Can Anyone Be "The" One?
Field Evidence on Dating Behavior

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ABSTRACT

Much empirical evidence shows that female and male partners look alike along a variety of attributes. It is however unclear whether this positive sorting is the result of either assortative or agreed-upon preferences or of meeting opportunities. We assess the nature of dating preferences and the relative importance of preferences and opportunities in dating behavior using unique new data from a large commercial speed dating agency. We find that both women and men value physical attributes, such as age and weight, and that preferences are assortative along age, height, and education. The role of preferences, however, is outplayed by that of opportunities. Along some attributes (such as education, occupation and smoking) opportunities explain more than two-thirds of the estimated variation in demand. Along other attributes (such as age), the role of preferences is more substantial, but never dominant. These results will have important implications for our understanding of the degree of social openness and mobility.

NON-TECHNICAL SUMMARY

Marriage data show a strong degree of positive assortative mating along a variety of attributes. That is, spouses tend to look alike in terms of their age, race, socio-economic status, and physical appearance. But since marriage is an equilibrium outcome, it is unclear how this positive sorting comes about. Is it that people have a preference for similar partners? Or does everyone agree on which attributes are most valuable and consequently the most attractive men and women are matched to each other? Or is it that people are much more likely to meet people who are similar to theirs in their daily lives?

We assess the nature of dating preferences and the relative importance of preferences and meeting opportunities in dating behavior using unique new data from a large commercial speed-dating agency. In this setting, subjects meet potential partners (roughly 23 individuals of the opposite sex) for three minutes each and indicate whom they want to contact again. Subjects' choices in these speed dating sessions constitute real behavior with actual consequences: when two speed daters match, their details are given to one another, permitting the arrangement of more traditional dates. One intriguing aspect of speed dating is that participants can meet many different potential partners in one evening – a gardener, a high-school teacher, a bank manager – any of whom might be 'the one'. Speed dating therefore offers the unusual opportunity to meet and match with people who are different from those we meet in our daily lives.

We emphasize three facets of our results. First, both women and men value some easily observable physical attributes: women prefer men who are young and tall, while men are more attracted to women who are young and thin. We also find that partner's education and occupation have an impact on desirability, irrespective of gender. Second, there is mild positive sorting in dating preferences along a number of characteristics. Women and men prefer partners of similar age and education, while the evidence that people prefer partners of higher status or that all have the same preferences over the absolute value of a partner's trait is weak. Third, the impact of dating preferences is countervailed by the meeting opportunities available to speed daters. Of the estimated variation in attribute demand, preferences can explain no more than 20-30 percent along education, occupation and smoking, and up to 50 and 60 percent along age for female and male subjects, respectively. The rest is accounted for by opportunities. This result emphasizes the notion that mating requires meeting: the pool of potential partners shapes the type of people to whom subjects propose and, ultimately, with whom they form longterm relationships.

The result that many traits (including education and occupation) can explain little of the variation in people's desirability in speed dating events is noteworthy, especially because these attributes have been reported as important determinant of mate preferences in other circumstances.

1. Introduction

A. Motivation

A well established tradition of social research has documented the strong resemblance of traits and social status between husbands and wives.[1] Individuals of both sexes tend to choose mates of similar age, race, socioeconomic status, and physical appearance. Social analysts have long recognized that this positive sorting can be the result of, at least, three different forces (for reviews, see Kalmijn [1998] and Kurzban and Weeden [2005]). First, women and men may have a preference for individuals with attributes similar to theirs. This idea of positive *assortative* preferences leads to positive marital sorting quite naturally. Second, all women and men value the same attributes equally so that they all agree on who are the most desirable mates. This notion of *agreed-upon* preferences is rather different than the previous one but again leads to positive sorting in equilibrium without contradicting the observation that many individuals are in relationships with partners other than those at the top of the market. Third, women and men are more likely to meet individuals similar to them, that is, their *opportunities* are limited to partners similar to them.

Identifying which of these three forces drives the observed positive sorting in marriage is hard, because marriage is an equilibrium outcome arising from a process that entails searching, meeting and choosing one another. While preferences are an obvious driver of mate choice, knowing the exact nature of the preferences behind such a choice is less obvious and debate on this issue is quite open (Kalmijn, 1998; Buss, 2003; Kurzban and Weeden, 2005). Some analysts argue that individuals prefer those who are similar to themselves on relevant dimensions (Berscheid et al., 1971; Thiessen, Young and Delgado, 1997). For example, similarity of values and tastes gives partners' a better chance to participate in joint activities, leads to mutual confirmation of each other's behavior and lifestyle, and creates a common basis for conversation and affection (DiMaggio and Mohr, 1985; Kalmijn 1994): a natural outcome of this "likes-attract" mechanism is positive marital sorting. Other social researchers claim that mate preferences are similar across all

[1]Early studies on mating date back to Westermarck (1903) and Hamilton (1912). The economics literature, which has grown out of Becker's (1973, 1974) seminal work, has produced models that can generate wide arrays of marital sorting (Lam, 1988; Bergstrom and Bagnoli, 1993; Burdett and Coles, 1997; Shimer and Smith, 2000; Choo and Siow, 2006; Smith, 2006). Kalmijn (1998), Cooper and Sheldon (2002) and Blossfeld and Timm (2003) provide broad surveys of studies by sociologists and psychologists.

individuals and primarily reflect traits that are evolutionarily advantageous (Buss, 2003; Buston and Emlen, 2003). People compete with others to search for mates with valuable resources. The result of this competition is that the most attractive candidates select amongst themselves while the least attractive ones must rely on one another. Competition for salient resources on the marriage market, therefore, leads to an aggregate pattern of positive assortative mating. Although the existing evidence on final matches reveals strong positive sorting, establishing whether this is the result of assortative dating preferences or not is of considerable interest. Indeed it may be relevant not only for its implications for theory but also for our understanding of how marital sorting comes about.

In addition, people choose partners from the pool of individuals they normally interact with. This pool (and, thus, dating opportunities) can be directly shaped by a preference for meeting specific individuals.[2] Disentangling the role of preferences (irrespective of whether they are assortative or agreed-upon) from that of opportunities is also important, since it provides us with clearer insights on mate selection and family formation and it enhances our understanding of how assortative mating occurs. In particular, our view of the openness of the marriage market or a society would be strikingly different if we knew that the observed patterns of positive sorting were driven by segregation rather than by individual preferences. For instance, if marrying within the same group (endogamy) is the result of missing opportunities, residential mobility initiatives like the Gautreaux program in Chicago (Keels et al., 2005) or universities' efforts to mix students with different background in classes and dorms (Marmaros and Sacerdote, 2006) may offer individuals the possibility to meet (and eventually match with) potential partners from diverse groups and with different attributes. If, instead, endogamy is the result of preferences, policy makers will have less room for redressing the potential segregation problems entailed by mate selection. Indeed, the results in Keels et al. (2005) and Marmaros and Sacerdote (2006) indicate that opportunities shape people's life chances and decisions quite considerably.

Very few studies of marriage have been able to isolate the influence of individual preferences from that of market availability. This is because most of the existing empirical work has been performed on data that contain only final matches between females and males

[2]A further empirical complication is that information on opportunities is usually not collected in standard surveys, and separate identification of the effects of preferences and opportunities is therefore not straightforward.

(i.e., marriages and cohabitations), which do not have direct information on opportunities.[3] We overcome this shortcoming by studying data from a large speed dating agency based and operating in the United Kingdom. In this setting, subjects meet potential partners (roughly 23 individuals of the opposite sex) for three minutes each and indicate whom they want to contact again.[4] Subjects' choices in these speed dating sessions constitute real behavior with actual consequences: when two speed daters match, their details are given to one another, permitting the arrangement of more traditional dates.

The speed dating setting is a compelling example of a naturally occurring market and offers some of the key advantages of field experiments (Harrison and List, 2007). Speed daters are not a convenience sample but a "population in the field". In every session, they meet a wide range of other participants, about whom they have no prior information, and can select potential partners only after meeting them. This is an advantage compared to other forms of mediated dating (e.g., personal advertisements and online dating), where part of the selection process occurs before the first actual (physical) meeting, and is usually based on self-reported and not fully verifiable information (Lynn and Shurgot, 1984; Hitsch, Hortaçsu, and Ariely 2006). Our data, therefore, provide a precise measurement of the meeting opportunities subjects have in a particular session, with such opportunities being considerably diverse. Importantly, this design gives us direct information on individual revealed preferences (i.e., whether or not subjects want to have a future date with their potential partners) as well as on the specific aspects of each dating session, which we call "market" (e.g., number of participants and their characteristics).

