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Cues of woman's fertility predict prices for sex with prostitutes

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Abstract

Prostitution is an exchange of sexual services for economic profit which predominantly reflects men's desire for sexually attractive women. These preferences could be shaped by sexual selection, as a woman's sexual attractiveness is believed to be a cue of fertility. Using data from Polish prostitutes, we investigated whether cues of fertility are associated with the price for sex. In line with evolutionary predictions, prostitute's age and body mass index (BMI) were negatively correlated with the price for sex, while breast size (except for very large breasts) and number of sexual offerings were positively associated with the price for sex. This suggests that young, slim prostitutes with moderate breasts are more expensive than older, stockier, and those with very large breasts. We suggest that commercial sex exploits men's evolved preferences for sexually attractive women who have high reproductive potential.

Keywords BMI · Breasts · Poland · Preference · Prostitution · Sex

Introduction

Females of most species are the choosier sex when selecting a mate because they are reproductively more limited than males. In contrast, the reproductive success of a male is limited by the number of females that he inseminates (Bateman 1948). Females invest more in postzygotic care for young, such as feeding and defence against predators (Trivers 1972). This is particularly the case for mammals where males of only 5% of the species invest in offspring care (Clutton-Brock 1991). Behavioural evidence from contemporary human populations

support the universality of higher selectiveness on the part of women; women are less likely than men to pay for short-term sex with prostitutes of the opposite sex, women are less attracted to visually explicit sexual materials, think less about sex with another than their own sexual partner, masturbate less frequently and engage less in extramarital affairs than men (reviewed by Schmitt 2014).

A man's reproductive success is maximized by a selection of women with the highest reproductive capacity which includes woman's residual reproductive value and fertility (Buss and Schmitt 1993). Residual reproductive value refers to expected *future* reproductive potential (Schmitt 2014). Most menstrual cycles, 2–3 years after menarche are, for example, anovulatory (Apter 1980), suggesting that the preference for young girls of age ~ 17 is advantageous for long-term mating strategy, because these girls have long-term reproductive potential (Cloud and Perilloux 2014; Symons 1979; Williams 1957). In contrast, men's short-term mating strategies are focused on selection of the most fertile women in their early 20s, when fertility peaks (Dunson et al. 2002; Leridon 1977). Women's fertility substantially decreases in their late 20s (Dunson et al. 2002; Leridon 1977; van Noord-Zaadstra et al. 1991) and the risk of genetic disorders increases (Cuckle et al. 1987; Kim et al. 2013). A woman's age is therefore a critical cue of both fertility and reproductive potential.

Compared with long-term mating strategy, men's short-term mating strategy is more directed toward woman's physical cues associated with high fertility (Buss and Schmitt

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1993; Cloud and Perilloux 2014; Jonason et al. 2012). With respect to behavioural characteristics, men dislike women for short-term sexual relationships who are prudish, conservative, or have a low sex drive (Buss and Schmitt 1993). Specifically, men interested in short-term mating prioritize women's bodily cues over facial cues in all probability due to the fact that a woman's body provides more reliable cues as to her fertility (Confer et al. 2010; Currie and Little 2009). The breast size of preference, for example, reveals medium- to large-sized breasts to be maximally attractive (Dixson et al. 2011, 2015; Havlíček et al. 2017) with large breasts being preferred most by men pursuing a short-term mating strategy (Zelazniewicz and Pawlowski 2011). Large breasts, particularly in women with low waist-to-hip ratios (Jasienska et al. 2004), correlate with higher estrogen levels which positively influences the likelihood of conception (Lipson and Ellison 1996; Venners et al. 2006). Women's body mass index (BMI; weight divided by height squared) is another strong determinant of physical attractiveness (Tovée et al. 1998). In Perilloux et al.'s (2013) study, BMI was a better predictor of self-perceived attractiveness, particularly for women who pursue a short-term mating strategy, compared to women interested in long-term relationships. This suggests that women are aware of men's prioritization of body attractiveness for short-term mating. Both being underweight or overweight reduces women's fertility (Clark et al. 1998; Pinborg et al. 2011; Sallmén et al. 2006; Zaadstra et al. 1993).

