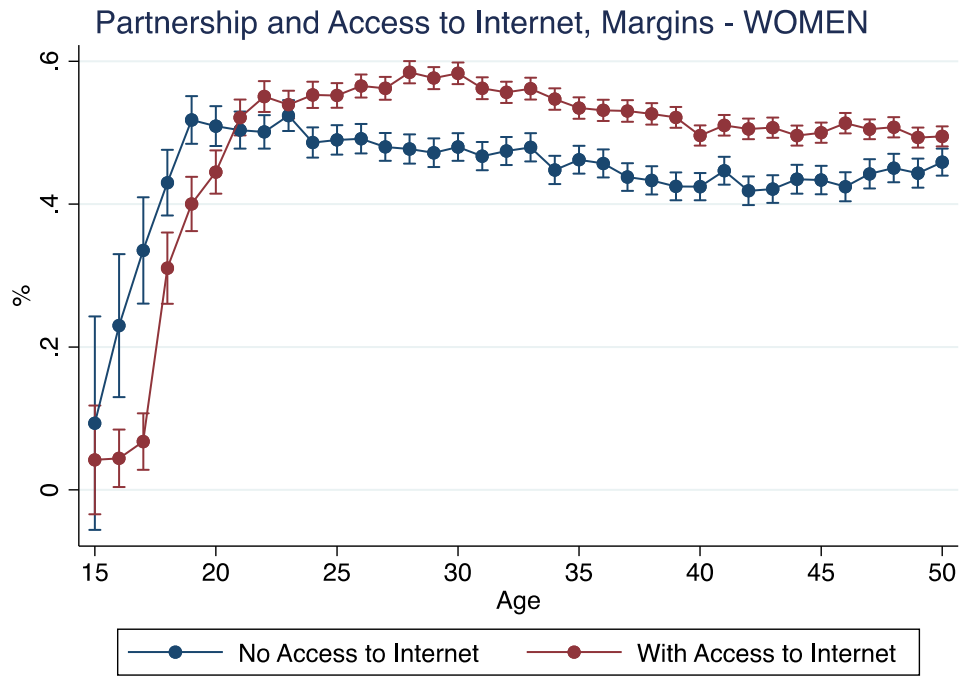


Figure A2. Predicted probability of being in a partnership by Internet access, All Locations - with confounders (CPS)