B. Related Literature

A small number of recent studies have analyzed mate selection taking advantage of the experimental setting of speed dating. Kurzban and Weeden (2005) use data from Hurry-Date, a large dating company operating in major metropolitan areas in the United States, to investigate the choices that approximately 2600 subjects make in dating partners. Their

[3] At the cost of model-specific functional form identifying restrictions, this has been achieved with the estimation of structural parameters of marriage (final match) models as in Wong (2003), Bisin, Topa, and Verdier (2004), and Choo and Siow (2006).

[4] Throughout the paper, the individual who makes the decision is labeled as "subject" and the individual who is decided upon as "partner".

main estimates show that female and male subjects have strong agreed-upon preferences rather than assortative preferences: they are equally attracted by physically observable attributes like weight, height, and age, and much less so by other attributes such as education and religion. They also report evidence of small positive assortative patterns along race and height.

Fisman et al. (2006a) base their experimental design on the HurryDate format to analyze a sample of about 400 students at Columbia University, with the objective of identifying gender differences in dating preferences. Their results slightly differ from those found by Kurzban and Weeden (2005): only men exhibit a preference for physical attractiveness while women respond more to intelligence and race. They too find some evidence of positive sorting, with male subjects valuing women's intelligence or ambition only if it does not exceed their own. They also document the importance of group size, whereby women (but not men) become significantly more selective in larger meetings. In a companion paper using the same data, Fisman et al. (2006b) investigate racial preferences in dating and highlight the importance of the interplay between preferences and opportunities. Their finding that women have stronger racial preferences than men is not consistent with the results reported in Kurzban and Weeden (2005).

Hitsch, Hortaçsu, and Ariely (2006) follow a different approach. They use data from a large sample of users of a major online dating service in Boston and San Diego to analyze how individual characteristics affect the likelihoods of having a personal profile browsed, being contacted, and exchanging contact information via e-mail. Although online daters do not physically meet, their study confirms some of the previous evidence. For example, in line with the results discussed in Fisman et al. (2006a), they find that women put more weight on a partner's income than men do; and, consistent with Fisman et al. (2006b), women have a more pronounced preference to form a match with men of their own ethnicity.

C. Our contribution

Our work makes two substantive contributions. First, we aim at getting an insight into the nature of people's dating preferences by disentangling the role of assortment relative to that of agreed-upon preferences in dating choice decisions. Second, because we have information on many speed daters, several of whom participate to more than one event,

and on a large number of speed dating sessions, we can analyze the relative importance of individual preferences and market opportunities in explaining the observed patterns of dating behavior. Knowing both such aspects of mate selection is crucial if we try to unpack why people are more likely to form unions within their group (endogamy) or with partners close in status (homogamy).

We emphasize three facets of our results. First, both women and men value some on easily observable physical attributes: women prefer men who are young and tall, while men are more attracted to women who are young and thin (Kurzban and Weeden, 2005). We also find that partner's education and occupation have an impact on desirability, irrespective of gender. Second, there is mild positive sorting in dating preferences along a number of characteristics. Women and men prefer partners of similar age and education (DiMaggio and Mohr, 1985), while the evidence that people prefer partners of higher status (Mare, 1991) or that all have the same preferences over the absolute value of a partner's trait (Waynforth and Dunbar, 1995) is weak. Third, the impact of dating preferences is countervailed by the meeting opportunities available to speed daters. Of the *estimated* variation in attribute demand, preferences can explain no more than 20-30 percent along education, occupation and smoking, and up to 50 and 60 percent along age for female and male subjects, respectively. The rest is accounted for by opportunities. This result emphasizes the notion that mating requires meeting: the pool of potential partners shapes the type of people to whom subjects propose and, ultimately, with whom they form long-term relationships (Kalmijn and Flap, 2001).[5]

The rest of the paper unfolds as follows. Section 2 introduces the speed dating protocol. Section 3 describes our data, compares them to other representative data on British singles, and documents the variety of participants' attributes in the sample. In Section 4 we discuss our findings on attribute demands. We perform this analysis with the objectives of comparing our results to those already existing in the literature and documenting the extent of positive assortment and agreed-upon preferences in this dating environment. Such results are then used in Section 5, where we present the estimates of a simple model which allows us to assess the relative importance of opportunities and preferences. Sec-

[5]Of course, preferences for attributes which we cannot observe (e.g., ethnicity, ambition and intelligence) may still play a substantial role.

tion 6 discusses our main findings emphasizing caveats and interpretations, and Section 7 concludes.

2. The Speed Dating Protocol

Speed dating offers single individuals the opportunity to meet a large number of potential mates over a short pre-determined period of time. It has become very popular among dating intermediaries, with several commercial agencies organizing events in countries like the United States, Canada, Australia, Germany, France, and the United Kingdom.[6]

We use data from one of the biggest UK private agencies that operates in small and large cities across the country. Participants register for an event that takes place in a specific location during the evening in a bar or club. Participants pay a fixed fee, which varies with location and occasional discounts. They also receive a "guarantee" that allows them to go back for free in case they did not propose to anyone, but in our sample this has been exercised rarely. There is no specified maximum number of women and men who can participate in each session, although there are rarely more than 30 women and 30 men. Events are stratified by age (23-35 and 35-50 are typical age ranges) so that individuals of roughly the same ages participate in the same session.[7] Bookings are made on the Internet or, less frequently, by phone. Individuals can book for an event as long as there are enough places available. The agency does not screen participants, nor does it intervene in the allocation of participants across events. Hence, each event gathers a broad set of individuals with fairly heterogeneous attributes (see the next section).[8]

In general, participants arrive for the event and, at registration, are given a starting table number, a label tag with a chosen film star alias, a pen and a card for indicating the alias of the people they wish to meet again (we shall refer to this choice as a *proposal*). Half an hour after registration, the host explains how the evening works, and then the session

[6] An updated list of agencies is available at `http://dmoz.org/Society/Relationships/Dating/Speed-Dating`.

[7] The suggested age range is only a guideline and it is not binding; anyone is free to participate, even outside her/his age range. Events with asymmetric age ranges (e.g., women 27-40, men 28-42) are also run occasionally. They represent, however, a small proportion of the sessions contained in our data set.

[8] The size of a market may be not random because the agency tries to organize events with 20-25 individuals on each side (profitability and participants' interest being the main explanations). This information, however, is not known to speed daters. Furthermore, to the best of our knowledge, no meeting had to be canceled because of excess or paucity of participants.

begins. People sit at the assigned table, with women usually staying seated at the same table and men moving around. Each date lasts for three minutes. After a date, men have about 30 seconds to move to the next table, and a new date begins. After eight individual dates the session stops, and participants can move around and get a quick drink from the bar before another round of eight three-minute dates starts. A typical evening consists of three such rounds, after which participants can stay in the bar to chat to others or leave.

Participants communicate their proposals to the agency right after the event. There is no limit to the number of proposals subjects can make from the pool of participants. In fact, each individual can be matched more than once. The agency collects all these proposals and exchanges contact details only between participants who have a *match*, i.e., those who propose to each other. Participants are recommended to create a personal profile on the agency's website reporting information on age, education, occupation, basic physical characteristics (weight, height, eye color, and hair color), interests (hobbies and activities outside work), smoking habits, and family situation (presence of children). This information is self-reported and is not verified by the agency in any formal way. Profiles are accessible by all participants *after* the event only, and can be consulted before communicating the proposals. Some characteristics in the profile are presumably easier to verify than others. Because participants have personally met, they are likely to have a good idea of each other's physical appearance. Thus, differently from other forms of mediated dating — such as small ads or on-line dating — the incentives to lie about characteristics that are easily verifiable are perhaps reduced.

3. Data Description

We have data on approximately 1800 women and 1800 men who participated in 84 speed dating events organized between January 2004 and October 2005. Table 1 presents the summary statistics of these meetings. On average, an event gathers 22.3 men and 22.3 women. Most events do not have exactly equal numbers of women and men, but the difference in numbers rarely goes beyond three. The participation fee across all markets is just below £20 per session (the median is £20), and ranges from £10 to £25. As mentioned earlier, participants who did not make any proposal are entitled to go back to a subsequent

event for free. About 38 percent of men and 46 percent of women do not choose anyone, and three-quarters of the non-proposing men and almost half of the non-proposing women in the sample go back another time. Proposers too go back another time, albeit at a smaller rate on average (about 10 and 20 percent for women and men, respectively).

