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The self-reported importance of olfaction during human mate choice

by

Mark J.T. Sergeant*(1), Mark N.O. Davies (1), Thomas E. Dickins
(2), Mark D. Griffiths (1)

(1) Nottingham Trent University, Nottingham, UK, (2) University of East London,
London, UK

*Corresponding author

Mark Sergeant

Division of Psychology

The Nottingham Trent University

Burton Street

Nottingham NG1 4BU

United Kingdom

Phone: 0044 (0)115 848 5631

Fax: 0044 (0)115 848 6826

E-mail: mark.sergeant@ntu.ac.uk

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This study evaluated sex differences in the relative importance placed on olfactory cues during mate choice. To evaluate this 151 men and 289 women completed an on-line version of the Romantic Interests Survey (RIS) (Herz & Inzlicht, 2002). Olfactory characteristics were declared to be extremely important during mate selection, more so than almost all other characteristics, but did not significantly differ between the sexes. There were significant differences concerning the *odour source* that individuals attend to, with greater preferences observed for a potential mate's body odour as opposed to artificial fragrances they use. These findings suggest the body odour characteristics of a potential mate are perceived to be an important factor during mate choice.

Keywords: Olfaction, mate choice, sex differences, parental investment

1. Introduction

Among humans there is a significant sex difference in the level of parental investment given to offspring (Trivers, 1972). In addition to the higher physical costs of producing female gametes, female parenting involves a considerable expenditure of time and resources due to a lengthy gestation and period of infancy (Clutton-Brock, Albon & Guinness, 1989). While men play a relatively smaller role in direct reproduction, they can, however, provide additional forms of parental benefits such as acting to defend their mate and offspring, provide food or other material resources, use their social status to aid in future alliance formations for their offspring, and provide beneficial heritable characteristics (Dunbar, 1995).

As women experience greater direct reproductive costs in the production of offspring and are always certain of maternity, Trivers (1972) argued they should be more selective than men in terms of their mate choice. Women engaged in intersexual selection for high quality men, will therefore choose those men who display characteristics indicative of high paternal investment and/or 'good genes' (which will increase the chances of an offspring's survival); specifically high access to resources, high social status and displays of good health (for review see Cashdan, 1997). Among humans the command of resources is directly linked to personal wealth, and the ambition to accumulate this wealth, and as access to resources is beneficial for offspring survival, there is a significant female preference for wealthy males (Buss, 1989; Sprecher, Sullivan & Hatfield, 1994). While status is also undoubtedly linked to wealth (Betzig, 1986) high status males are also likely to be physically well developed (Barber, 1995), capable of offering protection to their mate and her offspring from other males. Healthy men are a

more reliable provider of resources through being more resistant to environmental insults (such as pathogens) and being more physically developed (important in attaining high social status) (Nettle, 2002). A number of these traits, such as immune system characteristics, are heritable (Penn, 2002), and offer substantial benefits for offspring. One indirect index of health is believed to be fluctuating asymmetry (FA), which refers to the degree that an individual deviates from perfect bilateral symmetry (Kowner, 2001). The greater the deviation from perfect symmetry, the more the individual has been negatively affected by environmental insults (such as physical injuries or disease), with FA therefore acting as a sign of developmental stability (for review see Møller, 1997). As FA is based upon having good genes, and these genes provide for good health, FA acts as an indirect index of health and robustness (Waynforth, 1998). Thus it has been found that FA in men is negatively related to both perceived facial attractiveness (Perrett, Burt, Penton-Voak, Lee, Rowland, & Edwards, 1999) and frequency of female orgasm (Thornhill, Gangestad, & Comer, 1995).

Due to their lower level of parental investment and higher levels of paternity uncertainty, men are relatively less selective in their mate choice strategies, and seek more mates than women (Schmitt, Alcalay, Allik et al., 2003). As male reproduction is primarily limited by access to reproductively capable women, they seek potential mates displaying cues associated with youth and fertility (Sprecher, Sullivan, & Hatfield, 1994). These cues include neotenous features (such as a small chin, large eyes and smooth skin), which are found attractive in women (Cunningham, Barbee, & Pike, 1990). Males are therefore believed to focus on the physical characteristics of a potential mate, particularly their appearance (Sprecher et al., 1994). In summary, men place more stock

in *reproductive capacity* (signs of fertility and reproductive value, primarily expressed in physical appearance), while women focus on *resource acquisition* (signs of health, resources, and status, primarily expressed in social characteristics) (Buss, 1989).