Prostitution, the exchange of sexual services for economic profit, is a reflection of men's desire for pursuing a short-term mating strategy (Symons 1979). Prostitution is not restricted to humans, but is also well documented with invertebrates (reviewed by Vahed 1998), birds (Tryjanowski and Hromada 2005), canids (Dale et al. 2017) and primates (Colmenares et al. 2002; Gumert 2007; Yu et al. 2013), including chimpanzees, our closest relatives (Gomes and Boesch 2009). Prostitution amongst animals is more closely associated with successful conception (Schlicht and Kempenaers 2011). Although the use of contraceptives amongst humans extremely limits male reproduction, human prostitution is still an excellent candidate for investigation of male mating preferences, particularly in a short-term context, as men show a stronger preference for young (Arunachalam and Shah 2008; Gertler et al. 2005; Rao et al. 2003; Sohn 2016a) and less experienced prostitutes (Sohn 2016b) in terms of earnings per sexual act or per week. Both these choices are ultimately beneficial for males, because young females have greater reproductive potential than older females. Lower sexual experience in females is associated with stronger male preferences, probably because the lower risk of sperm competition increases paternity certainty for males (Buss 1989; Hartung 2012; Prokop 2015). We have extended this research to a sample of prostitutes from Poland to assess the replicability of these results in an Eastern European sample using data from a very popular, and

frequently visited, online website linked to this subject. We also investigated whether physical cues associated with high fertility (i.e., breast size, BMI) correlate with prostitute preferences by men. We specifically hypothesize that the preference for particular prostitutes, measured by the price per hour, is associated with cues of high fertility and/or reproductive value. First, we predict that prices for young prostitutes are higher than prices for older prostitutes (Prediction 1). Second, prices for prostitutes decrease with decreasing breast size (Prediction 2) and with increasing BMI (Prediction 3). Finally, we predict that the variety of sexual offerings, as a cue of sexual liberalism, positively correlates with the price for sex (Prediction 4).

Method

Participants and Procedure

Data about sex offerings by women was collected from a well-known Polish website (www.roksa.pl), from October to August 2016. This website included sex offerings by women from all over Poland. We collected information from 96 towns in 7 Polish regions (voivodeships). We collected sex offerings data for seven age class groups (18–25, 26–31, 32–37, 38–43, 44–49, 50–55, 56–61) from each town. In total, we collected data from 2379 (20%) (12,337 all offerings). Due to the large number of offerings in a large city for the age category 18–25, 26–31 and 32–37, we selected 100 random offerings of these categories, while we included all the offerings from the remaining categories. For each sex offering, we collected information about the price for sex per hour (converted from Polish Zloty to Euro), the woman's age, body height (cm), weight (kg), breast size (A, B, C, D, DD, E, F, G classes), place of sexual service (in a brothel, in the client's home or only a hotel). All these data are available on the website mentioned above. To avoid multicollinearity between body height and weight variables, we calculated BMI as weight/body height². From the short description included for each offering, we counted the number of sexual offerings of seven categories: vaginal sex, anal sex, oral sex, threesome sex, group sex, fetish and erotic massage. Using the included photos, we recorded information about how woman presented themselves (hereafter, the photo presentation): naked, half-naked with visible breasts, in underwear or fully dressed.

Statistical Analyses

We used the general linear mixed models (GLMM) with Gamma distribution, distribution and the log link function. For standardizing the explanatory variables, we used the Z-score function. The price per hour (in Euros) was defined as a dependent variable. We included the woman's age, BMI,

breast size, number of services and photo presentation as a fixed – effect predictor variable in the model structure. Beyond the main fixed effect, we added interaction in the model: Age \times BMI, Age \times Breast size, Age \times Number of services and BMI \times Breast size. The town size (three categories: below 20 thousand inhabitants, 20–70 thousand inhabitants, above 70 thousand inhabitants) and place of sexual service were treated as random factors. Before GLMM's analyses, we checked the variance of the inflation factor. The multicollinearity of the explanatory variables in GLMMs was not excessive ($VIF < 2$). Non-significant interactions were removed in the initial model, with the model being run again following the recommendations of Zuur et al. (2009). Least squared means contrasts were compared with Tukey method in lsmmeans package (Lenth 2016). All the analyses and graphs were performed in R 3.3.2 (R Core Team 2016) using R-packages: lmer4 (Bates and Maechler 2010), car (Fox and Weisberg 2011), ggplot2 (Wickham 2008).

