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What women want in their sperm donor: A study of more than 1000 women's sperm donor selections

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ABSTRACT

Reproductive medicine and commercial sperm banking have facilitated an evolutionary shift in how women are able to choose who fathers their offspring, by notionally expanding women's opportunity set beyond former constraints. This study analyses 1546 individual reservations of semen by women from a private Australian assisted reproductive health facility across a ten year period from 2006 to 2015. Using the time that each sample was available at the facility until reservation, we explore women's preference for particular male characteristics. We find that younger donors, and those who hold a higher formal education compared to those with no academic qualifications are more quickly selected for reservation by women. Both age and education as proxies for resources are at the centre of Parental Investment theory, and our findings further build on this standard evolutionary construct in relation to female mate preferences. Reproductive medicine not only provides women the opportunity to become a parent, where previously they would not have been able to, it also reveals that female preference for resources of their potential mate (sperm donor) remain, even when the notion of paternal investment becomes redundant. These findings build on behavioural science's understanding of large-scale decisions and human behaviour in reproductive medical settings.

1. Introduction

Human females (like most mammals) bear a heavier burden in reproduction than their male counterparts. Women's considerable physical investment of internal fertilization, months of gestation and possibly years of ongoing lactation all come at a substantial physical and resource cost. Because of this significant reproductive constraint of parental investment (Trivers, 1972), women have evolved preferences for males with the ability and willingness to provide resources. This may be to partly offset, or compensate, for the opportunity cost of their heavy maternal burden. As such, women's capacity to identify men with both the ability and willingness to provide resources to them and their offspring is of critical importance (Buss and Schmitt, 1993). A growing global market place for human gametes has facilitated a change in how women are able to identify and choose who fathers their offspring. Firstly, women no longer need to pursue and secure possible mates themselves; they are readily available as cryogenically frozen gamete samples at their nearest invitro fertilization (IVF) facility. Consequently, women no longer need a mate's consent to pursue pregnancy, as male donors relinquish dissemination control of their sperm at the time of their donation. Women are also no longer bound by the constraints of proximity, social class, culture, or race when choosing a male to mate with. A woman's choice is therefore no longer limited by the availability of certain genetic and environmental factors such as aesthetics, education, and income, in potential or available mates. The willingness of a male to provide resources or to paternally invest has also become redundant. Women can choose a male to father their children based purely on the suitability of his genetic fitness.

In most developed countries women (and men) with fertility problems, single women, and lesbians are all now able to freely access sperm from sperm banks and reproductive health facilities for the purpose of insemination. They are able to reserve sperm close to where they live, and the facilities they seek treatment from are able to source sperm from all over the world. This market place for life has been significantly driven by the commercialisation of

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the sperm donation industry in countries where it is illegal. Private companies such as Xytex Cryo International[1] and European Sperm Bank USA[2] supply a global market of reproductive health facilities and institutions. The commercialisation of the sperm donation industry and advances in (IVF) technology has notionally expanded women's opportunity set for mating, far beyond previous historical and evolutionary constraints. Behavioural exploration of how this market for human gametes operates is important, not only for the future of reproductive medicine and the psychology of its patients, but also wider behavioural and evolutionary science.

Exploring the characteristics of women's preferences in this market place, and how they notionally and quantitatively differ from more traditional mating settings like our social circles, speed dating, and in online dating (Buss, 1989; Fisman et al., 2006; Lee and Niederle, 2015; Lykken and Tellegen, 1993) is currently an under-researched field. Research into the characteristics of preferred sperm donors and the women that participate in these markets is relatively new (Riggs and Russell, 2010; Ripper, 2008; Whyte and Torgler, 2014). By utilizing data on donor gamete reservations from an Australian private practice fertility firm, we are able to explore the factors and characteristics preferred by women when choosing a sperm donor. The innovative element of our study is that we use the speed at which certain donor's samples are reserved as our dependent variable to analyse women's actual consumption decision of a mate. This provides a far more robust analysis, as the reservations are actual decisions, rather than a more commonly used instrument in behavioural sciences which records participants' stated preference (Leiblum et al., 1995; Scheib, 1994). Using the difference between date of gamete arrival at the firm and date of reservation by the recipient, we are able to create an elapsed time variable to explore women's preference for specific donor characteristics.

