Personality and Individual Differences 152 (2020) 109558

Contents lists available at ScienceDirect

Personality and Individual Differences

journal homepage: www.elsevier.com/locate/paid

Wearing high heels as female mating strategy

Pavol Prokop[a,b,*], Jana Švancárová[a]

[a] Department of Environmental Ecology, Comenius University, Ilkovičova 6, 842 15 Bratislava, Slovakia
[b] Institute of Zoology, Slovak Academy of Science, Dúbravská cesta 9, 845 06 Bratislava, Slovakia

ARTICLE INFO

Keywords:
Beautification
Human
Sexual signalling
Sociosexuality

ABSTRACT

Females use various behavioural tactics in order to attract the attention of a desirable mate. Wearing high heels enhances female physical attractiveness for the opposite sex, thus their use seems to be a powerful sexual signal. We investigated female preferences for high heels both in everyday life as well as in a hypothetical mating scenario. Slovak females reported a low frequency of wearing high heels (45% once per month, 38% never) in everyday life. Females with a lower body height and high self-perceived attractiveness reported more frequent use of high heels than others. Sociosexuality and involvement in a romantic relationship did not predict the wearing of high heels. When females imagined an interaction with an attractive male, preferences for high heels steeply increased compared with a scenario with an unattractive male. Females with a low body height use high heels in all probability to visually elongate their leg length in order to increase their physical attractiveness. High heels seem to be a form of sexual signalling by females in intersexual interactions.

1. Introduction

Across cultures, human females invest in offspring more than males in both traditional and modern societies (Eibl-Eibesfeldt, 1989; Geary 2000 Hewlett, 1992). Human males, on the other hand, spend more time caring for their offspring than males of virtually all other mammals (Bjorklund & Shackelford, 1999; Puts, 2010). This, relatively high paternal investment, constitutes a basis for female competition over a potential sexual partner (Puts, 2010). Indeed, females compete for an opposite sexual partner particularly when suitable partners are scarce (Campbell, 1995; Fisher, 2004).

A strong male preference for female physical attractiveness is followed by artificial beautification. In 2017, for example, breast augmentation was found to be the most popular cosmetic procedure worldwide with 1,677,320 procedures (ISAPS, 2018) which could be explained by male preferences for medium-to-large sized breasts (Dixson, Dixson, Grimshaw, Linklater, & Dixson, 2011; Dixson, Duncan, & Dixson, 2015; Havlíček et al., 2017; Prokop, Dylewski, Woźna, & Tryjanowski, 2019). Large breasts, in turn, are associated with higher fertility (Jasienska, Ziomkiewicz, Ellison, Lipson, & Thune, 2004), thus artificial beautification could ultimately exploit male mating preferences.

Wearing shoes with high heels by females has become extremely popular in modern society (Graff, Murnen, & Krause, 2013) despite it bringing physical harm to the bearer (reviewed by Barnish, Morgan, & Barnish, 2018). Females with high heels are considered more sexually attractive to males (Guéguen, 2015; Guéguen & Stefan, 2015; Guéguen, Stefan, & Renault, 2016), as it improves the lumbal curvature (Lewis et al., 2017), and alters the female's gait, reduces stride length and increases rotation and tilt of the hips (Morris, White, Morrison, & Fisher, 2013).

High heels can therefore represent an adaptive female mating strategy for enhancing physical attractiveness for the opposite sex (Smith, 1999; Smith & Helms, 1999). Morris (2005) hypothesized that high heels can elongate female legs and thereby increase their physical attractiveness for males. If this is the case, females with low body height in particular should prefer high heels more than their taller counterparts.

