



## Men's perception of women's dance movements depends on mating context, but not men's sociosexual orientation



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### ABSTRACT

We investigated the influence of mating context and sociosexual orientation (interest in sex without emotional involvement) on men's perceptions of women's dance movements. One hundred men aged 18 to 33 ( $M = 23.5$ ,  $SD = 3.5$ ) years viewed brief videos of five "high attractive" and five "low attractive" female dancers (aged 18 to 22 years;  $M = 19.8$ ,  $SD = 1.2$ ) from a sample of 84 motion-captured dancers, and judged them on promiscuity and movement harmony. Additionally, half the participants judged the dancers on attractiveness as a long-term mate and the other half on attractiveness as a short-term mate. Men were more attracted to high attractive dancers than to low attractive dancers and judged them higher on attractiveness when choosing as a potential short-term mate. In addition, high attractive dancers were rated higher than low attractive dancers on promiscuity and movement harmony. Specifically, promiscuity judgments predicted men's short-term attractiveness ratings, whereas movement harmony judgments predicted long-term attractiveness ratings. Men's sociosexual orientation did not influence perceptions of female dance movements. Results are discussed with reference to trade-offs in time and energy expenditure on child rearing in men's mate preferences, corroborating the hypothesis that women's body movements inform on these qualities.

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### 1. Introduction

Women's physical attractiveness is prioritized in men's mate preferences and men across cultures report preferences for female facial and bodily characteristics associated with youth, health and fertility (Symons, 1979; Williams, 1975; Kirchengast & Gartner, 2002; Roberts et al., 2004). Most studies of attractiveness perceptions of women have focused on assessments of static representations of faces and bodies. However, recent research corroborates the finding that female body movement (e.g., gait, dance) also affects men's attractiveness perceptions and may, therefore, convey information about mate quality (Hugill, Fink, & Neave, 2009; Fink, Hugill, & Lange, 2012).

Miller, Tybur, and Jordan (2007) reported higher tip earnings in female lap dancers in high-fertility days than in low-fertility days. Fink et al. (2012) showed that men judge the dances and walks of the same women higher on attractiveness when they were recorded in days of high fertility than in days of low fertility. It is not clear what

cycle changes cause the alteration in men's response, although these may include a combination of hormone-mediated behavioral and sensory changes. Visual and olfactory information were not available to male assessors in the Fink et al. (2012) study. Thus, the researchers concluded that there might be specific quality cues associated with female movement patterns, and that men judge women's movements to be more attractive in days of high fertility because these cues provide information about reproductive potential.

Men's emphasis on female physical attractiveness varies with the mating context (Buss, 1989; Buss & Schmitt, 1993; Gangestad & Simpson, 2000): men prioritize physical attractiveness when selecting a short-term mate (STM) more than when selecting a long-term mate (LTM). For example, Confer, Perilloux, and Buss (2010) found that men prioritize bodily information when making decisions about a potential STM vs. LTM. Burris, Welling, and Puts (2011) found that men are more attracted to attractive, feminine faces when judging women as a potential STM vs. LTM. In contrast to the importance of physical attractiveness in the short-term context, men prioritize traits such as honesty, intelligence, fidelity, and likeability when choosing a long-term mate (Buss & Schmitt, 1993; Fletcher, Tither, O'Loughlin, Friesen & Overall, 2004). Fletcher et al. (2004) for example, found that for LTM (relative to STM), men report greater preference for high levels of warmth/trustworthiness over high levels of attractiveness/vitality.

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These studies suggest that men's mating strategy influences perceptions of female physical attractiveness, but mating context is only rarely considered in studies of male mating preferences and motivation. Men's mating strategies range from the pursuit of brief sexual encounters (short-term) to the pursuit of committed, enduring romantic relationships (long-term), with greater preference for physical attractiveness when choosing a potential short-term mate and greater preference for honesty and parenting-related skills when choosing a potential long-term mate (e.g., Buss, 1989; Buss & Schmitt, 1993).