Striking gender differentials in proposal behavior are observed in the data. As emerged in many previous psychological studies (Trivers, 1972), women are much choosier than men. On average, women choose 2.6 men and see 45 percent of their proposals matched, while men propose to 5 women and their proposals are matched in only 20 percent of the cases. About 36 percent of men and 11 percent of women do not get any proposal. Overall, we observe 22 matches per event, an average of roughly one per participant.

To have a better understanding of speed daters' characteristics, we compare them to a representative sample of singles taken from the British Household Panel Survey (BHPS).[9] For this comparison, we use information from the fourteenth wave (2004) of the BHPS, and restrict the BHPS sample to individuals aged between 20 and 50. The summary statistics by sample are reported in Table 2. The differences across samples are notable. Speed dating participants are more educated on average (about two thirds of men and women have at least a university degree, against 20 percent of singles in the BHPS), and are more concentrated in relatively high-skilled occupations (83 percent of men and 76 percent of women are in 'skilled non-manual' and 'professional and managerial' jobs, as opposed to 40 percent in the BHPS). Our sample therefore fits the popular view about speed dating markets, according to which they seem to attract a disproportionate fraction of career people (Kurzban and Weeden, 2005).

Speed daters are also older than their BHPS counterparts (especially men, who are 5 years older on average). But if we restrict the BHPS sample to individuals with at least a university degree, the age differentials are reversed: male and female speed daters are 1 to 4 years *younger*, respectively. The average height is similar in both samples, slightly below 180 centimeters for men and around 165 centimeters for women. The average weight is comparable among men in the two samples, but it is much lower for female speed daters, and this difference does not disappear even if the BHPS sample is restricted to highly

[9]Since 1991, the BHPS has annually interviewed a representative sample of about 5500 households covering more than 10000 individuals. More information on the BHPS can be found at `http://www.iser.essex.ac.uk/ulsc/bhps/doc/`.

educated women. Dividing weight (measured in kilograms) by height squared (measured in meters), we obtain the Body Mass Index (BMI), which we include in our empirical analysis. General health guidelines associate 'normal' weight with a BMI between 18.5 and 25, and define 'underweight' when BMI is below 18.5 and 'overweight' when BMI is above 25. The shares of overweight men and, in particular, women are substantially larger in the BHPS sample than in the speed dating sample. The two sets of figures do not get closer even when the BHPS sample is restricted to more educated respondents.

It is worthwhile noting that in the speed dating sample there are substantially fewer women reporting weight information than men. Our demand analysis in Section 4 will try to minimize the resulting loss in sample size by assigning participants with missing weight information to the (base) normal weight category and identifying them with a missing weight dummy variable. We shall proceed in a similar fashion for all the variables with missing information (except age, because we restrict the sample to individuals with valid age data). Alternative assignment rules (e.g., substituting missing values with market mean or modal values computed on valid cases) have delivered exactly identical results to those discussed below and are, therefore, not reported. However, we will discuss the estimates for the dummy variables that record missing information.

Finally, smoking is more prevalent among BHPS respondents, with 36 percent of men and 38 percent of women smoking against 9 and 13 percent respectively in the speed dating sample. Limiting this sample to highly educated participants does not eliminate the differences but reduces them by more than half. Speed daters may believe that smoking reduces their overall desirability and, consequently, are more likely to misreport this information. However, as it was also the case for other attributes, many of the observed differences with respect to the general BHPS population of singles seem to be driven by the fact that speed daters are relatively older, more educated, and employed in better jobs.

Despite this sample selection issue,[10] our analysis does not suffer from the "articulation effect" mentioned in Fisman et al. (2006a). This emerges when subjects are asked to rate their partners on particular attributes at the same time as they propose to them. In such cases, it is possible that the proposal decision is affected by the reasoning on which the rating itself is determined. Because in our data set subjects do not have to articulate

[10]Concerns of sample selection also apply to all the other existing studies of speed dating experiments.

reasons for a specific decision and are never asked to rate partners (other than choosing them), the results below should not be driven by reason-based choice.

We have already mentioned in Section 2 that an attractive feature of the speed dating protocol is that no one has prior information about who will be attending an event. Events are filled up on a first-come/first-served basis, that is, the agency does not screen participants ex ante. But because individuals select a meeting with specific age bands, location and time, and because these aspects of the event are likely to be correlated with individuals' attributes, the choice set faced by participants may not be exogenous to their preferences. In fact, it could even be the case that individuals choose to attend specific events because they anticipate to meet certain desired types of potential partners. For example, speed daters might prefer people who have similar characteristics to theirs, so that they select events where they expect to meet people with attributes correlated to theirs. If this is the case, we will observe a systematic (non-zero) correlation in female and male characteristics across sessions with the odds of meeting partners with similar attributes being greater than the odds of meeting partners with different attributes. This, however, should not compromise the identification of the effect of opportunities on proposals, as long as there is enough variation in partners' attributes in each event. Admittedly, the coefficients of variation reported in Table 2 (in italics) provide evidence of a lower degree of dispersion in the speed dating sample than in the general population of singles along most of the observed characteristics, especially education and higher-level occupations. But we do not find significant differences in terms of other attributes, including age, height and weight.

To provide additional evidence, Figure 1 plots the distribution of female and male characteristics (means for age and height, and shares for the other attributes) across sessions. It shows a fairly random distribution of participants along all traits, except for age, which is not surprising. This is broadly confirmed by the correlation estimates reported in the first column of Table 3. Apart from age and smoking, the correlation between female and male attributes is close to zero and not significant. Furthermore, the second column of Table 3 reports odds ratios for all the female-male pairs in our sample.[11] Contrary to the

[11]Odds ratios are an appealing measure of endogamy because they have a simple interpretation: odds ratios greater than unity indicate that there is more endogamy than one would expect if individuals met at random. Moreover, odds ratios allow us to compare endogamy across attributes or groups because they

correlation results, the odds of meeting a similar partner are slightly (but significantly) greater than those of meeting a different partner for almost all attributes, with the exception of occupation and weight. Despite this result, such odd ratios are close to one and much lower than those generally found for women and men in final matches (Mare, 1991; Kalmijn, 1994; Pencavel, 1998). We, therefore, take these results as evidence of only mild sorting ex ante. We shall return to this non-random selection issue in the next two sections.

4. The Determinants of Proposals

In this section, we estimate attribute demands using a revealed preference approach. We look at all the proposals a subject can possibly make in a given market and examine which of the potential partner's observed attributes trigger a proposal. Our estimation method is similar to that adopted by Fisman et al. (2006a), with the revealed preference argument resting on the assumption that strategic incentives are low. Indeed, the scope for strategic proposals should be limited in our setting and lower than in other dating circumstances, since a speed dater does not normally know if she received a proposal from an individual unless she proposes to him and he proposes to her, and there is no limit to the number of proposals that can be made.

The Introduction also emphasized the need to study the nature of people's preferences in this environment. We thus examine the extent to which the pattern of observed proposals is driven by assortative preferences rather than by agreed-upon preferences. In this analysis, as well as in the related sensitivity checks, our primary goal is to detect whether or not there are systematic (assortative or agreed-upon) dating preference, that is, whether partners' attributes are systematically correlated to subjects' proposals. An explicit assessment of meeting opportunities and their importance relative to preferences is deferred to Section 5.

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are independent of the relative size of the groups under considerations. For a more detailed description, see Goodman (1979).

A. Baseline Estimates

Our basic regression specification is of the form

$$d_{ijm} = \mathbf{X}'_{jm}\beta + \mu_i + \epsilon_{ijm}, \tag{1}$$

where d_{ijm} is the proposal decision that subject i takes with respect to partner j in market m. This is equal to one if i proposes to j, and zero otherwise. The vector $\mathbf{X}_{jm}$ contains socio-demographic characteristics of potential partners in market m, μ_i is a subject-specific permanent effect, and ϵ_{ijm} is an idiosyncratic shock. For ease of interpretation, we estimate (1) with linear probability models using least squares regressions, which assume μ_i to be zero but account for the potential correlation of observations within markets, and random-effects regressions. Similar results were obtained with probit models which are therefore not reported.

The estimates are shown in Table 4.[12] Although the OLS and RE estimates are qualitatively similar, few differences along some attributes are statistically significant. But because the hypothesis that μ_i is zero is always strongly rejected, our discussion focuses on the random-effects results. Both OLS and RE models, however, explain relatively little (at most, between 4 and 9 percent) of the overall variation in proposals. This is an important point to which we will turn again in Section 5. Notice also that the hypothesis that the RE estimates are equal to those obtained from fixed-effects models cannot be rejected at conventional levels of statistical significance (see the p-value of the Hausman specification tests at the bottom of the table), suggesting that the correlation between potential partners' (and subjects') attributes and the unobserved propensity to propose is likely to be limited.[13]

More educated women are 10 percent more likely to receive a proposal than less educated women, but there is no evidence of a similar pattern on the other side of the market (i.e., in the case of women's demand). Men and women in manual and low-skill occu-

[12] In the regression analysis below, we enter age (in years) and height (in centimeters) linearly, distinguish individuals with degree or higher qualifications, have three occupational dummies, and separate overweight people from the others. We have tried a number of other specifications (e.g., polynomials in age and height, and more dummies for occupation and BMI), but all our main results were unchanged.