Female beautification is expected to increase in a sexual context (Eisenbruch, Simmons, & Roney, 2015; Elliot, Greitemeyer, & Pazda, 2013; Haselton & Gangestad, 2006; Haselton, Mortezaie, Pillsworth, Bleske, & Frederick, 2007). Females use, for example, more makeup (Guéguen, 2012) and dress more provocatively (Durante, Li, & Haselton, 2008; Eisenbruch et al., 2015; Haselton & Gangestad, 2006; Haselton et al., 2007) when the probability of conception is high and/or when they are otherwise interested in sex (Grammer, Renninger, & Fischer, 2004). This behaviour can be mediated by the partnership status since single females are more interested in uncommitted sex (Prokop & Fedor, 2013), respond more intensively to cues depicting heterosexual intercourse (Rupp & Wallen, 2007) and facial photos of

* Corresponding author at: Department of Environmental Ecology, Faculty of Natural Sciences, Comenius University, Ilkovičova 6, 842 15 Bratislava, Slovakia.
E-mail address: pavol.prokop@savba.sk (P. Prokop).

https://doi.org/10.1016/j.paid.2019.109558
Received 31 January 2019; Received in revised form 10 August 2019; Accepted 10 August 2019

the opposite sex (Rupp et al., 2009).

Sexual signalling is stronger amongst sexually unrestricted individuals who attract more sexual advances than individuals with restricted sociosexual orientations (Kennair & Bendixen, 2012). Sexually unrestricted individuals are more likely to select partners based on physical attractiveness (Prokop, Pazda, & Elliot, 2015; Simpson & Gangestad, 1992), have a higher sex drive (Ostovich & Sabini, 2004), are more interested in casual sex (Sevi, Aral, & Eskenazi, 2018), have a higher lifetime number of sexual partners (Lukaszewski, Larson, Gildersleeve, Roney, & Haselton, 2014; Prokop & Fedor, 2013), and engage in extrapair sex more often (McIntyre et al., 2006). Sexually unrestricted females in particular reported more frequent use of attraction tactics that enhance their own physical attractiveness (Bleske-Rechek & Buss, 2006; Elliot & Pazda, 2012). This evidence suggests that female beautification may be associated with an interest in short-term sexual relationships (Bradshaw, Leyva, Nicolas, & Hill, 2019).

In this study, we investigated female preferences for high heels in the context of sexual selection. If high heels represent a female strategy to enhance their own attractiveness for the opposite sex, then females should prefer wearing high heels in contact with an attractive male. Physical beautification, in contrast, is not expected in a scenario where a female might meet a physically unattractive male. We also predicted that single and sexually unrestricted females will engage in wearing high heels more than those involved in a romantic relationship and more than sexually restricted females. Females with a lower body height are expected to prefer high heels more than taller females in order to visually elongate their leg length. Physically more attractive females should have stronger preferences for high heels, because only high-quality individuals can cope with the costs of carrying sexual ornaments (Zahavi & Zahavi, 1999).

2. Method

2.1. Participants

A total of 321 Caucasian students, attending a mid-sized university in Slovakia, participated in the study. After excluding students who reported having a bisexual and homosexual orientation and who were below the age of 18, the sample was 292 females with a mean age of 21 years (SD = 4.67). Data exclusions were determined prior to any analysis.

2.2. Measuring sociosexuality

Sociosexuality was assessed with the Revised Sociosexual Orientation Inventory (SOI-R; Penke & Asendorpf, 2008). The 9-itemSOI-R provides an overall assessment of sociosexual orientation. A high SOI-R score indicates an unrestricted sociosexual orientation - a propensity to engage in more short-term sexual relationships. We summarized the scores from the SOI-R to create an overall sociosexuality index (M = 20.23, SD = 7.25, range = 11–70) with high reliability (α = 0.80).

2.3. Self-perceived attractiveness

The participant's self-perceived attractiveness was assessed with the 7-point Likert-type scale (“How physically attractive are you for males?” [1 very unattractive, 3 average and 7 very attractive])? (Little, Burt, Penton-Voak, & Perrett, 2001).

2.4. Wearing high heel shoes

Wearing shoes with high heels was assessed by one item: “How often do you wear shoes with high heels similar to those in the picture below?” A picture with legs with black high heel shoes (11 cm heels) was inserted below the question. The responses were categorized following Goetz, Shackelford, Schipper, and Stewart-Williams (2006) (1 = never, 2 = once per month, 3 = 2–5 times per month, 4 = 6–10 times per month, 5 = 11–12 times per month, 6 = 25 times per month and more).