Olfaction

Perceptions of mate quality are based on multiple sensory modalities, with vision often ranked as the most dominant among humans (Brand & Millot, 2001). Among many non-human species it is olfaction that plays a central role in mate selection practices (Agosta, 1992), though recent research suggests this modality is also important for humans (for review see Wyatt, 2003). Many previous studies have examined the link between olfaction and mating in humans (for review see Wyatt, 2003). Unfortunately many of these studies have suffered from methodological and theoretical problems (Hays, 2003). For example, the studies of Cutler, Friedman and McCoy (1998) and McCoy and Pitino (2002) investigated how the use of an artificial 'pheromone' (Athena 10:13) derived from axillary secretions affected sociosexual behaviour in men and women. Both studies claimed to show that the use of Athena 10:13 significantly increased levels of sociosexual behaviour in both sexes. While this research is often cited as an example of olfaction influencing human mating behaviour, the study has been criticised on a number of methodological and statistical grounds (Grammer, Fink & Neave, 2005). A number of robust phenomena have, however, been documented, the most intriguing of these being the communication of male health information through body odour.

Major Histocompatibility Complex (MHC) characteristics play a crucial role in immunological self/non-self recognition, and therefore predict an individual's response to

environmental pathogens (Penn, 2002). MHC genes are the most polymorphic loci in the human genome and are directly expressed through body odour (Penn 2002). Human women are reported to prefer the body odour of men with generally dissimilar MHC characteristics (Jacob, McClintock, Zelano & Ober, 2002). These preferences have been implicated in subsequent female mate selection (Ober, Weitkamp, & Cox, 1999). Reproducing with a mate possessing general MHC dissimilarity will provide offspring with more adaptive immune functions through having a more diverse immunological repertoire (Penn & Potts, 1999). It therefore appears that male body odour provides information on immune functions, which influences female mate choice.

There is also evidence that FA characteristics (see above) co-vary with female hedonic perceptions of male body odour. While FA appears unrelated to hedonicity for most of the menstrual cycle, there is a significant negative relationship at ovulation (Rikowski & Grammer, 1999). Thornhill and Gangestad (1999) suggest this preference at the peak of fertility reflects “an evolved preference for sires with good genes” (p.175). The combination of a visual index and the co-varying olfactory expression of FA could form an efficient multi-modal mating signal (Møller & Pomianowski, 1993).

Given the ability of body odour to communicate information about mate quality, it is important to note the superior olfactory sensitivity of women, specifically greater discrimination, recognition and identification abilities (Wysocki & Gilbert, 1989, Doty, 1997). This finding has been replicated consistently and cross-culturally (Doty, Applebaum, Zusho & Settle, 1985; Schleidt, Hold, & Attili, 1981, Wysokci & Gilbert, 1989). Women are also more responsive to a number of biologically relevant odours such as androstenone (a substance reported to act as a human pheromone) (Wysocki & Gilbert,

1989) Clear sex differences in sensitivity appear at an early age (Dorries et al., 1989). A significant peak in female hedonic descriptions of androstenone is reported around ovulation (Hummel, 1991; Grammer, 1993). As with FA, Grammer (1993) speculates this could facilitate female contact with men at the optimum time for conception.

The work of Herz and Inzlicht (2002) suggests women declare olfaction as the most important physical characteristic during mate evaluation, whereas men value physical appearance. Although this research was declarative in nature (i.e., participants declared what they consciously considered important during mate choice) its findings are consistent with research demonstrating superior olfactory abilities in women (see above). Earlier research by Herz and Cahill (1997), however, suggests “men rated visual and olfactory information as being equally important for selecting a lover” (p 275). As this discrepancy has implications for the significance given to olfactory cues during mate choice, the current investigation assessed the importance of olfaction in human mate selection relative to other physical qualities, and the nature of any significant sex differences in the importance of olfactory characteristics in mate selection.

The current investigation also examined both the importance of *odour source* and *odour hedonics* in mate choice. Regarding *odour source*, Herz & Inzlicht (2002) report both sexes rated the qualities of an individual’s natural body odor to be of more importance during mate evaluation than artificial fragrances they use. Due to the biologically important information expressed through body odour (i.e. MHC characteristics), this finding is both important and in need of further investigation. Regarding *odour hedonics*, it is possible that olfaction is simply acting as a way of detecting and avoiding malodorous individuals during mate selection. In this way

olfaction would act more as a filter for bad odours rather than a mate selection criterion per se. The validity of the concept will also be assessed.