[13] As shown by the p-value of the 'joint significance' tests in Table 4, none of the indicators of missing information on partner's traits is significant in the female proposal regressions. The likelihood of male proposals is only reduced by women not reporting information on their weight. Women who do not report their weight may be less desirable because they might be overweight.

pations are about 10 percent less likely to get a date than their professional/managerial counterparts. In this setting, therefore, partner's education and occupation have a powerful impact on the desirability of both men and women.

Similarly, physically observable attributes have an effect on desirability. Men are more likely to receive proposals if they are young and tall, and women receive more proposals if they are young and slim. For example, an additional year of age reduces female desirability to men by 1 percentage point (which represents a 5 percent reduction in the male proposal rate) and male desirability to women by 0.5 percentage point (or 4 percent reduction in the female proposal rate). On average, five extra centimeters (nearly one standard deviation increase in men's height) will increase female proposals by almost 1 percentage point (a 9 percent increase in female proposal rates). An overweight woman, instead, will see her chance to get a proposal reduced by about 13 percentage points (a 60 percent reduction), which is consistent with earlier findings in the psychology and evolutionary biology literatures (Tovée et al., 1998; Thornhill and Grammar, 1999). If a woman smokes, her likelihood of receiving a proposal is reduced by almost 4 percentage points, and, if a man does, his likelihood goes down by almost 2 percentage points. It is worthwhile noticing that socioeconomic position and physical attributes are correlated in our sample. For male subjects, education is strongly positively correlated with both own age and height. For female subjects, instead, we find that height and weight are correlated with neither own education nor occupation, but age is negatively related to higher educational attainment. Regardless of gender, smoking is negatively associated with both education and occupation. When formulating their proposals, therefore, individuals (especially women) may be using partners' desirable physical attributes, such as height and age, as strong signals of their socioeconomic position (Hoppe, Moldovanu, and Sela, 2006).

B. Are Dating Preferences Assortative?

The estimates in the first two columns of Table 4 give us little information on the nature of dating preferences. For example, the result that younger individuals are more desirable to both women and men may be driven by an inherent preference among young speed daters (which would lead to positive assortative dating), or by an inherent preference among the old (which would lead to negative sorting along age), or both. Because we have

information on proposals and not on final matches, we can see whether preferences are assortative or reflect generally agreed-upon values. In particular, we examine if subjects propose to partners who are similar to themselves rather than partners with different attributes. Specifically, we estimate the influence of subjects' own characteristics on their demand for partners.[14] The random-effects estimates of this specification are in the last two columns of Table 4. For both men and women, the direct effects of partner's attributes are similar to those discussed earlier, with the exceptions of education in the case of male proposals and smoking in the case of female proposals (which both lose their statistical significance), and male height which retains significance but halves its impact on women's proposals.[15]

The remaining estimates in Table 4 offer mild evidence of positive assortative preferences. As before, physical attributes are important. Women are 4 percentage points (or 35 percent) less likely to propose to men who are shorter than they are and prefer partners who are 7 or more centimeters taller. They also fancy a date with men of similar age, being 27 and 44 percent less likely to propose to younger partners and partners who are more than 5 years older respectively. Men too prefer women who are younger by no more than 5 years and shorter by no more than 7 centimeters, and they are 27 percent less likely to propose if their potential partner is taller. Subjects who smoke prefer smokers (but these effects are not statistically significant at conventional levels), even though smoking is not seen as a desirable attribute.

Partner's desirability is also influenced by educational similarity. All subjects prefer partners with their own level of education to partners who are less educated than they are. In addition, both men and women tend to propose more to partners who are more educated, but this tendency is never statistically significant. We do not observe any positive sorting, instead, along occupational attributes, perhaps because these are difficult to assess more

[14]For this analysis, we use differences in age and height between men and women. In particular, we distinguish pairs in which the man is 7 centimeters taller from other pairs. Although this cutoff is arbitrary, 7 centimeters correspond to one standard deviation in the height distribution of married men and women aged 20-50 in the 2004 BHPS. Seven centimeters are also about half of the gender height difference among married couples. Similar considerations apply to the case of age, for which we distinguish men who are 5 or more years older than women.

[15]We also looked at the direct effect of subject's own attributes on proposal behavior. Both women and men are choosier (i.e., are less likely to propose) if they are older and more educated. We do not find any significant effect for the other attributes.

precisely or — as pointed out earlier — because subject may use physical attributes to proxy socioeconomic position.

In sum, preferences over the attributes considered here have a relatively limited impact on dating behavior, in terms of our ability to explain the observed variation across speed daters.[16] There are nonetheless two findings that are worth stressing. First, the effects of partners' physical attributes (height, BMI, and age) on male and female dating proposals are comparable to the effects of partners' socioeconomic position (education and occupation), with gender differentials in attribute demands being relatively small. These results are not entirely consistent with those found by Fisman et al. (2006a and 2006b) and Hitsch, Hortaçsu, and Ariely (2006) but confirm the findings presented in Kurzban and Weeden (2005), the only other study based on speed dating data from a large commercial company. Second, we find some evidence of positive assortative preferences along many observable attributes (age, education, and height). This confirms the earlier literature findings based on final match data, despite the short span of time that characterizes a speed dating meeting, and provides little support for the evolutionary notion that dating preferences are similar across individuals and must reflect properties that were advantageous in past environments. We shall use this evidence of assortative preferences in the analysis of Section 5, but before doing so we next consider the robustness of our results to a number of sensitivity checks.

C. Sensitivity Analysis

Children — To attend a speed dating session, individuals must be single, even though they may have children. Participants with children may face worse dating opportunities than those without children. But the inclusion of a dummy variable, indicating whether a potential partner has one or more children, did not change any of our previous estimates. Furthermore, having a child does not affect female desirability to men, while it mildly increases male desirability to women (but this increase is never significant at conventional levels).

Common interests — The data contain information on individuals' interest in seven ac-

[16]This result is robust to the inclusion of other potential determinants as illustrated in the next subsection.

tivities (film and music, sports, arts, traveling, restaurants and bars, outdoor recreation, and other activities) with binary responses. For each activity, we constructed an indicator variable that took value one if both subject and partner shared interest in that activity. We then summed these seven indicators up into one 'common interests' variable and used this in our regression analysis. The common interests variable is never correlated with women's proposals, and only slightly positively correlated with men's proposals, with such a correlation being primarily driven by shared interests in sports and restaurants and bars. More importantly, all our previous results are robust to the inclusion of this new variable.

Other physical traits — We have information on other physical traits (such as eye and hair color), which have not been used in our analysis so far. When we include partner's eye and hair color indicators in our regressions, the estimates in Table 4 are unaffected. Notice that these additional physical attributes are correlated neither with education nor with occupation. This latter result ties in well with the notion that, when formulating their proposals, subjects use partners' physical attributes as signals of socioeconomic position, but physical traits that are not economically salient will not be used in subjects' dating decision.

Popularity — Physical attributes may also be correlated with other traits, which are not observed by us but can be seen by all participants and may drive the estimated pattern of proposals (e.g., attractiveness and personality). To gauge these traits, we use the proposals to partner j made by all subjects other than i in any given market m averaged over all subjects in that meeting. We denote this by $\overline{d}_{-ijm}$, which can be seen as a measure of partner's general popularity. On average, women are more popular than men, simply because men choose relatively more women. Although our earlier findings are not sensitive to the inclusion of $\overline{d}_{-ijm}$ in our regressions, this variable is a powerful predictor of demand. A one percent increase in this measure increases the likelihoods of female and male proposals by about 5 percentage points, which represent 45 and 22 percent increases in women's and men's proposal rates, respectively. To the extent that $\overline{d}_{-ijm}$ reflects a potential partner's (possibly unobserved) consensual value, these estimates therefore suggest a strong role of agreed-upon preferences. When we include subject's own popularity in the analysis, however, we again find evidence of positive assortative preferences in general, with an interesting gender asymmetry: a woman is less likely to propose to a man if he is

more popular than she is, while a man is less likely to propose to a woman if she is *less* popular than he is.