Results

The price for sex per hour ranged between 50 and 700 Euro ($M = 168.4$, $SD = 66.01$, $N = 2379$). The most frequent sexual offerings were vaginal sex (99.9%), followed by oral sex (51.6%), erotic massage (23.7%), anal sex (13.7%), fetish (12.7%), group sex (3.9%) and threesome sex (0.5%). Further descriptive data is shown in Tables 1 and 2.

The results of the final GLM model are shown in Table 3. The prices for sex per hour for younger prostitutes were higher than prices per hour for older prostitutes, providing support for Prediction 1 (Fig. 1). The prostitute's breast size was positively associated with price per hour supporting Prediction 2. Indeed, a majority (67%) of women reported having C and D breast size (Table 2). Too large breasts were, however, associated with a decreasing price per hour (Fig. 2). Post hoc comparison showed only a significant difference on price per hour between B and DD breast size classes ($p = 0.05$), and between C and G ($p < 0.01$) (Fig. 3). An increasing BMI in a prostitute was associated with a decreasing price per hour, providing support for Prediction 3 (Fig. 4). Finally, the variety of sexual offerings weakly, but significantly, correlated with the price per hour, providing support for Prediction 4. The

town size, place of sexual service and photo presentation were not associated with the price per hour.

The statistically significant interaction term Age \times BMI suggests that young prostitutes with a smaller BMI had a higher price for sex per hour compared with older prostitutes, where BMI played a less important role in determining the price for sex (Fig. 4).

The statistically significant interaction term Age \times Breast size suggests that the highest prices were observed for young prostitutes with breast sizes of C, D and DD classes, while older prostitutes with small breasts showed lower prices than young prostitutes (Fig. 2). An interaction term BMI \times Breast size suggests that highest prices were more common in prostitutes with smaller BMI and with medium and large breast size (Fig. 5).

Discussion

Men's mating preferences derive almost exclusively from physically observable attributes such as attractiveness, BMI, height and age (Kurzban and Weeden 2005). This study was focused exclusively on the physical characteristics of prostitutes who provide sex for direct benefits (money), a practise known since ancient times (Bullough and Bullough 1978). All the physical cues based on prostitutes' self-reports and declared on a well-known Polish web page showed significant associations with price per hour, which can be understood as a proxy of female reproductive value.

In line with Prediction 1, prices per hour for younger prostitutes were higher than prices per hour for older prostitutes. This result is in agreement with previous research showing the same associations between the age of prostitutes and their prices in different countries (Arunachalam and Shah 2008; Gertler et al. 2005; Rao et al. 2003; Sohn 2016a). Increasing age is associated with lower fertility and poorer health in females (e.g., Dunson et al. 2002; Leridon 1977). It is therefore not surprising that younger females are the most attractive to men (Cross and Cross 1971; Deutsch et al. 1986; Henss 1991; Kenrick and Keefe 1992; Korthase and Trenholme 1982; Maestriperi et al. 2014; Mathes et al. 1985; Teuscher and Teuscher 2007; Wernick and Manaster 1984). With regard to men's preferences for woman's residual reproductive value or

Table 1 Descriptive statistics for reported data by prostitutes obtained from www.roksa.pl

Variables	Mean \pm SE	SD	Min-Max	95% CI
Age	30.61 \pm 0.162	7.924	18–61	30.29–30.93
BMI	20.78 \pm 0.622	3.032	14.03–37.25	20.56–20.91
Reported weight	58.5 \pm 0.180	8.774	39–105	58.15–58.85
Reported height	167.79 \pm 0.097	4.752	150–198	167.59–167.98
Number of services	2.06 \pm 0.023	1.107	1.6	2.02–2.10