2. Method

2.1. Participants

A total of 151 men and 289 women completed the Romantic Interests Survey online (see below). Participants were required to be between the ages of between the ages of 18 and 50 years, identify themselves as exclusively heterosexual, and to lack significant impairment in any sensory modality. All participants were self-selected and received no form of course credit or financial compensation.

Sexual orientation was established using a series of four separate Kinsey Scales (Kinsey, Pomeroy & Martin, 1948) designed to assess sexual identity, attraction, behaviour and fantasies. Mean orientation scores from the four scales were 0.11 (SD=0.23) and 0.07 (SD=0.24) for men and women respectively.

Age was established using a bracketed scale system. 55.9% of participants were aged between 18 and 20, 32.8% between 21 and 30, 7.2% between 31 and 40, and 4% were aged between 41 and 50. The ethnicity of the sample was 70% white, 17% black, 9% Asian, and 4% of unspecified ethnicity. The distribution of age and ethnicity were similar for both men and women.

2.2. Materials

As this research represents a replication and extension of Herz and Inzlicht (2002), the same survey measure, the *Romantic Interests Survey* (RIS) was employed. This survey consists of eighteen 7-point Likert items (*strongly disagree* to *strongly agree*) used by participants to declare the conscious importance of various characteristics in a potential mate. The items are designed to be grouped together under three topics: 1) physical and social factors involved in selecting a potential lover (10 items; used to evaluate the importance of various characteristics in mate evaluation), 2) better than average physical qualities (4 items; used to evaluate the importance of a single high quality characteristic when all others are of at least average quality), and 3) natural versus artificial fragrance quality (4 items; used to evaluate the importance of natural body odour compared to artificial fragrances). The items under topic 3 are also used to distinguish the relative importance placed on pleasant and unpleasant odours.

Participants were also asked to indicate their sex, age, ethnicity, sexual orientation and any severe impairment they had in a sensory modality. All of the above information was coded into an on-line presentational format using the *autoform* system of Nottingham Trent University (an on-line survey authoring tool optimised for fast downloading, wide browser compatibility and clarity of display).

2.3. Procedure

The on-line formatted RIS was posted on the websites of the ‘Social Psychology Network’ (www.socialpsychology.org), the ‘Human Behavior and Evolution Society

(www.hbes.com), and the 'Psychological Research on the Net' (<http://psych.hanover.edu/Research/exponnet.html>) for a total of three months.

An on-line sampling method was selected to substantially increase the number of responses and the variability in sample background (see demographic details above). As participants were drawn from internet-users it could be argued that the sample was unrepresentative of the wider population. This is unlikely. Age and ethnicity of respondents were highly varied, and appear to be more so than among the participants used by Herz and Cahill (1997) and Herz and Inzlicht (2002). These authors only report their subjects were university students with a mean age of 19.75 and 19.66 respectively, drawing into question the generality of their findings. Given the rapid growth of internet use, on-line populations are becoming increasingly varied and are no longer exclusively composed of technologically proficient, white, male professionals (Hewson, 2003; p 32). The demographics of the participants from this study offer support for this. There is in fact very little reliable evidence that on-line samples are more biased and homogeneous than undergraduate samples traditionally used in psychological research (Hewson, 2003; p 30-36).

The independence offered through internet-based research also significantly reduced social desirability effects (Joinson, 1999), a consistent problem in mate-choice research. However this reduced the level of direct control held over participants. To increase researcher control wherever possible, participants were provided with clear and explicit instructions to follow, the on-line survey-authoring tool was deliberately selected for its presentational consistency across web browsers (see above) and IP addresses were recorded to prevent multiple submissions (in cases of multiple submissions being

received from a single address, only one, randomly selected, submission was included and the others deleted).

3. Results

Inferential statistics for each topic involved a mixed design ANOVA with *sex* as the between-subjects factor, *item* as the within-subjects factor, and *rating score* (measured by 7 point Likert scale) as the dependent variable. A minimum alpha value of 0.05 was used for inferential statistics. All subsequent analysis was based on multiple t-tests to examine between-subjects differences. As multiple comparisons were made in this analysis, a minimum alpha value was established using the Bonferroni approach (multiplying the standard probability ($p < 0.05$) by the number of comparisons made in order to decrease the chances of a type 1 family-wise error occurring). This produced a minimum alpha value for of 0.0023 for subsequent analyses.