Heterogeneous responses — Dating proposals may vary according to subjects' observable characteristics more substantially than what we have permitted so far. To see this, we estimated models that distinguish subjects by age, education, and occupation.[17] There is evidence of substantial heterogeneity.[18] For example, younger women prefer men who are younger too, have higher educational qualifications, and are in non-manual jobs. But older women tend to choose men who are older, taller, have lower educational qualifications, and do not smoke. More educated women prefer younger and more educated partners, while less educated women are generally less picky over men's attributes.

A good deal of heterogeneity emerges also in subjects' actual choices by age, education, and occupation. Younger and more educated men who are in managerial and professional occupations are 38 to 65 percent more likely to propose than their older, less educated, and in lower-level occupation counterparts. Similar differentials emerge among female subjects too. These differences, however, may arise not only because, say, less educated subjects are more selective, but also because the available pool of potential partners does not fit their preferences.[19]

5. Opportunities in the Speed Dating Market

The analysis of the previous section has given evidence in favor of positive assortative preferences rather than agreed-upon preferences along a number of attributes: speed daters — as well as individuals in final matches — display a preference for partners who look like them. The same analysis, however, showed that preferences alone could explain only a small fraction of the overall variation in dating proposals. There are two possible explanations for this. First, there is considerable heterogeneity in dating preferences. For

[17]Subjects are defined to be 'younger' if they have 35 or fewer years of age, and 'more educated' if they have university or higher educational qualifications.

[18]For the sake of brevity, we can only sketch some of these results. The estimates and a fuller description of this analysis are available from the authors.

[19]We also considered price and location of meetings as two additional sources of heterogeneity in subjects' proposal behavior. The results from this analysis reveal that differences in price and location have little overall effect on subjects' demand. That is, subjects' behavior in larger cities is not significantly different from the behavior of subjects in smaller cities; likewise, the proposal patterns in more expensive events mirror the patterns in cheaper events.

example, in a given market, some highly educated subjects may have a preference for highly educated partners and systematically propose to a larger proportion of them, while other highly educated subjects in the same market prefer less educated partners. If this is the case, preferences have powerful but offsetting effects on proposals, so that their net impact is muted. Second, speed daters put little weight on partners' attributes and proposals are driven not so much by preferences but by the pool of potential partners. Since our data contain information on several events and a non-negligible fraction of participants speed date more than once, we can disentangle one explanation from the other. In particular, we shall provide an assessment of the importance of meeting opportunities relative to that of dating preferences along each of the attributes considered so far.

A. A Simple Setup

If meeting opportunities are crucial in this dating environment, then there should be a close mapping between the attributes of potential partners in a given session and the attributes of the partners who, in the same session, receive a proposal. For example, suppose that subjects have no intrinsic (assortative or agreed-upon) preference for any particular attribute and dating is driven by meeting. Dating proposals, then, will be entirely determined by the pool of potential partners. On average, the share of proposals received, for instance, by highly educated people in a given speed dating session should be equal to the share of highly educated people in that same session. In this sense, therefore, anyone can be "the" one.[20]

More formally, let us contrast the observed mean (or share) of a given attribute computed over all partners in meeting m, $\overline{X}_{jm}$, with the mean (or share) of all partners who have been chosen by subject i in m, $\overline{X}^{(c)}_{jm}$. If subjects do not have a systematic preference for partners with a specific characteristic, this conditional mean should be identical to the overall market mean, i.e., $\overline{X}^{(c)}_{jm} = \overline{X}_{jm}$. For each attribute X, therefore, we can infer how opportunities and preferences interact from subject-level regressions of the form

$$\overline{X}^{(c)}_{jm} = \alpha_0 + \alpha_1 \overline{X}_{jm} + u_{im}, \tag{2}$$

[20]The context of this interpretation is the speed dating environment in which proposals are observed. In this environment, matches may not be intended to be long-term relationships. The possibility to follow speed daters over time and analyze how their matches continue is an open issue which is left for future research.

where α_0 measures the extent to which partners with attribute X attract a disproportionate share of proposals from subjects in all markets, α_1 measures the sensitivity of proposals to a change in the share of partners with that attribute, and u_{im} is an attribute-specific disturbance term. If $\alpha_1 = 1$ a change in X amongst partners who have received a proposal corresponds directly to a change in X amongst *all* available partners in a given speed dating session. In other words, X does not have any weight in the subject's decision as to whom to propose to. Conversely, if $\alpha_1 \neq 1$ and/or $\alpha_0 \neq 0$, then preferences are likely to play a role too.[21] A value of α_0 other than zero reflects the systematic inclination of subjects in all meetings for partners with a specific trait. Of course, since regression (2) does not hold constant other attributes, this inclination may be due not only to an intrinsic preference for X but also to a preference for another trait correlated with X.

One of such inclinations is positive assortative preferences. To capture this tendency along attribute X (without imposing any specific correlation with partner's or subject's characteristics other than X), we augment equation (2) with the subject's own attribute, X_{im}, and — after including a set of session-specific characteristics, $\mathbf{S}_m$, such as venue, age range and meeting fee — estimate[22]

$$\overline{X}_{jm}^{(c)} = \alpha_0 + \alpha_1 \overline{X}_{jm} + \alpha_2 X_{im} + \mathbf{S}_m' \gamma + u_{im}, \tag{3}$$

in which a positive value of α_2 is evidence of positive sorting.

We should emphasize that the estimates of a "constrained model" in which $\alpha_0 = \alpha_2 = \gamma = 0$ and $\alpha_1 = 1$ could be interpreted in two different ways. The first is consistent with the idea that dating proposals are entirely driven by the type of potential partners met in a given session with preferences being relatively unimportant: this means that, indeed, anyone could be the one. The other story is that, in every session, there is a random mixture of speed daters with strong but opposite preferences over partners' attributes. This is what at the beginning of this section we called preference heterogeneity. If this

[21] In this formulation, markets do not matter only in the limit case of $\alpha_1 = 0$.

[22] This linear specification is a convenient approximation, but it does not directly correspond to the model of proposals underlying the analysis presented in Section 4. Thus, any comparison of the results below to those reported earlier is only suggestive and should be drawn with caution. For convenience, in what follows the variables in $\mathbf{S}_m$ are assumed to capture taste shifters only. The results in Table 5 and their interpretation, however, are not sensitive to this assumption. In particular, they are robust to the alternative hypothesis according to which $\mathbf{S}_m$ is assumed to reflect market-specific properties and the vector does not have to be set to zero for the constrained variant of (3) to be given an opportunity-only interpretation.

is what happens, the first interpretation (according to which market opportunities shape proposals) will be misleading.

To discriminate between these two interpretations, we allow u_{im} to be decomposed into two additive parts, one being a subject-specific permanent component (φ_i) and the other an idiosyncratic shock to subject i in market m (ν_{im}). Since we have data on the same individuals in several different markets, subject-specific permanent effects can be identified in regressions such as (2) and (3). If we cannot reject the hypothesis that φ_i matters (or that its variance is different from zero), then the second interpretation (according to which speed daters have pronounced and opposite preferences) cannot be ruled out.

By estimating a model with subject-specific effects we can also check whether individuals choose to attend meetings non-randomly (see also our discussion in Section 3). In particular, if we reject the hypothesis that φ_i is a fixed permanent component in favor of the alternative hypothesis that it is a random effect, then we can infer that speed daters with strong preferences for an attribute are not systematically more likely to self select into meetings where such an attribute is expected to be abundant. The opposite case is evidence of non-random selection.

B. Identification and Tests

The simplicity of this analytical framework and its estimation derives from the experimental nature of our speed dating data (Harrison and List, 2004). In this setting, the identification of the role of the choice set available to speed daters is driven by the variation in the distribution of attributes across speed dating events. We isolate the effect of preferences, instead, by taking advantage of the fact that a non-negligible number of participants (nearly 30 percent of women and 40 percent of men in the sample) are observed to attend more than one event. Because of these "serial" speed daters, random- and fixed-effects (RE and FE) versions of (2) and (3) can then be estimated.

Summarizing our diagnostic strategy, we perform two statistical checks for the simple opportunity-only model outlined in the previous subsection. The first is the joint test that $\alpha_0 = \alpha_2 = \gamma = 0$ and $\alpha_1 = 1$. The second is based on the comparison of the R^2 obtained from the constrained (opportunity-only) model to the unconstrained model as specified in (2) or (3). In addition, Hausman tests of RE versus FE models provide us with an

indication of the extent of random self selection into speed dating events, while checking that the variance of φ_i is zero tells us whether or not there is preference heterogeneity.

