### Do Evolutionary psychological mechanisms have an impact on thinking distortions among fertility patients?

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**Objective:** Tocompare the importance of desired traits in a life partner to traits desired in a sperm donor.

**Design:** A questionnaire survey of heterosexual women who undergo donor insemination treatments.

**Setting:** Internet support groups and forums for women undergoing donor insemination.

**Patient(s):** 278 heterosexual women older than 38 years who are unmarried and have no children who undergo donor insemination treatments.

**Intervention(s):** Questionnaire sent by mail after patient agreement to take part in the survey.

**Main Outcome Measure(s):** The mean importance attached to 38 traits of a desired life partner and a desired sperm donor that were grouped by confirmatory factor analysis (CFA) into four factors: personality; outward appearance; genes and health; and socioeconomic status.

**Result(s):** Paired-samples t tests showed that patients attached a significantly higher importance to the social status, personality, and the outward appearance of a desired life partner than to those of a desired sperm donor; no differences have been found regarding the genetic quality of the desired life partner versus the sperm donor.

**Conclusion(s):** Findings contribute to the understanding of fertility patients' preferences of sperm donors and demonstrate adaptations in evolutionary psychological mechanisms do not lead to thinking distortions during decision making.

**Keywords**: genes; donor insemination; mate selection; parental investment theory; sperm donor.

**Introduction**

Most women who purchase sperm donations are heterosexual unmarried women and the rest are lesbians who wish to become mothers without a male paternal figure for the child or women married to an infertile man (Co-Author, 2016a, b; Freeman Freeman, Jadva , Kramer , & Golombok, 2009; Jadva, Badger, Morrissette, & Golombok, 2009; Kramer & Cahn, 2013; Rodino, Burton, & Sanders (2011). Heterosexual unmarried women tend to turn to sperm banks and fertility clinics after the coming to terms with the understanding that they probably would not find a life partner with whom they may bring children to life (Co-Author & Colleague, 2015; Jadva, Badger, Morrissette, & Golombok, 2009). In contrast to heterosexual couples that can conceal the sperm origin from the child, women with no male partner may find it difficult to refrain from telling the child about his being a sperm donor offspring. A recent French study found that despite this privilege, most heterosexual couples tended to disclose their use of donated sperm to their children or intended to do so in the near future (Lassalzede, Paci, Rouzier, Carez, Gnisci, Saias-Magnan,... & Metzler-Guillemain, 2017). Heterosexual women who are not in a relationship with a male partner are used to look for a male spouse according to their individual values, beliefs and preferences. The literature of sperm donor selection focuses on the desired traits in a sperm donor, however this corpus of knowledge is relatively small and does not include a comparison of preferences in a sperm donor versus preferences in a life partner (Zeifman & Ma, 2013). Two studies that addressed this topic were conducted with young women who were requested to *imagine* they are looking for a sperm donor ( Scheib 1994; 1997; Zeifman & Ma, 2013). The external validity of such methodology is questionable , as Scheib (1997) notes: "The experimental results may not be directly generalizable to women who use DI, as most subjects were in their twenties, and women who use DI typically …are in their thirties. Furthermore, the subjects in these experiments probably were not considering having children at that time" (p. 500). No study to date has investigated this topic among women at the ages of around 40 who actually look for a sperm donor in real life. The present research project aims at filling this gap and provides such a comparison 25 years after Scheib's (1994) pioneering study. We begin our article with a brief overview of preferences in a sperm donor, we proceed to describe women's mate preferences in a long term partner, then we present our study hypotheses and research methodology.