Topic 1) Physical and social factors

Responses to items within this topic were merged into two aggregate measures, reflecting *physical characteristics* ('looks', 'voice', 'smell', 'skin texture' and 'athleticism') and *social characteristics* ('money', 'friends', 'ambition', 'smartness' and 'pleasantness'). This method allows for comparison of the relative importance placed by participants on physical characteristics (largely tied to reproductive capacity) and social characteristics (largely linked to resource acquisition). Mean scores for *physical* and *social* characteristics were 5.08 (SD 0.87) and 4.25 (SD 0.86) respectively for men and 4.80 (SD

0.89) and 4.67 (SD 0.874) respectively for women. A 2x2 (item type x sex) mixed design ANOVA revealed that the main effect for sex was not significant ($F_{(1, 438)} = 0.881, p > 0.05$), a significant main effect was observed for item ($F_{(1, 438)} = 112.634, p < 0.05$), and a significant interaction was observed between item and sex ($F_{(1, 438)} = 27.590, p < 0.05$).

Analysis of the simple main effect (SME) for physical characteristics revealed a significant difference based on sex ($t_{(439)} = 266.675, p < 0.05$). Analysis of the SME for social characteristics revealed a significant difference based on sex ($t_{(439)} = 262.354, p < 0.05$). Men placed more importance on characteristics linked to physical attractiveness, while women placed more importance on signs of social factors.

Subsequent analysis of individual items using independent t-tests revealed six significant sex differences, with men declaring they place more emphasis on *looks*, and *skin texture*, and women declaring they place more emphasis on *money*, *number of friends*, and *ambition* when selecting a potential partner (see Table I for full details). There was no significant sex difference based on the importance of *smell*.

Insert Table I about here

Based on the methods of Herz and Inzlicht (2002), mean ratings were used to rank all sensory or physical qualities for their importance in selecting a potential partner (this method was not employed for other topics due to their limited number of items). Both sexes ranked *pleasantness* as most important overall characteristic for a potential mate, with the highest ranked physical characteristics being *looks* for men and *smell* for women (see Table I for full rankings). Paired t-tests were also used to statistically compare

within-sex scores *smell* to other sensory and physical qualities (see table II for full details). For both men and women, mean scores for *smell* were significantly higher than those given to almost all other characteristics. The only exception to this rule was the importance placed on *pleasantness* for both sexes (rated significantly higher than olfaction) and *looks* for male participants (rated equal to olfaction).

Insert Table II about here

Topic 2) Better than average physical qualities

A 4x2 (item x sex) mixed design ANOVA revealed a significant main effect for sex ($F_{(1, 438)} = 21.318, p < 0.05$), a significant main effect for item ($F_{(3, 1314)} = 65.929, p < 0.05$), and a significant interaction was observed between item and sex ($F_{(3, 1314)} = 7.659, p < 0.05$).

Subsequent analysis using independent t-tests revealed three significant sex differences, with men declaring they place more importance on *better-than-average-looks*, *better-than-average-voice*, and *better-than-average-skin-texture*. There was no significant sex difference based on the importance of *better-than-average-smell* (See Table I for full details).

Paired t-tests were used to compare within-sex scores for other sensory or physical qualities to smell (see table II for full details). Both sexes rated *better-than-average-smell* as being significantly more important than other characteristics, except for men who declared *better-than-average-smell* and *better-than-average-looks* as equally important.

Topic 3): Natural versus artificial odours

Responses to items within this topic were merged into two aggregate measures reflecting the importance of *body odour* ('not liking their body odour' and 'liking their body odour') and *artificial fragrances* ('not liking the relative importance placed by participants on natural and artificial odours produced by a potential mate. Mean scores for *body odour* and *fragrances* were 5.06 (SD 1.18) and 4.76 (SD 1.05) respectively for men, and 5.23 (SD 1.23) and 4.90 (SD 1.06) respectively for women. A 2x2 (item type x sex) mixed design ANOVA revealed the main effect for sex was not significant ($F_{(1, 438)} = 2.987, p > 0.05$), a significant main effect was observed for item ($F_{(1, 438)} = 278.76, p < 0.05$), and a non-significant interaction was observed between item and sex ($F_{(1, 438)} = 0.056, p > 0.05$).