While resources (as a signal of parental investment) has been a core theoretical construct in understanding how women decide with whom to mate (Trivers, 1972), this setting allows us to explore the decision making process free of such constraint. Key genetic and environmental factors such as a male's age, aesthetic features (eye colour, hair colour, height and weight), occupation and education level, can be analysed and distinguished from any correlation with paternity. The exclusion of proxies for resources allows us to explore women's true preference for certain genetic factors: the genetic factors that women know will be passed on to their future offspring.

Another interesting feature of the gamete market is that it is non-sequential in supply. Traditional mate choice decisions usually entail humans making a "yes or no" decision about a possible partner at a single point in time, never knowing if another more suitable (or any) other option may materialise in the future. The sperm donor market is non-sequential, in that women have multiple options to choose from in real time, and the ability to attempt to maximise their preference set in a particular group of (mate) options (Whyte and Torgler, 2015).

Like many mate choice studies, this quantitative research seeks to ascertain the relevance and importance of the specific characteristics of males in the donation process. We question the key determinants or properties of donors, and whether certain traits increase reproductive success (i.e. do women prefer certain characteristics in men for reproduction when more formal constraints are relaxed). Our research aims to understand and demonstrate a tangible measurement of the female choice mechanism in a (notionally unbounded) non-sequential mating market. By exploring the timing of reservation of gametes from a commercial IVF facility, we aim to ascertain the factors at play in this large scale human mating decision.

Non-sequential multiple demographic factor evaluation of potential mates (sperm donor profile selection) deviates from how women and men historically have gathered information on and chosen who to mate with. Technological and human capital advancement in reproductive medicine (and to a lesser extent the conduit of the internet) is facilitating a fundamental shift in how the human species can make decisions about who to reproduce with. The unique setting explored in this study allows the researchers to observe how people actually make decisions (choose) in a domain where they have little or no prior training or expertise, and furthermore in a domain with extremely high (economic, psychological and biological) stakes. To the best of the author's knowledge this is the first ever economic analysis of actual female choice (not just preference) in a reproductive medical setting. While the inimitability of the data set used in this research means the findings presented are somewhat limited in scope, the researchers believe they represent a valuable contribution to what is sure to become a topic of burgeoning interest across a wide range of scientific disciplines.

2. Method

2.1. Data

This empirical research was conducted in conjunction with Queensland Fertility Group[3] (QFG). The data for this project were collated between December 2014 and June 2015. The donor information was generated from pre-existing non-identifiable data collected from individual donor profiles, readily available on a myriad of internet sperm bank websites (for example Xytex & European Sperm Bank USA). Donor profile data generally includes (at a minimum) the donor's date of birth, his marital status, occupation, ethnicity, blood type, physical attributes, and educational attainments.

The empirical data consists of the date of arrival for the donor's semen sample and the date of reservation by the recipient at the QFG facility. As the sale of human tissue is illegal in Australia, women do not purchase gamete samples, rather they "reserve" the donation for use. To create a unique dependent variable of the elapsed time before reservation, the more recent date (the reservation date) was subtracted from date of arrival to give an "elapsed number of days" for each individual reservation. Only the first reservation by each different woman was included in the sample, as subsequent reservations are naturally correlated with the initial decision, and are often linked to reproductive medical procedures or ongoing semen storage decisions. As reservation numbers differ between donors (minimum one to maximum ten), each reservation in our sample represents a recipient's[4] unique choice of donor. The primary sample consisted of 1546 individual recipient reservations of semen across the time period 16th October 2006 to 22nd January 2015. Not all of these observations were able to be used in our analysis, as some profiles have missing values for some variables. This can be due to the fact that donor profiles are not globally standardised and differ by sperm bank. In

[1] Xytex Cryo International Ltd., 1100 Emmett Street Augusta, Georgia 30904-5826 USA.

[2] European Sperm Banks USA: Sperm Bank & Cryobank. 4915 25th Ave NE #204, Seattle, WA 98105, United States.

[3] Queensland Fertility Group, 55 Little Edward St Level 2 Boundary Court Spring Hill, Queensland 4000, Australia.

[4] No female patient of QFG was identified at any point in this research by the QUT researchers. No demographics or identifying data was viewed or collated by the QUT researchers at any time. All female observations in this research were anonymous and consisted only of the date of reservation by the female, and the date of arrival of the sample at the facility.