***Preferences in a sperm donor***

 The literature on female mate choice is very rich, however studies on women’s preferences in a sperm donor are scant (Whyte & Torgler, 2015). Scheib (1994) was the first scholar who studied preferences in sperm donors. Her point of departure was that a selection of a long term mate and a selection of a sperm donor share crucial similarities with respect to the genetic contribution of the man to the future child. A consistent finding in all her experiments was that women rated the health of the donor as the most important factor (Scheib, 1994; Scheib, Kristiansen, & Wara, 1997). Preferences of a sperm donor were different than those in a long term mate, a finding interpreted by Scheib (1997) as a result of evolved psychological adaptations to another natural occurring context: that of extrapair copulation. Receiving semen from a donor resembles to some degree to receiving genetic substance during extrapair copulation where in the two cases the women does not receive any financial support to the upbringing of the child/ren. Similarly to Scheib's (1994, 1997) findings, Whyte & Torgler (2015) found that the importance attached to physical factors of the donor are higher than financial resources or other elements of socioeconomic status, because of the presumed female evolutionary psychological adaptations. Whyte, Torgler & Harrison (2016) analyzed 1546 individual reservations of semen by women from a private Australian clinic. They found that younger donors, and those who hold a higher formal education compared to those with no academic degrees are more quickly selected by recipients. Furnham, Salem & Lester (2014) conducted an experiment where 318 respondents, most of them are young students, were asked to help a friend choose a sperm donor out of 16 profiles. The donors differed in age, social class and ethnicity; There were 16 possible sperm donor profiles and all participants rated each one of the 16 profiles on a 9-point Likert scale. Participants were told that the sperm vials of all donors were similar in their quality and quantity; in some profiles personality traits of the donor were substituted for height (5'6" to 5'8" vs. 6'1" to 6'3"). Respondents preferred to recommend a hypothetical friend to choose a tall middle class and Caucasiansperm donor*.* The occupation of the donor had an impact over the chances of being recommended and there was a strong preference for professional donors rather than skilled workers. Furnham, Salem & Lester (2014) explain this finding with the common belief that profession serves as a proxy for intelligence, which is seen by lay people as heritable*.* Rodino, Burton, & Sanders (2011) examined how single, partnered lesbian, and partnered heterosexual women who were instructed to imagine they are undertaking donor insemination rate the importance of donor characteristics. Health of the donor was the rated as the most important information for the recipient to inform her future offspring.

***Women's mate preferences in a long term partner***

Mate choice studies show that individuals of both genders want their partner to be kind, understanding, dependable, sociable, emotionally stable, and intelligent. They also want their partner to be honest, affectionate, considerate, loyal, and interesting (Buss et al., 1990; Buss & Barnes, 1986; Botwin, Buss & Shackelford, 1997; Conroy-Beam & Buss, 2016). Beyond these similarities, gender differences prevail in a wide variety of societies and cultures with regard to mate choice. Buss et al.’s (1990) intercultural study examined more than 10,000 individuals from 33 countries spanning six continents, and found that men value physical attractiveness more than women, while women seem to be generally more selective. Women also value the earning capacity of their prospective partner more than men (see also, Buss, 1999; Conroy-Beam, Buss, Pham & Shackelford, 2015; Conroy-Beam & Buss, 2016; Fales et al., 2016; Fletcher, Tither, O’Loughlin, Friesen & Overall, 2004; Jonason, 2009; Li, Valentine & Patel, 2011). Traits that women seek in their long-term mates include economic resources, good financial prospects, high social status, older age, ambition and industriousness, dependability and stability, athletic prowess, good health, love, and willingness to invest in children. In contrast to this relatively extensive list, men merely seek three characteristics in long-term mates: (a) Youth and younger age than themselves (related to fecundity and childbearing ability); (b) Physical attractiveness, which includes large eyes, small nose and chin, prominent cheekbones, thick lips, thin eyebrows, as well as symmetry and averageness of size of body and face parts ([Baudouin](https://www.sciencedirect.com/science/article/pii/S0001691804000794%22%20%5Cl%20%22%21) & [Tiberghien](https://www.sciencedirect.com/science/article/pii/S0001691804000794#!), 2004; Jasienska, Lipson, Ellison, Thune & Ziomkiewicz, 2006; [Komori,](https://www.sciencedirect.com/science/article/pii/S0001691809000407#!) [Kawamura,](https://www.sciencedirect.com/science/article/pii/S0001691809000407#!) & [Ishihara](https://www.sciencedirect.com/science/article/pii/S0001691809000407#!), 2009); and (c) Particular body shape, which was found to be associated with fecundity and childbearing (i.e., being slim and having a low waist-to-hip ratio). These gender differences are cross-culturally robust and prevail even in societies with high levels of gender equality (Conroy-Beam, Buss, Pham & Shackelford, 2015).