2.5. Preference for high heels in a mating scenario

Two facial photographs of young males (age about 20–25 years), downloaded from Google and differing in perceived sexual attractiveness, were used as stimuli. Fourteen female volunteers with a mean age (M = 25, SD = 1.74) rated men's facial pictures on a Likert-type scale (1 = not attractive, 7 = very attractive). The attractive male received a higher attractiveness score (M = 6.1, SD = 0.73) than the non-attractive male (M = 1.57, SD = 0.76) (Wilcoxon test, Z = 3.3, p = .0009).

In an on-line questionnaire, female participants were asked: “Imagine that the male in the picture invited you on a date. Which of the two shoes would you prefer for this date?” The responses were binary coded (high heels or flat sole shoes).

2.6. Stimuli

Legs with black coloured shoes with high heels (11 cm heels) and similarly looking black flat sole shoes (1 cm heels) were chosen for the experiment. The photographs of the legs were taken by photographing the legs of a 22-year-old volunteer female. The female wore shoes with high heels and flat sole shoes and was photographed from the same distance. For the mating scenario, the colour in the photographs was manipulated using Adobe Photoshop CS2 from original black to white in order to increase the visibility of the shoes. We specifically created a photo filter covering the entire surface area of the shoes. We consequently manipulated the colour of the filter, which allowed other aspects of the legs to remain unchanged.

2.7. Procedure

Ethical approval was received from the local Institutional Review Board. The participants were initially asked demographic questions (age, sex, body height and weight), self-perceived attractiveness, frequency of wearing high heel shoes and sociosexuality. Majority of females (182 of 292, 62%) reported to be involved in a romantic relationship (mean length of a relationship = 37 months, SD = 51.24, n = 182). A facial picture of one male was then presented on one slide with a picture depicting legs with high heels and a picture depicting flat sole shoes placed below the male's picture. A facial picture of a second male, along with the high heels and flat sole shoes, was shown on the next slide.

2.8. Statistical analyses

Female preference for high heels in the mating scenario was compared with the McNemar test, because data were not independent. The influence of the participant's age, SOI, relationship status, and self-perceived attractiveness on preferences for high heels in the mating scenario (binomial dependent variable) was examined with multiple logistic regression. The influence of the participant's age, SOI, relationship status, and self-perceived attractiveness on the frequency of use of high heel shoes (ordinal dependent variable) was examined with the Generalized Linear Model (GLM) with the probit link function. Correlation matrix showing all inter-correlations was calculated with Pearson's correlation coefficient and relationships with the ordinal variables were calculated with Spearman's rank correlation coefficient.

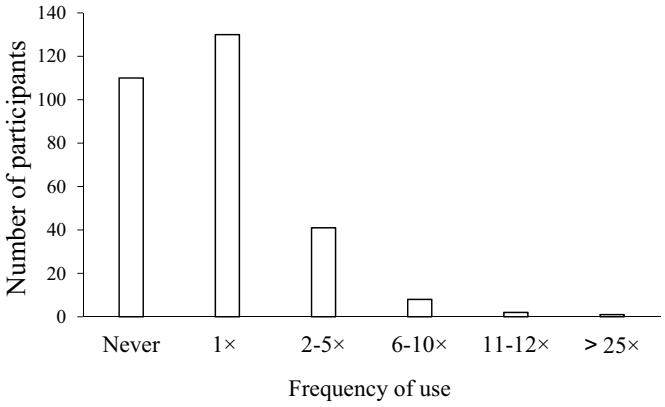

Fig. 1. Self-reported frequency of wearing shoes with high heels by women for one month.

3. Results

3.1. Preferences for high heels in everyday life

Around 38% did not report wearing shoes with high heels at all (Fig. 1). A majority of females (45%) reported wearing shoes with high heels once per month and the remaining 17% reported wearing shoes with high heels more than two times per month.