Table 2 Descriptive statistics for reported data obtained from www.roksa.pl

Variables		Percent	N
Breast size	A	0.3	8
	B	14.5	345
	C	42.1	1002
	D	25.2	599
	DD	11.7	279
	E	3.8	91
	F	1.3	30
Town size	<20	3.1	73
	20–70	11.5	274
	>70	85.4	2032
Photo presentation	Naked	11.9	284
	Half-naked	24.4	581
	Underwear	48.6	1156
	Dressed-up	15	358
Place	Client home	701	29.5
	Hotel	518	21.8
	Prostitution home	1160	48.8

fertility (Buss and Schmitt 1993), our sample contains a very low number of women in their teens (~ 1% of 18 and 19 year-old-women) which makes any statistical comparisons unreliable. Sohn (2016a) found that the price for sex for prostitutes in their late teens to early 20s was similar suggesting that men are unable to clearly distinguish between reproductive value and fertility.

One might argue that the number of women engaged in prostitution would copy men's preferences; if so, then the highest number of 20–25-year-old prostitutes (~ 30% of 20–25-year-old women) may provide some support for the women's fertility hypothesis. Polish women, however, are citizens of a more religious and less atheist country compared to western countries (Greeley 2017). Indeed, Polish women reported the oldest age of initial vaginal intercourse as compared with German, Slovak and Spanish women (Díaz-Morales

Table 3 Final GLMM model on prices for sex per hour as dependent variable

Variable	Estimate	SE	t-value	P
Age	-0.084	0.000	-10.78	<0.0001
BMI	-0.11	0.009	-11.99	<0.0001
Breast size	0.036	0.008	4.43	<0.0001
Sexual offerings	0.016	0.007	2.27	0.023
Age × BMI	0.049	0.008	6.19	<0.0001
Age × Breast size	-0.019	0.008	-2.52	0.012
BMI × Breast size	-0.014	0.007	-2.18	0.029

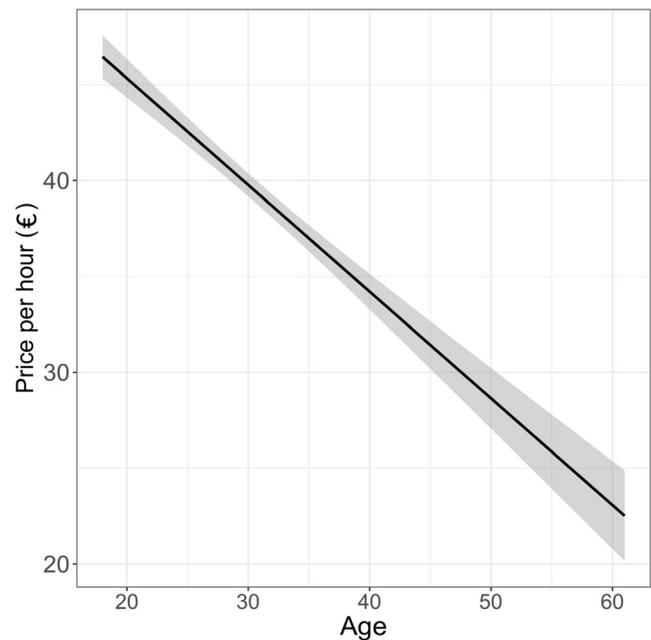


Fig. 1 The relationship between the price for sex per hour and the prostitute's age

et al. 2018). In addition, a study involving 56 countries backed the cross-cultural link between higher personal religiosity and lower sexual permissivity (Schmitt and Fuller 2015). High religiosity in Poland, and the significant parental influences of an adolescent's religiosity (Regnerus et al. 2004), could be factors responsible for the low numbers of prostitutes aged < 20.