***Comparing preferences in a life partner versus preferences in a sperm donor***

 Scheib (1994, 1997) and Scheib, Kristiansen & Wara (1997) conducted three experiments in which in each one a group of students was requested to rate the desired attributes of a long term mate, and another group of students was requested to rate the same attributes with regards to a sperm donor. She found that the attributes valued by female university students were similar when choosing a hypothetical sperm donor or long-term mate. The most important cluster of attributes was the man's health and the second important cluster of traits related to personality. Scheib, Kristiansen, and Wara (1996) compared women’s selection criteria for sperm donors with those for dating/relationship partners and extra-pair copulation (EPC) partners (i.e., partners for having extramarital or extra-relationship affairs). In addition to looking at the relative importance of various traits in a potential donor versus a potential dating or extra-pair partner, Scheib asked women to assess the relative heritability of various physical and psychological characteristics in order to see how heritability estimates contribute to decisions about sperm donors. As predicted, Scheib found that good genes indicators such as health, physical appearance, and abilities were valued to a greater extent in the sperm donor condition than in the two other conditions. Hence Scheib concluded that it is surprising to find out that women selecting a hypothetical sperm donor continued to place a high value on character traits—traits such as kindness, understanding, and affection—in spite of attributing little genetic heritability to these traits.

 A recent study sought to compare factors shaping sperm donor and mate-selection decisions, and included female respondents in two age groups ( young students with a mean age of 18 college alumnae with a mean age of 34) were asked to (a) depict an ideal man and (b) rate and rank the importance of traits associated with good genes, parenting ability, a good potential for being a life partner, and socio economic status. Women of both age groups who were asked to imagine they are seeking sperm donors valued good genes more, and being a good life partner potential was rated lower than women seeking life partners. The findings suggest women adjust their selection criteria as a function of context and that mate preferences may change as women mature (Zeifman & Ma, 2013).

***Research hypotheses***

According to Evolutionary psychology, any parental investment of resources, such as time, energy, food, money and alike, that benefits one [offspring](https://en.wikipedia.org/wiki/Offspring) at a cost to [parents](https://en.wikipedia.org/wiki/Parent)' ability to invest in other components of [fitness](https://en.wikipedia.org/wiki/Fitness_%28biology%29), contributes to the [reproductive success](https://en.wikipedia.org/wiki/Reproductive_success) of the parents. According to Trivers (1972), Parental investment theory posits that Parental investment is the investment in offspring by the parent that increases the offspring's chances of surviving and hence reproductive success at the expense of the parent's ability to invest in other offspring. From an evolutionary perspective, it is expected that the attributes considered highly important in a life partner and future father of the offspring to be born will differ from those favored in a sperm donor, and these differences would be based on seeking cues that may indicate ‘‘good genes’’ versus ‘‘good jeans’’ (i.e. a good life partner who is expected also to be a good father in evolutionary sense, that is to be a good breadwinner and provide with financial stability and security). A steadily growing trend in contemporary era is sperm donor insemination, which is becoming more and prevalent ; this study aims at examining the question whether and in what sense the selection of a sperm donor for use in donor insemination is unique and what are the differences between sperm donor selection and a choice of a life partner. Accordingly, it is hypothesized as follows:

H1: Personality traits would be rated more important with regard to a life partner as compared to a sperm donor

H2: Socioeconomic status would be rated more important with regard to a life partner as compared to a sperm donor

H3: Physical outward appearance would be rated similarly important with regard to a life partner and a sperm donor

H4: Good genes and health would be rated similarly important with regard to a life partner and a sperm donor

**Method**

Before embarking on the research, ethics approval for the study was provided by the IRB of the University in which the authors are employed (the name of the university is to be disclosed after the blind review process).

***Measures***

The research questionnaire was developed to explore sperm recipients' preferences in a life partner and a sperm donor. The questionnaire consisted of 38 attributes of a life partner and of a sperm donor and is based on Buss's mate preferences questionnaire (2013); this research tool is considered the most valid and reliable research tool for exploring mate preferences by scholars around the globe. The respondents were requested to fill in this questionnaire twice: once for a life partner and once again for a sperm donor. The same traits were rated on a ten point Likert scale starting from 1 =not important at all to 10=must have.

## *Sampling method*

The sampling technique was based on volunteer sampling method: We contacted coordinators of internet forums and internet support groups for women who undergo donor insemination treatments and secured their permission to publish an advertising which invited women who are undergoing DI treatments to contact us and fill in an online survey. 312 women contacted us but only 285 were above the age of 38. Of the 285 potential respondents, 7 women reported they are married and hence their questionnaires were not included in the data set. We reached a final sample size of 278.

***Demographic Characteristics of the sample***

The sample consisted of 278 heterosexual never-married women, the mean age was 44.82 (SD=1.85), and the median age was 42.85. See Table 1 for details about the sample characteristics.