Comparison of *body odour* and *artificial fragrances* through paired t-tests revealed a significant difference in ratings ($t_{(439)} = 6.157, p < 0.0023$). Both sexes declare that the body odour characteristics of a potential mate are more important than the artificial fragrances they used. Subsequent analysis of individual items in topic three revealed no significant sex differences (see Table I for full details).

Topic 3): Pleasant versus unpleasant odours

Responses to items in this topic were again merged into two aggregate measures, this time reflecting the importance of *pleasant odours* ('liking their body odor' and 'liking their fragrances') and *unpleasant odours* ('not liking their body odor' and 'not liking their fragrances'). This method allows for comparisons of the relative importance placed by participants on pleasant and unpleasant odours produced by a potential mate. Mean scores for *pleasant odours* and *unpleasant odours* were 5.51 (SD 1.11) and 4.30 (SD 1.23)

respectively for men, and 5.75 (SD 1.16) and 4.38 (SD 1.39) respectively for women. A 2x2 (item type x sex) mixed design ANOVA revealed the main effect for sex was not significant ($F_{(1, 438)} = 2.987, p > 0.05$), a significant main effect for item ($F_{(1, 438)} = 278.756, p < 0.05$), and a non-significant interaction between item and sex ($F_{(1, 438)} = 1.157, p > 0.05$).

Comparison of *pleasant odours* and *unpleasant odours* through paired t-tests revealed a significant difference in ratings ($t_{(439)} = -19.777, p < 0.0023$). Both sexes declare that when an individual smells pleasant (both in terms of their body odour and artificial fragrances) this has a greater impact on their evaluation as a potential mate than if they smelled unpleasant.

4. Discussion

Rankings based on mean scores for *Physical and social factors* indicated the most important physical quality when evaluating a potential partner was *how a person smells* for women and *how a person looks* for men. This finding is consistent with research by Herz and Inzlicht (2002), though it should be noted that a simple ‘eye-ball’ comparison of mean scores is a crude method of analysis. When statistically comparing the importance of smell to other characteristics, however, a different pattern emerges. Women declare olfaction as significantly more important than all other physical characteristics, and while this is also generally true of men, they place equal importance on how a potential mate both looks and smells. This finding is consistent with the work of Herz and Cahill (1997). Additionally no significant sex differences in scores for the importance of olfactory characteristics were recorded. These findings are consistent with Herz and Cahill (1997)

but are inconsistent with Herz and Inzlicht (2002). The within-sex relationships revealed through statistical testing, as opposed to simply ‘eye-balling’ the data, demonstrate the importance of selecting appropriate tests for analysis.

Regarding general preferences for physical and social characteristics of a potential mate, there were clear and significant sex differences. Men declared a greater preference for physical characteristics (*reproductive capacity*) whereas women declared a greater preference for social characteristics (*resource acquisition*). This particular phenomenon was not directly investigated by Herz and Inzlicht (2002), but conforms to the predictions of parental investment theory. This is not to say that men and women *exclusively* use physical or social characteristics to evaluate potential mates. Some aspects of resource acquisition, for example, are linked to physical characteristics such as height (Nettle, 2002).

The mean score rankings for *Better than average physical qualities* indicate the most important physical characteristic when selecting a potential lover as *better than average looks* for men and *better than average in smell* for women. As with the findings from *Physical and social factors*, however, men rated the importance of *better than average looks* and *better than average in smell* equally. These findings indicate participants rate olfactory cues as important when variance in other physical characteristics is controlled. There were, however, no significant sex differences in scores for the importance of *better than average smell*. As with *Physical and social factors*, this finding suggests participants consider olfaction to be important during mate selection, but that sex differences in the evaluation of its importance are small.

For *Natural versus Artificial odours* there were no significant differences between the sexes for the importance of a particular odour source during mate selection. The finding that across both sexes the hedonicity of natural body is declared odour as more important than that of artificial fragrances is, however, significant (see Table I for full details). This study suggests individuals are not merely concerned with the hedonic qualities of an odour, but declare conscious preferences based on odour source. This finding is significant not only because body odour can communicate a wealth of biologically relevant information, but also because individuals consciously attend to it.