Individual differences in men's sociosexual orientation also affect their evaluation of prospective mates. Simpson and Gangestad (1991) developed the Sociosexual Orientation Inventory (SOI) to measure willingness to engage in sex without emotional bonding (sex without commitment). Sexually unrestricted men (higher SOI scores), who express greater interest in sex without commitment, prioritize information obtained from female bodies more than sexually restricted men (Confer et al., 2010). In addition, sexually unrestricted men – compared to sexually restricted men – judge women with lower Waist-to-Hip Ratios (WHR) and lower Body Mass Indexes (BMI) as more attractive (Swami, Jones, Einon, & Furnham, 2009). Both characteristics are indicators of female health and fertility (for a review, see Thornhill & Gangestad, 2008).

Successful pursuit of short-term relationships benefited ancestral men's reproductive success more than ancestral women's reproductive success (Buss & Schmitt, 1993), and men should be especially attracted to facial and bodily features signaling current health and fertility in STM contexts. For ancestral women, short-term relationships were associated with greater costs than for ancestral men. Men pursuing a short-term strategy should therefore be sensitive to information signaling a woman's interest in short-term sex. Although there is evidence that men's mating strategy (STM vs. LTM) and sociosexual orientation (restricted vs. unrestricted) influences attractiveness assessments of female facial and bodily characteristics, little is known about whether these effects extend to women's body movements.

In humans, dance is a set of dynamic and rhythmical body movements, often assessed as an indicator of mate value or quality (Hanna, 1987, 2010). Specifically, dancing ability signals mate quality in terms of health and fertility and may influence men's perceptions of women's attractiveness (Fink et al., 2012). Cazzato, Siega and Urgesi (2012) found that variations of implied motion influenced aesthetic evaluations of female and male bodies, and that harmony and positive perceived emotion judgments predict liking judgments of moving postures (e.g., running, walking).

Following the evidence (e.g., Kenrick, Sadalla, Groth, & Trost, 1990) that men are more attracted to sexual permissiveness in potential short-term mates than in potential long-term mates, we investigated differences in men's attractiveness perceptions of women's dance movements as a function of male mating context (STM vs. LTM) and sociosexual orientation. Specifically, we tested whether unrestricted men show greater attraction to dance movements signaling promiscuity whereas sexually restricted men show greater attraction to dance movements signaling movement harmony. Related to findings that harmony perceptions of dynamic postures predict liking perceptions (Cazzato, Siega, & Urgesi, 2012), harmony, in turn, may signal health and personality characteristics such as likeability, qualities more desired in a long-term mate than in a short-term mate.

Additionally, we expect that perceived promiscuity will show a greater relationship (relative to perceptions of movement harmony) with overall attractiveness ratings of potential short-term mates, whereas movement harmony ratings will show a greater relationship (relative to perceptions of promiscuity) with overall attractiveness ratings of potential long-term mates. No previous research has tested specific movement associations that may influence attractiveness perceptions of female dance movements. We therefore investigated relationships between dance movements rated as harmonic and health perceptions of those dance movements to test the assumption

that women's dance movements could also serve as a signal of mate quality in terms of health.

## 2. Materials and methods

### 2.1. Stimuli

Dance movements of 86 women were recorded with an optical motion capture system (12 cameras; Vicon, Oxford, UK) at a constant 200 Hz rate, running Vicon Nexus software. Participants were recruited from the student population of Northumbria University (UK). Recordings of two women for who technical problems in post-processing of dance movements occurred were excluded from the rating study. Thus, the final sample included dance movements of 84 heterosexual women (by self-report), aged 18 to 41 years ( $M = 20.6$  years,  $SD = 3.80$ ). All women reported to be non-professional dancers and not currently suffering health problems that might affect their dance performance. Thirty-nine reflective markers were attached to each participant in accordance with the Vicon Plug-In-Gait marker set to capture the major body structures. All participants were instructed to dance for 30 s to the same basic drumbeat to eliminate likeability effects, and to dance as they would do in a dance club situation. Motion-capture data were applied to a virtual, featureless, and gender-neutral humanoid character (avatar) using Autodesk MotionBuilder (Autodesk Inc., San Rafael, CA, USA). For presentation in the subsequent pre-study, a 15-sec sequence (for the subsequent main study a 10-sec sequence) was extracted from the middle of each dance recording and converted into.avi format, with a resolution of  $784 \times 640$  pixels at a frame rate of 24 fps.