C. Main Results

Table 5 presents the RE estimates of equation (3) by subject's gender.[23] Similar estimates were obtained from least squares regressions. In fact, we cannot reject the hypothesis that the variance of φ_i is zero in all cases, with the exception of age and education for male subjects. The possibility that speed daters have pronounced and opposite preferences, therefore, is not strongly supported by our data. As documented by the Hausman test statistics, we also cannot reject the hypothesis of random self-selection at conventional levels of statistical significance along all attributes.[24] Comparable estimates and test results emerged from equation (2), which are not reported for convenience.

The constrained model, according to which $\alpha_0 = \alpha_2 = \gamma = 0$ and $\alpha_1 = 1$ is rejected at the 5 percent level along age for female subjects, and along age, education, and smoking for male subjects. Opportunities, therefore, do not entirely explain dating proposals, but can have a significant role. A stronger indication of this is given by the fact that the observed variation in attribute demand that can be accounted for by the constrained model is generally substantial, irrespective of the subject's gender. As shown in the first two columns of Table 6, apart from age (and, to a lesser extent, overweight for female subjects), the fraction of R^2 that the opportunity-only model can explain with respect to the unrestricted version of specification (3) is large, varying between a minimum of 66 percent (in the cases of occupation for female subjects and height for male subjects) and a maximum of 86 percent (in the case of smoking for female subjects). Along age, instead, the picture is slightly different. In this case, the fraction of R^2 that can be accounted for by the opportunity-only model is more modest albeit still considerable nonetheless (50 and 36 percent for female and male subjects, respectively). This echoes the results of Section 4 according to which age affects dating proposals substantially. Therefore, although meeting opportunities are not the only force behind the patterns of proposals observed in our data,

[23] In order to limit the influence of missing data, shares or means were computed only on individuals for whom we have valid information on each specific attribute.

[24] Notice that, because α_2 in equation (3) cannot be identified using a fixed-effects model, the Hausman tests reported in Table 5 were performed on specification (2).

they do play a large part. With the opportunity-only model being statistically rejected in only four out of the twelve cases analyzed, these results provide strong evidence of the importance of the environment in which individuals meet and choose each other.

D. Robustness

The analysis so far hinges on specification (3) according to which selectivity along one attribute is determined, besides market-specific characteristics, by the pool of available partners who possess that attribute and whether or not the proposer shares that same attribute. It is possible, however, that different traits (such as age, education and occupation) are related to each other, and this interdependence might be systematically correlated to selectivity. In other words, assortment along one attribute could be accompanied by a preference for other observable traits. We thus checked the robustness of the results in Table 5 by augmenting specification (3) with the whole set of averages/shares of partner's observable characteristics other than $\overline{X}_{jm}$. The last two columns of Table 6 present the R^2 explained by the opportunity-only model as a fraction of the R^2 found with the unrestricted characteristic-augmented variant of specification (3). (All the other results are not reported for convenience but are similar to those shown in Table 5.) Unsurprisingly, adding the entire set of partner's characteristics reduces the explanatory power of the opportunity-only model, but this decline is generally very modest and never greater than 4 percentage points. Similar conclusions are reached in the case in which the full vector of subjects' attributes is also included in the analysis. Therefore, the findings of the previous subsection carry through virtually unchanged.

To what extent are our earlier estimates driven by serial speed daters? Do serial participants change their proposal behavior when they participate in a second or third event? Speed daters can decide to participate again for a number of different reasons. For instance, some might enjoy speed dating (preferences), while others might not be successful in finding suitable partners in earlier events (opportunities). If the results in Table 5 were shaped by serial participants who had fun or problems in "playing the game", they would not be easily generalizable to the whole population of speed daters. To see whether this is the case, we stratified the sample by the number of times individuals are observed in the data, and re-estimated the least squares version of (3) on the subgroup of participants

who are observed only once and the subgroup of serial speed daters (those who participate to at least two events).[25] For this latter subgroup, we further distinguished the first time from the other subsequent times an individual is observed in the data (second time and third/plus time).

This analysis — the results of which are not reported for convenience — shows no significant difference between one-timers and serial speed daters, suggesting that the estimates in Table 5 are not driven by a special group of recidivists and confirming our earlier findings on the variance of φ_i. In addition, serial participants do not exhibit a proposal behavior the second (or third/plus) time around that is systematically different from that displayed the first time, indicating that the extent of taming the game is overall limited. In sum, meeting opportunities tend to play a dominant role in the behavior of speed daters regardless of the number of times they attend an event. This result is also robust to more general specifications than that given by (3), in particular those including the full set of subject's and partner's average attributes.

E. Matching

Turning back to Table 5, the evidence of positive assortative preferences (i.e., greater positive values of α_2) emerges generally more starkly when the opportunity-only model explains relatively less of the observed variation in attribute demands, in particular age and education and, to a lesser extent, overweight and height. In line with the estimates shown in Table 4, in fact, these are the cases for which proposals tend to have a stronger assortative connotation. A natural question at this point is to check whether greater positive sorting is found when we observe a match, that is, when two people propose to each other. This will provide an indication that preferences play a role in making speed dating matches closer to final matches.

Repeating the analysis reported in Section 3, we compute attribute odds ratios for the female-male pairs for which there is a match. To ease our exposition, these estimates are presented in Table 3, close to the corresponding odds ratios computed on all female-male meetings. The odds of getting matched to a partner of similar age are 11 times

[25] As a caveat, individuals who are observed only once may not be genuine one-timers, since they could have participated to events either before our observation period began or organized by other agencies. Clearly if this were the case, the implications stemming from our exercise would be weaker.

greater than those of getting matched to partner of different age, which represents an almost five-fold increase with respect to the corresponding odds ratio computed on all speed daters. The odds ratios for matched pairs on the other attributes increase too, and, as indicated by the last column of the table, this increase is significant in the cases of education and occupation. But the magnitude of such odds ratios is always modest, especially if compared to the estimates found with final match data (Mare, 1991; Kalmjin, 1994 and 1998; Pencavel, 1998; Schwartz and Mare, 2005). Thus, assortative preferences (in particular, on age and education) influence match formation in this environment, but much less than what we observe amongst partners in cohabiting or marital unions. Again, meeting opportunities seem to have a dominant role among speed daters.

In Section 4, we found evidence of assortative preferences along a measure of agreed-upon popularity, a proxy of potential partners' consensual value. To provide further evidence of how such preferences operate in mate selection and partnership formation, we estimated odds ratios on the whole sample of female-male pairs and on the subsample of pairs for which there is a match using such a measure. The odds ratio increases from about 1 (t-value=0.8) in the former sample to 4.7 (t-value=10.4) in the latter, suggesting that a highly popular individual is almost 5 times more likely to get a date with another highly popular mate than with a less popular individual. Not only are popular individuals more likely to receive proposals and propose to each other, but they are also more likely to get a date with one another. Assortative preferences therefore may trigger this positive sorting on market value, but the measure itself reveals the importance of the marriage market within which it is determined.

6. Discussion

The previous section has documented one important new result: dating is affected more by meeting opportunities than by preferences. Once individuals have decided to speed date — a decision that at least in part is determined by preferences — their proposals seem to be driven more by the type of people they face than by pronounced preferences, irrespective of whether they are assortative or not. This indicates that mating (or dating) requires meeting: the pool of available interaction partners is shaped by various institutionally

organized arrangements (e.g., schools, work places, neighborhoods, family networks, voluntary associations, bars and clubs) and these constrain the type of people with whom we form personal relationships and eventually durable partnerships.

The importance of the environment in which individuals choose their partners and friends has been already stressed in earlier studies in different contexts (e.g., Bisin, Topa, and Verdier, 2004; Marmaros and Sacerdote, 2006). Our result adds to such contributions and has ramifications for our understanding of social structure and socioeconomic mobility. It also provides us with fresh underpinnings to interpret the existing results on mate selection highlighted in the speed dating context (Kurzban and Weeden, 2005; Fisman et al., 2006a and 2006b) or in other mediated and unmediated environments (Plomin et al., 1977; Lynn and Shurgot, 1984; DiMaggio and Mohr, 1985; Wong, 2003; Choo and Siow, 2006; Hitsch, Hortaçsu, and Ariely, 2006). In particular, even in settings in which the amount of positive assortative matching is considerable (such as in final matches), the pool of available partners may be salient. This suggests a continued emphasis not on assortment, but rather on identifying institutional and social milieux where people meet and mate as well as formulating a more precise definition of marriage markets (Pawłowski and Dunbar, 1999).