Finally for *Pleasant versus Unpleasant odours* there were yet again no significant differences between the sexes. However participants did report that when they liked an individual's odour (i.e., found it pleasant) this had a significantly greater influence on their evaluation as a mate than when they disliked an individual's odour (i.e., found it unpleasant). If odour were being used exclusively as a filter, there should be a particular threshold, or short range of values, that allows an individual to differentiate potential partners who smell pleasant from those who smell unpleasant. If this were the case, then both pleasant and unpleasant odours should be rated as being equally important (the threshold would be the same regardless whether it was described in terms of pleasantness or unpleasantness as these terms reflect polar opposites on the same scale). Instead this suggests participants actively select mates whom they perceive as having a pleasant odour rather than simply avoiding those with unpleasant odour. A potential problem, however, emerges over the wording of the RIS. The unpleasantness of an odour is gauged in response to the statement "The person was clean and you really liked their body odour/the fragrances they used" whereas pleasantness is gauged in response to "The

person was clean and you really liked their body odour/the fragrances they used". The addition of the qualifier 'really' in the pleasantness items could have caused participants to overestimate the importance of this dimension (i.e., they are being asked about someone whose smell they *really like* as opposed to someone's smell they simply *like*). While this is a possibility that warrants further investigation, the fact that participants scored highly on these items is noteworthy. Rather than simply liking pleasantness per se, participants indicated a distinct preference for individuals whose smell they really liked. Based on these responses, it appears that participants would actively seek mates who smell exceptionally good to them, rather than simply avoiding malodour individuals.

In summary, both sexes rated olfaction as an important sensory dimension in human mate choice. The influence of olfaction was rated as being higher than for all other characteristics with the exception of pleasantness in women and physical looks and pleasantness in men. This finding remained apparent even when other physical qualities were controlled (in *better than average physical qualities*). There were, however, no significant sex differences in scores for the importance of olfaction. While supporting the findings of Herz and Cahill (1997), this study has not replicated the clear sex differences observed by Herz and Inzlicht (2002). Where significant sex differences were observed, these supported previous findings based on parental investment theory (Trivers, 1972). Women indicated a preference for symbols of status (*money, number of friends and ambition*) while men indicated a preference for signs of youth and fertility (*looks, voice, and skin texture*). More importance was given to *reproductive capacity* for men, and *resource acquisition* for women (Buss, 1989).

Previous research has shown human women possess superior olfactory abilities (for review see Brand & Millot, 2001) and that olfaction plays an important role in female mating behaviour (Ober et al. 1999). This research, however, questions the importance of olfaction in male mate choice, which is considered to be comparatively limited. Given that men declare olfactory characteristics important during mate selection, how could olfactory cues benefit male mating interests? Poran (1995) reports male hedonic perceptions of female bodily odors vary across the menstrual cycle. Odors were reported as most pleasant, and participants expressed greater desire to smell them for bouts of longer duration, around ovulation. Poran (1995) speculates these substances could be functioning as a signal of fertility, increasing contact at the peak chance of conception. This phenomenon could function in a similar fashion to female perceptions of androstenone (Grammer, 1993). Many previous studies, however, have failed to record these variations based on female fertility (i.e. Doty et al. 1975). Poran's (1995) findings are unique however, as they were based on a variety of bodily odors (saliva, vagina, inner labia major, axillae and loins) rather than simply axillary secretions. While currently a speculative idea, future research should aim to clarify if men and women do differentially use olfaction to assess mate fertility and quality respectively.

One important issue in this research is the nature of responses collected. Participants were *declaring* what characteristics they *consciously* perceived to be important during the process of mate choice. This distinction is significant as there can be a great distance between declared preferences and actual behaviour. An additional methodology for assessing the importance of olfaction would be to run a series of experiments that contrasted the importance of actual olfactory samples (i.e., samples of body odour or the

frangrances used by an individual) with other characteristics (i.e., images to represent an individual's appearance or a sound recording to represent their vocal qualities). However, the use of the Romantic Interests Survey, the same tool used by Herz and Inzlicht (2002) allows more valid comparisons to be drawn between the current research and that of Herz and Inzlicht (2002).

The findings from the current study, however, are consistent with previous research demonstrating olfaction is an important modality during mating behaviour. Human body odour can signal immune system characteristics (Jacob et al., 2002; Thornhill & Gangestad, 1999), influence mood states to facilitate inter-sexual contact (Jacob & McClintock, 2001), and signal female fertility (Poran, 1995), all potentially significant during the process of mate selection. The findings from the current research are also consistent with those of both Herz and Cahill (1997) and Herz and Inzlicht (2002), who documented the important nature of olfaction during mate choice. If olfaction is not important during mate choice, it raises the obvious question why three consecutive studies have documented similar findings. However, a number of olfactory phenomena are mediated by unconscious perceptions (Köster, 2002), and as a result their importance during mate choice could not be evaluated during this study. It is recommended that future research investigate whether unconscious perceptions of odors have as significant an impact on mate choice as conscious perceptions are reported to do.