3.2. Factors influencing wearing high heels in everyday life

Because only two females reported wearing shoes with high heels 11–12 times per month and one only female reported wearing shoes with high heels more than 25 times per month and more, these two categories were pooled together with wearing high heels 10 times per month. Zero-order correlations (Spearman) showed that self-reported attractiveness and reported body height correlated with the frequency of wearing shoes with high heels ($r = 0.20$ and -0.11, $p < .001$ and 0.05, respectively). Other variables (age, SOI, reported weight) did not correlate with the frequency of wearing shoes with high heels ($r = 0.01$, 0.09 and 0.004, $p = .90$, 0.14 and 0.95). Insertion of these variables along with relationship status into the GLM confirmed zero-order correlations. The frequency of wearing shoes with high heels was positively associated with self-perceived attractiveness and negatively with self-perceived height. Physically more attractive females reported wearing shoes with high heels more frequently than their less physically attractive counterparts. Taller females reported wearing shoes with high heels less frequently than females with a lower reported body height (Table 1). Correlations between other variables are shown in Table 2.

3.3. Preferences for high heels in the mating scenario

A majority of females (175 of 292, 60%) reported wearing high heels shoes for a date with an attractive male. In contrast, only 22% of females (63 of 292) reported wearing high heels shoes for a date with an unattractive male. This difference was highly significant (McNemar test, $\chi^2 = 102.7$, df = 1, $p < .001$). When females who reported not wearing shoes with high heels were removed from the analysis, the results remained the same; 132 of 182 females (73%) reported wearing shoes with high heels for a date with an attractive male while only 51 of 182 females (28%) reported wearing shoes with high heels for a date with an unattractive man (McNemar test, $\chi^2 = 77.12$, df = 1, $p < .001$).

Table 1
Results of GLM on the self-reported frequency of wearing shoes with high heels (df = 1).

	Wald χ^2	p
Age	0.16	.69
SOI	1.66	.20
Height	6.80	.009
Weight	1.90	.16
Self-attractiveness	11.13	<.001
Relationship status	1.21	.27

Table 2
Correlation matrix of the variables included in analyses.

	SOI	Height	Weight	Self-attractiveness
Age	0.004	−0.001	0.16**	0.06
SOI	–	0.05	0.016**	0.19**
Height	–	–	0.43***	−0.01
Weight	–	–	–	−0.16**

Note:
** $p < .01$.
*** $p < .001$.

3.4. Further factors influencing female preferences for high heels in the mating scenario

The mating scenario correlated with the self-reported use of high heels in everyday life. Those who are more physically attractive and those with a lower body height prefer shoes with high heels on a date with an attractive male more frequently than less attractive and taller females (logistic regression, Wald's $\chi^2 = 8.87$ and 3.69, df = 1, $p = .003$ and .05, respectively). The influences of age, SOI, self-reported body weight and relationship status were not statistically significant (Wald's $\chi^2 = 1.81$, 0.41, 0.08 and 0.88, all $p > .17$, respectively). When a non-attractive male target was considered, only the influence of self-reported body height remained significant (Wald's $\chi^2 = 5.26$, df = 1, $p = .02$) while the influences of age, SOI, self-reported body weight, attractiveness and relationship status remained non-statistically significant (Wald's $\chi^2 = 1.03$, 2.79, 1.62, 0.23 and 1.65, all $p > .09$, respectively).

4. Discussion

This study investigated certain factors influencing female preferences for wearing high heels. Based on self-reports, we demonstrated that Slovak females wear high heels infrequently and their use negatively correlated with self-reported body height and positively with self-reported attractiveness. The use of high heels steeply increased when females imagined interacting with an attractive man.

The use of high heels in everyday life was restricted to about 62% of Slovak females, but their use was infrequent. This finding might be surprising at first look, considering that high heels enhance female attractiveness (Guéguen, 2015; Guéguen et al., 2016; Guéguen & Stefan, 2015; Lewis et al., 2017; Morris et al., 2013). One prominent explanation for the infrequent use of high heels is their harmful effects on human health; there are associations between wearing high heels and hallux valgus, musculoskeletal pain, first-party injury and osteoarthritis (reviewed by Barnish et al., 2018).