We have long known that the chances to marry endogamously are higher the more often one meets people within the "group" (however this is defined) and the more often one interacts with group members on a day-to-day basis (see, among others, Kalmijn [1998]). Stone (1977) offers a fascinating account of the development of a series of county marriage markets, centered on the facilities of county towns (such as balls, card parties, annual fairs, and horse-racing events), and a national marriage market, centered on London and Bath, for the British aristocracy during the first half of the eighteenth century. Despite this, our knowledge of marriage markets is rather patchy. In fact, the operationalization of the very notion of marriage markets is challenging. Economists have typically studied specific aspects of the number of women and men in a reference population, such as sex ratios among immigrants or ethnic groups (e.g., Chiappori, Fortin, and Lacroix, 2002; Angrist, 2002); but this offers a fairly coarse view of the institutional mechanisms by which the courting process comes about. A well established strand of sociological research has focused on the geographic distribution of groups and especially ethnic groups, such

as Asian-Americans in California or Jewish-Americans in New York City (Lieberson and Waters, 1988; Bills, 2005). Others have examined local marriage markets such as schools or workplaces (Bozon and Héran, 1989; Kalmijn and Flap, 2001). But the demographic (including gender) composition of a specific population cannot be seen separately from the regional distribution of groups. If people base their decision to live in a given area on factors that are not independent of in-group preferences, then preferences play a part and cannot be distinguished from partners' availability. Here is where the speed dating setup turns out to be of critical importance. But a more precise definition and a better measurement of the concept of marriage markets are needed.

The result that many traits (including education and occupation) can explain little of the variation in people's desirability in speed dating events is also noteworthy, especially because these attributes have been reported as important determinant of mate preferences in other circumstances (Hout, 1982; Mare, 1991; Kalmijn, 1994; Pencavel, 1998). It is of course possible that these traits do not show up strongly in speed dating events, not because they are unimportant, but because they are traits for which it is difficult to gain reliable information in a short interaction (Hoppe, Moldovanu, and Sela, 2006). It is however unclear why speed daters are substantially less able to assess each others' schooling or wealth than individuals in the context of personal ads or online dating, where researchers have found consistent preferences for status and education (Lynn and Shurgot, 1984; Pawłowski and Koziel, 2002; Hitsch, Hortaçsu, and Ariely, 2006) and where the reliability of the information posted cannot be easily checked. More broadly, these findings underline the need to build a more cohesive picture of the attributes of individuals that make them more desirable in the mating market and how the set of such attributes may change in different dating environments.

Finally, because the context of our analysis is speed dating, more general external validity issues ought to be raised. Our results apply to situations in which people meet potential partners for the first time but may not adequately characterize repeated interactions over longer periods of time. In other more natural dating environments, where most of the final matches arise, the importance of meeting opportunities relative to preferences may be more limited if partners refine their expectations or learn about one another during the courtship period. Speed daters could be looking for matches that are not meant to be

long-term relationships, and their preferences may be salient only before a speed dating session takes place (i.e., deciding to participate, choosing an event, setting up an online personal profile, and so on) but not at the time of proposing to other participants. At the extreme opposite of studies that look at sex ratios in large subpopulations, speed dating events provide us with very small local marriage markets, where the actual structure of each market can be affected by preferences. Whether our findings apply to matches in more general contexts or not is therefore an issue for further research.[26]

7. Conclusion

This paper analyzes dating behavior using new data from a large UK speed dating agency. It pursues two primary goals. The first is to shed light on the nature of people's preferences when selecting mates. We find that speed daters' proposals are primarily driven by assortative preferences and less by generally agreed-upon mate values, with both women and men preferring partners of similar age and education. We also find that women and men value observable physical attributes: women prefer men who are young and tall, while men are more attracted to women who are young and thin. But partner's education and occupation too have an impact on desirability, irrespective of gender.

The second goal of the paper is to provide empirical evidence on the importance of meeting opportunities relative to preferences (assortative or otherwise). Our estimation results show that the role of preferences is overshadowed by that of meeting opportunities. Of the estimated variation in attribute demand, preferences can explain as little as 20-30 percent along education, occupation and smoking, and up to 50 and 60 percent along age for female and male subjects, respectively. The rest is accounted for by opportunities. This finding stresses the need to gain deeper insights and better measurement on the wide variety of formal and informal institutions that give rise to what we call marriage markets and that shape mate selection, dating behavior, courtship, and matchmaking.

This work contributes to the growing economics literature that emphasizes the importance of studying mate selection and estimates individual preferences in dating partners.

[26]The fact that speed daters actually meet before they can receive information about their potential partners and propose to them, however, is a feature that positively distinguishes speed dating from other forms of mediated dating (such as online dating and personal advertisements), and sets it closer to customary dating experiences.

A number of extensions and improvements would be desirable even within our speed dating context. First, incorporating how speed daters learn about their potential partners' characteristics (either during the meeting or browsing their profiles) would give us a deeper understanding of dating preferences, which may also have ramifications for theory. Second, a methodology similar to that applied here could be used to analyze different substantive issues (such as the extent to which dating preferences differ by ethnicity), different rules of the game (e.g., allowing participants to interact for more/less than three minutes or letting them know they have received a proposal even if they do not reciprocate), different agencies that target diverse populations (in terms of age, occupation, race, or religion) and speed daters in different countries. Finally, an ambitious extension is to follow speed daters over time and observe how their matches evolve: this will allow us to have a better view on how they screen potential partners and eventually form durable long-term relationships.

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Table 1
Sample Characteristics of Speed Dating Events

	Mean	Std. dev.	Min	Max
Number of female subjects (N_m = 84)	22.3	3.9	15	31
Number of male subjects (N_m = 84)	22.3	3.9	15	30
Number of proposals made per meeting by:				
Female subjects (N_i = 1868)	2.6	3.1	0	30
Male subjects (N_i = 1870)	5.0	5.8	0	30
Number of proposals received per meeting by:				
Male partners (N_j = 1870)	2.6	3.1	0	18
Female partners (N_j = 1868)	5.0	4.4	0	22
Number of matches per meeting	22	20	2	117
Share of proposals matched (as a fraction of all proposals) for:				
Female subjects (Obs = 4119)	0.45			
Male subjects (Obs = 9467)	0.20			

Note: N_m is the number of events (or markets), N_i is the number of subjects, N_j is the number of partners, and 'Obs' refers to the number of subject-partner pairs in which the subject has made a proposal.

Table 2
Summary Statistics of Subjects' Attributes

	Women		Men	
	Speed dating	BHPS	Speed dating	BHPS
Age (years)	34.5 (7.5)	32.7 (9.4)	35.8 (6.9)	30.5 (9.1)
	0.217	*0.287*	*0.193*	*0.298*
	[1,776]	[1,351]	[1,828]	[1,200]
University degree or greater qualification	0.66	0.20	0.65	0.20
	0.322	*0.797*	*0.339*	*0.803*
	[974]	[1248]	[1071]	[1053]
Occupation				
Professional and managerial	0.36	0.33	0.43	0.24
	0.611	*0.672*	*0.521*	*0.755*
Skilled non manual	0.50	0.19	0.40	0.16
	0.486	*0.802*	*0.583*	*0.827*
Other occupations[a]	0.14	0.48	0.17	0.60
	0.877	*0.520*	*0.827*	*0.403*
	[1008]	[862]	[1110]	[905]
Height (cm)	165.4 (6.7)	163.8 (6.4)	179.1 (6.9)	178.4 (7.4)
	0.041	*0.039*	*0.039*	*0.041*
	[1008]	[1270]	[1139]	[1095]
Weight (kg)	57.8 (5.9)	66.4 (14.0)	77.6 (10.0)	79.9 (15.5)
	0.102	*0.211*	*0.129*	*0.194*
	[334]	[1192]	[774]	[1067]
Share underweight[b]	0.05	0.04	0.00	0.02
Share overweight[c]	0.05	0.38	0.29	0.45
Smoking	0.13	0.38	0.09	0.36
	0.824	*0.619*	*0.886*	*0.636*
	[844]	[1278]	[1045]	[1101]

Note: In each cell, we report the mean, the standard deviations in parentheses, the coefficient of variation (which, in the case of the speed dating sample is a weighted average by market, with weights given by the number of participants over the total population of speed daters) in italics, and the number of subjects in square brackets. Standard deviations are not reported for dummy variables.

[a] Includes workers in manual occupations, self-employed, full-time students, and individuals in other jobs.

[b] If BMI<18.5.

[c] If BMI>25.