Based on Prediction 2, it is suggested that breast size positively correlates with the price for sex. Moderate breast size

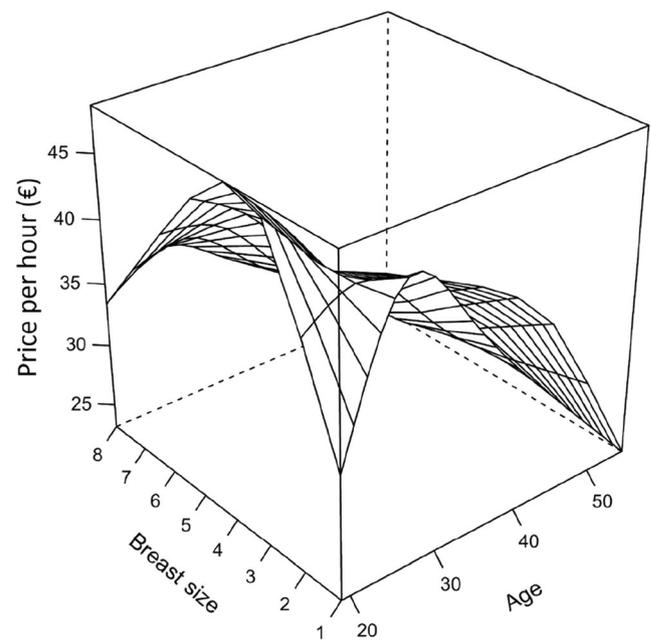


Fig. 2 A visualization of interactions between a prostitute's breast size, age and the price for sex per hour

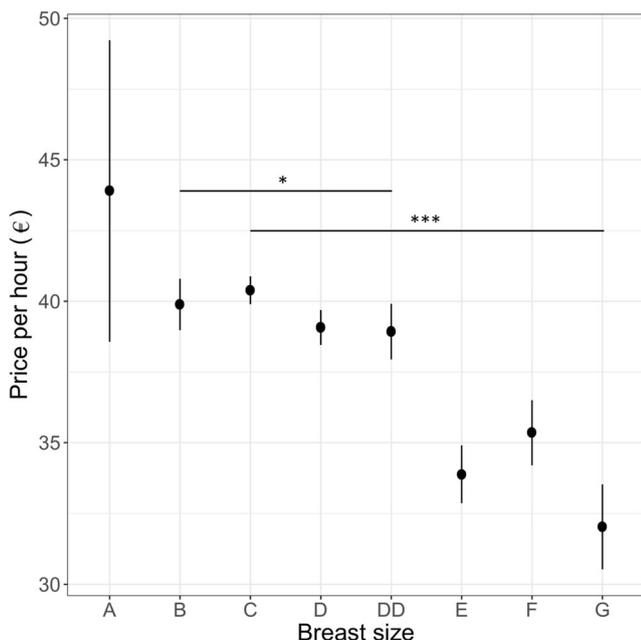


Fig. 3 The relationship between the price for sex per hour and the prostitute's breast size

was associated with the highest prices which is in line with the highest preferences for moderate breasts followed by large and small breasts sizes, respectively (Dixon et al. 2011, 2015; Havlíček et al. 2017; Zelazniewicz and Pawlowski 2011). Preferences for larger breasts (Prediction 2) along with preferences for small BMI (Prediction 3) could be ultimately advantageous, these being associated with higher fertility among women (Jasienska et al. 2004). Smaller breasts can be advantageous for older women, because large breasts

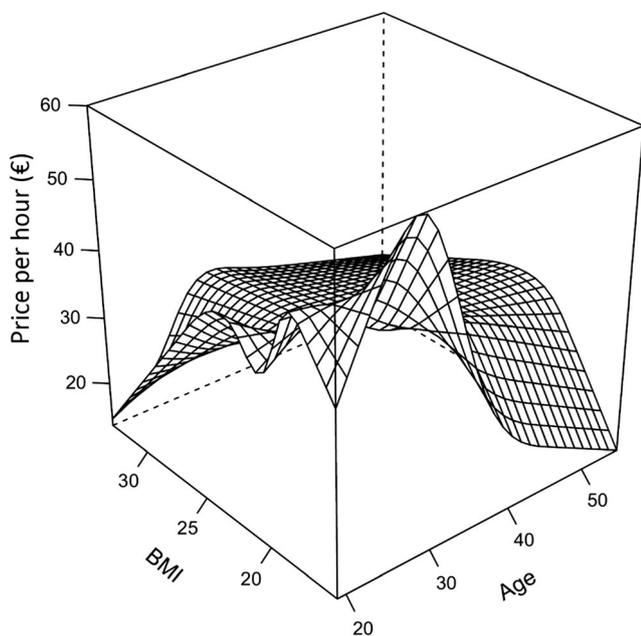


Fig. 4 A visualization of interactions between a prostitute's BMI, age and the price for sex per hour