This study has demonstrated that olfaction is rated as an important sensory dimension for the evaluation of potential mates. Both men and women declare a person's smell as one of, if not the, most important physical characteristic in mate evaluation. This finding was still apparent even when other physical qualities were controlled through

standardization. Additionally it is unlikely that smell simply functions as a filtering mechanism as participants expressed a clear preference for potential mates who smell very pleasant. This study found no evidence for significant sex differences in the importance of olfaction. It is possible that olfaction is an equally important signal for both sexes, with male and female preferences determined by the relevance to differential reproductive strategies. These issues must be addressed if the importance of olfaction for human mate choice is to be revealed.

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Table I: Male and female responses (scores and rankings) on the Romantic Interests Survey

	Men's Responses			Women's Responses			Sex differences	
	Mean	S.D.	Rank	Mean	SD	Rank	t	p
Topic 1: When initially choosing someone as a potential lover...								
a) How they look can make a big difference to me	5.70	1.114	2	5.17	1.318	5	4.361	<0.0028
b) How their voice sounds can make a big difference to me	5.05	1.157	5	4.76	1.354	6	2.301	>0.0028
c) How they smell can make a big difference to me	5.56	1.314	3	5.73	1.268	2	-1.2396	>0.0028
d) How their skin feels can make a big difference to me	4.89	1.362	6	4.39	1.423	7	3.830	<0.0028
e) How much money they earn can make a big difference to me	2.59	1.439	10	3.27	1.501	10	-4.869	<0.0028
f) How many friends they have can make a big difference to me	2.89	1.534	9	3.37	1.556	9	-3.336	<0.0028
g) How ambitious they are can make a big difference to me	4.55	1.611	7	5.20	1.354	4	-4.837	<0.0028
h) How smart they are can make a big difference to me	5.19	1.449	4	5.28	1.405	3	-0.674	<0.0028
i) How pleasant they are can make a big difference to me	6.05	1.054	1	6.21	1.030	1	-1.722	>0.0028
j) How athletic they are can make a big difference to me	4.21	1.684	8	3.93	1.599	8	1.831	>0.0028
Topic 2: Imagine that a potential lover is at least average in the quality of their looks, voice, body smell and skin. How important is it to you that they be better than average on each specific trait listed below?								
a) Being better than average looking	4.85	1.449	na	4.13	1.388	na	5.486	<0.0028
b) Being better than average in how nice their voice sounds	4.28	1.317	na	3.83	1.314	na	3.647	<0.0028
c) Being better than average in how they smell	4.85	1.320	na	4.72	1.395	na	1.018	>0.0028
d) Being better than average in how good their skin feels	4.41	1.363	na	3.86	1.299	na	4.459	<0.0028
Topic 3: How much would it influence your sexual interest in someone if...								
a) The person was clean but you did not like their body odour	4.61	1.811	na	4.78	1.962	na	-0.934	>0.0028
b) The person was clean but you really liked their body odour	5.51	1.395	na	5.68	1.329	na	-1.319	>0.0028
c) The person was clean but you did not like the fragrances they used	4.01	1.359	na	3.98	1.451	na	0.200	>0.0028
d) The person was clean and you really liked the fragrances they used	5.52	1.351	na	5.82	1.330	na	-2.422	>0.0028

Table II. Paired t-tests evaluating the importance of smell compared to other characteristics

Characteristic	Paired t tests with smell scores	
	Men	Women
How they look	-1.12	7.15*
How their voice sounds	4.39*	13.19*
How their skin feels	5.42*	20.54*
How much money they earn	18.98*	28.24*
How many friends they have	16.94*	24.57*
How ambitious they are	6.25*	6.68*
How smart they are	2.59*	5.30*
How pleasant they are	-4.35*	-6.74*
How athletic they are	8.31*	19.42*
Better than average looks	-0.05	8.09*
Better than average voice	5.48*	12.69*
Better than average skin	4.09*	15.20*

* Significant at the 0.0023 level