Table 3
Correlation Coefficients and Odds Ratios in Female and Male Attributes

	Female-male correlation (all speed daters)	Odds ratios		
		All speed daters	Matched pairs	Test of equality (*p*-value)
Age[a]	0.904** (0.002)	2.39** (0.003)	11.01** (0.97)	0.000
University degree or greater qualification	0.091 (0.413)	1.10** (0.002)	1.54** (0.13)	0.004
Professional and managerial occupations	0.052 (0.652)	1.01 (0.02)	1.25* (0.12)	0.013
Height[a]	0.103 (0.389)	1.04* (0.05)	1.08 (0.09)	0.933
Overweight	0.031 (0.780)	1.00 (0.16)	0.69 (0.76)	0.421
Smoking	0.232** (0.030)	1.18** (0.01)	1.81* (0.41)	0.059

Note: The figures in the first column are correlation coefficients between male and female attributes. Their standard errors (in parentheses) are bootstrapped from 100 replications. The figures in the second and third columns are odds ratios obtained from logistic regressions. Standard errors are in parentheses. In the column labelled 'Test of equality' we report the *p*-value of the test that the odds ratio in the second column equals the corresponding odds ratio in the third column.

[a] Odds ratios for this attribute are computed using two distinct groups, that is, individuals who are above the average age or height, and individuals who are at the average or below.

The '**' in the first column indicates that a correlation is significantly different from zero at the 1 percent level; the '*' and '**' in the second and third columns indicate that an odds ratio is significantly different from one at the 5 and 1 percent level, respectively.

Table 4
Demand for Partner's Attributes

	Subject's gender					
	Female		Male		Female	Male
	OLS	RE	OLS	RE	RE	RE
Age (years)	-0.004**	-0.005**	-0.010**	-0.011**	-0.004**	-0.011**
	(0.0009)	(0.0002)	(0.001)	(0.0003)	(0.0003)	(0.0004)
University degree or	0.003	-0.0005	0.021	0.021**	-0.020	-0.011
greater qualification	(0.010)	(0.004)	(0.012)	(0.005)	(0.013)	(0.017)
Skilled non-manual	0.011	0.008*	-0.002	-0.004	0.010*	-0.004
	(0.008)	(0.004)	(0.012)	(0.005)	(0.004)	(0.006)
Other occupations	0.0006	-0.010*	-0.014	-0.024**	-0.009	-0.027**
	(0.016)	(0.005)	(0.018)	(0.008)	(0.005)	(0.008)
Height (cm)	0.0015**	0.0014**	0.0009	0.0011**	0.0007**	0.0011**
	(0.0006)	(0.0002)	(0.0007)	(0.0003)	(0.0003)	(0.0004)
Overweight	0.0001	0.0005	-0.155**	-0.132**	0.002	-0.114**
	(0.009)	(0.005)	(0.028)	(0.023)	(0.005)	(0.025)
Smoking	-0.019	-0.016**	-0.047**	-0.039**	-0.019	-0.058*
	(0.012)	(0.006)	(0.014)	(0.008)	(0.019)	(0.026)
Man is 5+ years older					-0.050**	-0.066**
					(0.004)	(0.006)
Woman is older					-0.031**	-0.068**
					(0.004)	(0.006)
Man is more educated					0.010	-0.055**
					(0.013)	(0.016)
Woman is more educated					-0.032**	0.015
					(0.011)	(0.017)
Both are in professional/					0.009	0.002
managerial occupations					(0.007)	(0.010)
Both are in skilled non-					-0.005	0.0002
manual occupations					(0.007)	(0.009)
Both are in other					-0.001	0.028
occupations					(0.016)	(0.021)
Man is 7+ cm taller					0.026**	-0.016*
					(0.006)	(0.008)
Woman is taller					-0.039**	-0.060**
					(0.006)	(0.008)
Both are overweight					0.047	-0.071
					(0.034)	(0.053)
Both smoke					0.055	0.049
					(0.029)	(0.038)
Both are not smoking					0.002	-0.016
					(0.018)	(0.025)
Joint significance of missing partner's information (*p*-value)	0.138	0.095	0.090	0.077	0.078	0.068

Joint significance of missing subject's information (*p*-value)					0.192	0.114
Joint significance of all missing information variables (*p*-value)					0.133	0.072
Hausman test of RE model versus FE model (*p*-value)		0.176		0.180	0.147	0.171
R^2	0.017	0.016	0.042	0.042	0.041	0.091
Mean dependent variable		0.113		0.222	0.113	0.222
Observations		41782		40544	41782	40544

Note: OLS = ordinary least squares; RE = random effects; FE = fixed effects. Estimates are obtained from linear probability models. In the OLS regressions, robust standard errors clustered by market are in parentheses. Observations are at the subject-partner meeting level. Other variables included in all regressions are dummy variables recording missing partner's information on education, occupation, height, weight, and smoking. In addition, the regressions reported in the last two columns contain the same missing information dummy variables for the subject.
* significant at 5 percent; ** significant at 1 percent.

Table 5
Opportunities and Preferences in the Speed Dating Market

	Age (mean)	University degree or greater qualification	Professional and managerial occupations	Height (mean)	Overweight	Smoking
Female subject						
α_0	-6.252	-0.032	-0.147	-9.016	-3.373	0.024
	(4.889)	(0.303)	(0.309)	(22.041)	(5.516)	(0.130)
α_1	0.927**	1.133**	1.182**	0.968**	1.162**	1.639**
	(0.101)	(0.113)	(0.105)	(0.115)	(0.211)	(0.169)
α_2	0.199**	0.048*	0.030	0.040	0.037	0.074**
	(0.018)	(0.023)	(0.025)	(0.028)	(0.068)	(0.020)
$H_0 : \alpha_0 = \alpha_2 = \gamma = 0, \alpha_1 = 1$ (p-value)[a]	0.000	0.133	0.162	0.186	0.756	0.002
$H_0 : \mathrm{Var}(\varphi_i) = 0$ (p-value)[b]	0.069	0.215	0.374	0.103	0.819	0.956
Hausman test (p-value)[c]	0.520	0.712	0.245	0.791	0.192	0.089
R^2 (unrestricted)	0.709	0.298	0.194	0.162	0.257	0.244
R^2 (opportunity-only)	0.354	0.238	0.127	0.099	0.148	0.210
Observations	973	684	713	635	205	589
Male subject						
α_0	6.853**	0.261	-0.058	-3.103	3.161*	-0.091
	(2.273)	(0.151)	(0.159)	(10.657)	(1.388)	(0.140)
α_1	0.640**	0.864**	0.916**	0.972**	0.833**	1.718**
	(0.055)	(0.059)	(0.060)	(0.051)	(0.056)	(0.114)
α_2	0.056**	0.057**	0.004	0.027	0.017	0.007
	(0.015)	(0.016)	(0.016)	(0.016)	(0.017)	(0.020)
$H_0 : \alpha_0 = \alpha_2 = \gamma = 0, \alpha_1 = 1$ (p-value)[a]	0.000	0.000	0.497	0.206	0.016	0.000
$H_0 : \mathrm{Var}(\varphi_i) = 0$ (p-value)[b]	0.014	0.002	0.711	0.895	0.870	0.217
Hausman test (p-value)[c]	0.897	0.555	0.440	0.063	0.394	0.179
R^2 (unrestricted)	0.791	0.347	0.359	0.411	0.435	0.332
R^2 (opportunity-only)	0.286	0.246	0.290	0.272	0.325	0.241
Observations	1207	909	942	951	507	868

Note: Random-effects estimates from the estimation of equation (3). Standard errors are in parentheses. All regressions control for event-specific price, location, and age range dummy variables (coefficients of these controls not reported).
* significant at 5 percent; ** significant at 1 percent.
[a] Joint test of significance for the opportunity-only model.
[b] Breusch-Pagan test that the variance of the random effect component of the error term is zero.
[a] Hausman test of the random-effects versus the fixed-effects version of specification (3).

Table 6
The Importance of Dating Opportunities Relative to Preferences

	Specification (3)		Unrestricted augmented variant of specification (3)	
	Female	Male	Female	Male
Age	0.499	0.362	0.499	0.361
University degree or greater qualification	0.799	0.709	0.796	0.691
Professional and managerial occupations	0.656	0.808	0.651	0.801
Height	0.611	0.662	0.582	0.651
Overweight	0.576	0.747	0.563	0.732
Smoking	0.861	0.726	0.850	0.693

Note: The figures in the first two columns are the ratios of the R^2 obtained from the opportunity-only model and the R^2 obtained from the unrestricted model (equation (3)) reported in Table 5 (with random effects). The figures in the other two columns are the same except that the R^2 obtained from the unrestricted model are obtained from the augmented variants of specification (3) which include the entire set of partners' average attributes (with random effects).

Figure 1
Joint (Female and Male) Average Distribution of Attributes