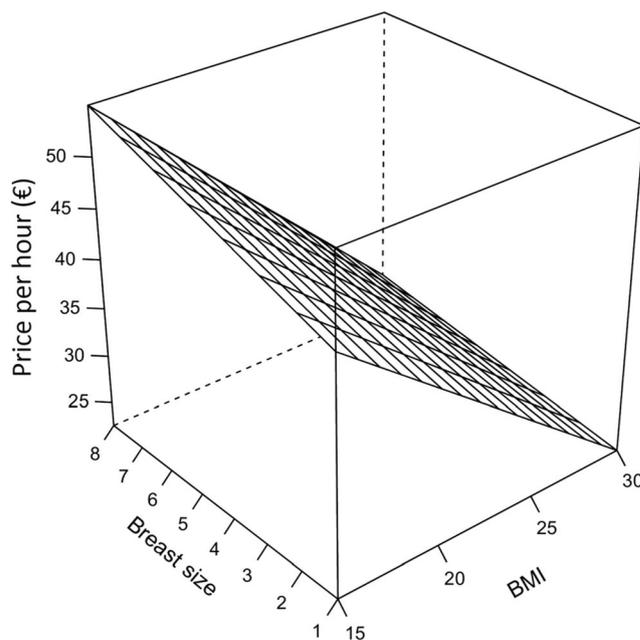


Fig. 5 A visualization of interactions between a prostitute's BMI, breast size and the price for sex per hour

compared to small breasts become more pendulous with age (Rinker et al. 2010) and firm breasts are more attractive to men than pendulous breasts (Havlíček et al. 2017). Indeed, small breast size seems to be advantageous in terms of price per sex for the group of prostitutes aged 30–40 more than for younger prostitutes (Fig. 1). Some prostitutes could have breasts surgically enlarged with implants, but this information is not provided on the web page. Further research can uncover possible associations between photo presentation and breast size/firmness and breast augmentation. In addition, women's waist-to-hip ratio (WHR), a reliable cue to fertility (Butovskaya et al. 2017; Mondragón-Ceballos et al. 2015) could be included in future research on female intersexual attractiveness.

Our final prediction dealt with the correlation between the variety of sexual offerings as a cue of sexual liberalism and the price for sex (Prediction 4). Non-vaginal sexual offerings provide an additional risk of being contaminated with sexually transmitted diseases (Donovan 2000; Frisch et al. 1997; Edwards and Carne 1998; Herrero et al. 2003; Ho et al. 1998; Schwandt et al. 2006). Thus, prostitutes who are at a higher risk of contamination can in theory ask for higher prices for sex. Alternatively, less attractive prostitutes perhaps use a variety of sexual offerings to increase their market value. Risk of contamination can also be influenced by female facial attractiveness, because males are more willing to have sex with attractive females, but are less inclined to use condoms when they do so (Eleftheriou et al. 2016). More research in this field is required to uncover these associations.

The results of our research suggest that prostitution in the modern world is influenced by preferences which evolved in

our evolutionary past, and the price for sex reflects women's reproductive potential. Preference for young, physically attractive women has been reproductively advantageous, because such women could produce more offspring. Furthermore, vaginal sexual intercourse, the only sexual practise which can result in conception, was offered by almost all of the prostitutes. This additionally suggests that prostitution is not only about sexual pleasure, but about exploiting the evolution of men's preferences. Thus, commercial sex exploits men's evolved preferences for sexually attractive women who have high reproductive potential.

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Compliance with Ethical Standards

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee (KE IZ WMWiNoZ 1/UPD/09/2017) and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent The data of the participants involved in this study was publicly shared.

Conflict of Interest Authors declare no conflict of interests.

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