***Data analysis***

The 38 attributes of Buss's questionnaire of a life partner and of a sperm donor based on Buss's questionnaire were classified into four factors as follows: 'personality'; 'outward appearance'; 'genes and health; and 'socioeconomic status'. The measure of each factor was the mean values of the attributes included in it. A Confirmatory Factor Analysis (CFA) for examining these four factors. CFA is a useful statistical procedure aimed at reducing a large number of traits to a small number of clusters called factors. This CFA was performed in the present study twice: once for a life partner and once again for a sperm donor. The attributes that were associated with each factor are presented in table 2. Indices used to assess the goodness of fit of the CFA were: Chi Square, chi/df, TLI, NFI, CFI and RMSEA (See table 3). The factorial design was confirmed according to these indices.

**Results**

Table 4 presents the descriptive statistics of the four factors for a life partner and a sperm donor. In order to examine the study hypotheses, a t test for paired samples was performed on the differences between the means of preferences of a life partner and a sperm donor in each factor. Figure 1 illustrates the means of each factor.

**H**1 was tested using a paired-samples t-test for examining the difference in the personality factor.Findings show that the personality traits of a life partner were rated as more importantthan personality traits of a sperm donor: t (276)=15.774, p=.000. Hence findings corroborated H1.

H2 was tested using a paired-samples t-test for examining the difference in the outward appearance factor. Findings show that the outward appearance traits of a life partner were rated as more importantthan outward appearance traits of a sperm donor: t (276)=4.58 , p=.000. Hence findings corroborated H2.

H3 was tested using a paired-samples t-test for examining the difference in the genes and health factor. Findings show that the genes and health traits of a life partner were *not* rated as more importantthan genes and health traits of a sperm donor:

t (276)=0.155 , p=.877. Hence findings corroborated H3.

H4 was tested using a paired-samples t-test for examining the difference in the socioeconomic status factor. Findings show that the socioeconomic status traits of a life partner were rated as more importantthan socioeconomic status traits of a sperm donor: t (276)=13.29 , p=.000. Hence findings did not corroborate H4.

**Discussion**

The current study reveals differences and similarities between the desired traits of a sperm donor and those of a life partner. The findings corroborated H1, H2 and H4 and show that good genes are equally sought after in a life partner and a sperm donor. Personality traits, outward appearance and socioeconomic attributes were significantly more important in a life partner than in a sperm donor. H3 was not corroborated, because in contrast to a priori expectations, women attached a similar importance to the physical outward appearance of a life partner and a sperm donor. Many scholars consider the donor and his genetic contribution to future offspring as irrelevant in the reproductive project because merely being a biogenetic father is very different from being a social father (Ignovska, 2014). Hence most women opt for an anonymous donor, who is never personified nor mystified as the father and acknowledged for a limited reproductive role (Graham, 2012). These finding align those of Whyte & Torgler (2015) who found that the importance attached to physical factors of the donor are higher than financial resources and other elements of socioeconomic status, because of the presumed female evolutionary psychological adaptations to mating with men for short term relationships, including extrapair copulations and/or one sexual intercourse.

 The findings are best explained by evolutionary psychology and Triver's (1972) parental investment theory to the area of sperm donor selection: firstly, if the biogenetic father is absent then it is irrelevant to consider his personality traits because there would not be any actual relationship between him and the sperm recipient and / or her donor offspring; secondly, if the biogenetic father is absent then it is irrelevant to consider his outward appearance; and thirdly, if the biogenetic father is absent then it is irrelevant to consider his socioeconomic status and earning capacity. We show how evolutionary psychological mechanisms underlie the high importance of genetic quality and health. Although physical outward appearance is heritable and an attractive sperm donor is expected to contribute to the physical attractiveness of the future offspring, findings show that this category of traits were rated as less important in a sperm donor. It is reasonable to assume that the genetic quality of the sperm donor, which includes, *inter alia,* lack of heritable illnesses and disorders stands in the focus of sperm recipients' concerns, as they wish for and foremost to bring to life a healthy baby whose life chances and wellbeing would be optimal.

 From an evolutionary psychology perspective, it can expected that the traits desired in a short-term sexual partner will differ from those desired in a life partner, and these traits are differentiated on the basis of which cues may signal ‘‘good genes’’ and/or ‘‘good parent.’’ (Rodino, Burton, & Sanders, 2011). However, sperm donation is a novel type of "relationship", hence no evolutionary psychological mechanisms have evolved for preference in a sperm donor. Jones (2005) as well as Becker, Butler, & Nachtigall, (2005) highlight the assumed desirability of visible physical similarity between the sperm recipient and her future donor offspring; hence it is understandable in this context why they rated the importance of the outward appearance of the donor lower than that of a life partner with whom they may enjoy social appreciation as well as intimate sexual relationship. By choosing sperm donations a woman is making a very specific decision about genetic inheritance rather than a choice of a supportive partner or mate (Furnham, Salem & Lester, 2014).