Slovak females with a lower reported body height showed a stronger preference for high heels in both self-reported wearing and in the would-be mating scenario. We suggest that high heels could add to physical attractiveness particularly amongst females with a lower body height, because female legs slightly longer than average are sexually more attractive to males (Sorokowski et al., 2011; Sorokowski & Pawlowski, 2008; Swami, *Einon, & Furnham*, 2006, 2007). Longer legs are associated with better health (e.g., Gunnel et al., 2005; Lawlor, *Ebrahim, & Davey Smith,* 2002; Lawlor, Taylor, Davey Smith, Gunnell, & Ebrahim, 2004) which may ultimately explain male preference for longer legs in females.

Slovak females' self-perceived attractiveness was positively associated with wearing of high heels. Since sexual signalling is associated with the quality of an individual (e.g., Andersson, 1994; Zahavi & Zahavi, 1999), more attractive females might have better health (Hume & Montgomerie, 2001; Lie, Rhodes, & Simmons, 2008; Shackelford & Larsen, 1999; Thornhill & Gangestad, 2006; Weeden & Sabini, 2005) and, thus, are more resistant to potentially negative bodily outcomes from wearing high heels.

Partnership status failed to influence any preference for wearing high heels in Slovak females. Interestingly, certain researchers failed to find the effect of partnership status on preferences for sexually attractive clothes (Grammer et al., 2004; Prokop & Hromada, 2013). Lack of any effect could be due to the continuing attraction of an actual partner by females involved in a romantic relationship. If so, sexual signalling by single females is hard to detect, at least in case of costly signals such as high heels. Alternatively, perhaps females more satisfied with their actual partner use sexual signalling less intensively than those who are less satisfied, and, thus, differences between single females and those who are satisfied with their partners need to be investigated in further detail.

Sociosexuality does not seem to be a simple trait associated with wearing high heels. More specifically, high sociosexuality was not associated with self-reported frequency of wearing high heels, or with preferences for high heels in a mating scenario. Interestingly, Batres et al. (2018) recently demonstrated that although females using make up are perceived as more sexually unrestricted by males, sociosexuality was not associated with using makeup in females. These findings do not, therefore, support the hypothesis that sociosexuality is associated with sexual signalling at least in case of a preference for high heels.

The use of high heels was very strongly enhanced when females imagined interacting with an attractive, but not unattractive, man. It was experimentally shown that females who expected interacting with an attractive man displayed a red colour (a sexually attractive cue of the fertile phase in non-human primates, see Nunn 1999) (Niesta Kayser, Elliot, & Feltman, 2010) and preferred a red shirt (Elliot et al., 2013) more than when they expected to interact with an unattractive man. This suggests that females strategically wear high heels when anticipating an interaction with an attractive male and in all probability avoid wearing high heels when anticipating an interaction with a relatively unattractive male. From an evolutionary view, high heels serve as a subtle and strategic indicator of female sexual interest. On the other hand, females might avoid high heels in situations in which they wish to avoid unwanted mating attention.

Future research might benefit from investigating the role of hormonal changes associated with risk of conception. When risk of conception is high, for example, females dress more provocatively (Haselton et al., 2007), report more flirtatious behavior (Haselton & Gangestad, 2006) and are more receptive to male courtship invitations (Guéguen, 2009). It remains to be investigated whether wearing high heels can also be influenced by conception risk.

The results of the present research are based on a specific homogeneous sample of young Slovak females. Future research should further investigate the preference for high heels with data from larger, more diverse samples, because the more divergent the cultures being considered, the stronger the case for universality (Norenzayan & Heine, 2005).

In conclusion, the present research demonstrated that the use of high heels by females has a functional, adaptive value. Wearing high heels seem to be a form of sexual signalling by females in intersexual interactions. Females with lower body height might benefit in particular from high heels, because their legs are visually elongated and, therefore, more attractive to males. These findings add to the literature on sexual signalling, showing that high heels play an important role in human mating interactions.

Acknowledgement

David Livingstone improved the English of the manuscript. This work was supported by grant KEGA no. 001PU-4/2017 and VEGA no. 1/0104/16.

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