 There is a paucity of research on sperm donor selection in a context where there is no relationship between the sperm recipient and her donor but a healthy baby is the desired outcome. The contribution of the present research project is twofold: the first one is a theoretical one and adds empirical knowledge to the existing scholarship pertaining to psychological processes and phenomena that accompany sperm donor insemination, Our findings show that selection of sperm donors does not follow the same preferences of real life mate selection. We show that Evolutionary psychological mechanisms do not lead thinking distortions among fertility patients during a crucial phase of decision making. Unmarried women over the age of 38 who look for a sperm donor rated donor’s personality as of lower importance because they are not intended to live with him and establish couple relationship; the donor is not supposed to raise the future child and therefore his character was rated less important than that of a real life partner. The second contribution of the study is a practical one and relates to counseling sperm recipients during the period of sperm donor selection. It is recommended to advise these women to focus on genetic quality and health attributes and dedicate minimal attention to traits that are irrelevant to donor insemination. This recommendation is highly important because in contrast to heterosexual couples who tend to ignore the existence of the donor (Burr, 2009; Grace et al., 2008), single mothers fantasized about marrying him (Hanson, 2001) some sperm recipients tend to focus on traits that have no usefulness for the achievement of a healthy baby; this inclination is explained by the fact that in contrast to heterosexual couples who tended to ignore or erase the existence of the donor (Grace et al., 2008), some recipients' tendency to see the donor as a virtual life partner (Bokek-Cohen & Gonen, 2015; Co-Author, 2016; Hanson, 2001).

 Our finding show that single women undergoing donor insemination tend to value characteristics in a donor differently than the way they regard traits sought after in a long term spouse; these findings stand is sharp contrast to the findings of Scheib (1994) Scheib et al. (1996, 1997). Twenty five years have passed since Scheib's pioneering studies, during which sperm recipients became more realistic, thanks to the growing awareness to genetics such as in the realm of donor insemination procedures and results (Catz, Green, Tobin, Lloyd-Puryear, Kyler, Umemoto, A., ... & Wolman, 2005). As Genomic literacy is becoming increasingly important, a recent study confirmed that most participants had adequate knowledge about how traits are shared by family members and the role of genes (Sandberg, Rodriguez, Howard, Quandt, & Arcury, 2017). Our finding go hand in hand with those of Zeifman & Ma (2013): Women adjust their selection criteria as a function of context and that mate preferences may change in accordance to the purpose of the relationship.

 The main limitation of the research is that despite the high response rate, the women who volunteered to take part in the survey may be different in their orientation and world perspective than those who saw our invitation to participate but decided not to reply. There are two main strengths to the current study: the first is the inclusion of a sample of fertility patients that were searching a sperm donor in real life, while previous studies which compared preferences of a sperm donor to a life partner used younger women, most of them students, who were asked to *imagine* they are searching for a sperm donor; the second strength is that previous studies asked groups of students to rate the importance of traits in a life partner and another group of students was asked to rates the traits of a sperm donor; our research project asked the same respondents to rate the desired attributes of both a life partner and a sperm donor. Hence the comparisons conducted in the current project have much potency in exploring thinking distortions among respondents. Accordingly, the external validity of the present project is better; the study enables us to generalize the findings to real-life circumstances because the respondents expressed their real life preferences. An additional strength of the study is the usage of Buss's (2013) well validated tool for measuring women's mate preferences, a tool that is in use since 1989 up to the present days by scholars all over the globe.

In summary, we found no empirical evidence to thinking distortions among women who select a sperm donor, we believe these findings reflect adaptations made in evolutionary psychological mechanisms involved in mate choice , because the women consciously acknowledge that attributes in the realms of personality and socioeconomic status are not genetically inherited. The genetic quality and health of the future donor offspring stands at the focus of the donor selection and outweighs any irrational, non-realistic or illusionary considerations that may occur during searching for a life partner. What remains enigmatic is another kind of thinking distortion: why sperm recipients rely so heavily on the genetic quality of the sperm donor and seem to nullify/ disregard??? their own genetic contribution to their future child?

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