In a pre-study, 49 heterosexual (by self-report) male students aged 19 to 30 years ( $M = 23.7$  years;  $SD = 3.82$ ) were recruited on the campus of the University of Göttingen, Germany to judge the attractiveness of these dancers on a 7-point Likert scale (1 = *very unattractive*, 7 = *very attractive*). The videos were presented in serial order and randomized across participants, using MediaLab software (Empirisoft Inc., New York, USA). On the basis of mean attractiveness ratings, two sets of dancers were selected for subsequent study: Set 1 included the five most attractive dancers (high attractive dancers) and Set 2 included the five least attractive dancers (low attractive dancers). Attractiveness ratings to the two sets differed significantly (Set 1:  $M = 5.03$ ,  $SD = 0.17$ ; Set 2:  $M = 1.92$ ,  $SD = 0.14$ ; independent samples *t*-test, one-tailed  $t(8) = 32.02$ ,  $p < .001$ ).

### 2.2. Main study

One hundred (self-reported) heterosexual men, aged 18 to 33 years ( $M = 23.5$ ;  $SD = 3.45$ ) were recruited from the student population of the University of Bamberg, Germany to judge both sets of dance videos ( $k = 10$ ) for promiscuity and movement harmony (without a specific description of the two attributes) on a 7-point Likert scale (1 = [*not at all promiscuous/harmonic*], 7 = [*very promiscuous/harmonic*]). Additionally, 50 of the raters (18–30 years,  $M = 23.8$ ;  $SD = 3.08$ ) were instructed to judge dancer attractiveness as a potential short-term mate (STM), e.g., affair or one-night stand, and the other 50 raters (18–33 years,  $M = 23.2$ ;  $SD = 3.79$ ) were instructed to judge dancer attractiveness as a potential long-term mate (LTM), e.g., committed relationship (also on a 7-point Likert scale). Videos were presented using MediaLab software without audio and in randomized order across participants. At the beginning of the rating task, participants provided informed consent, answered demographic questions (including age, relationship status, and sexual orientation) and completed the revised Sociosexuality Orientation Inventory (SOI-R; Penke & Asendorpf, 2008), a nine-item questionnaire designed to assess interest in short-term sex without commitment. Responses are recorded on a 5-point scale and summarized in a total score, ranging 9 to 45. Lower scores reflect lesser interest in short-term sex (i.e., a more restricted sociosexual

orientation). The rating procedure lasted about 10 min; each participant received a payment of 7 Euros and was debriefed subsequently about the study.

To corroborate our assumption that dance movements signal mate quality, we asked a 13 new participants (six women) aged 21 to 54 years ( $M = 34.0$ ,  $SD = 9.84$ ) to judge the dancers on health using a 7-point Likert scale (e.g., 1 = *very unhealthy*, 7 = *very healthy*) and 11 new participants (four women), aged 27 to 54 years ( $M = 38.0$ ,  $SD = 9.48$ ) to judge the dynamic, activity and variety of the dance movements (e.g., 1 = [not at all dynamic/active/varied]; 7 = [very dynamic/active/varied]).

### 3. Results

Mean ratings for the three attributes were calculated, separately for the two sets of dancers (high vs. low attractive) and, with regard to ratings of “attractiveness,” separately for STM vs. LTM context. Table 1 reports descriptive statistics ( $M \pm 1 SD$ ) of male ratings of attractiveness (split for the experimental condition STM vs. LTM), promiscuity, and movement harmony judgments, separately for the high attractive and low attractive female dancers. Analyses of reliability indicated substantial consistencies between judgments of female dancer's attractiveness, promiscuity and harmony (all  $\alpha = .99$ ).

Mixed-model ANCOVAs with men's perceptions of attractiveness (STM vs. LTM context), promiscuity and movement harmony as dependent variables, and women's dance attractiveness (high vs. low attractive) as a within-subjects factor and sociosexuality (SOI-R total score) as a covariate were conducted. There was a main effect of women's dance attractiveness on men's attractiveness ratings ( $F_{(1,97)} = 12.71$ ,  $p < .01$ ,  $\eta^2 = .10$ ). Dancers categorized as highly attractive on the basis of the previous ratings (pre-study) were judged as more attractive than their lower-rated counterparts. Moreover, there was an interaction effect of dancers' attractiveness (high vs. low) by mating context (STM vs. LTM) ( $F_{(1,97)} = 15.11$ ,  $p < .001$ ,  $\eta^2 = .12$ ). Men judged the attractiveness of attractive female dancers particularly high in STM context.

Additionally, we found a main effect of women's dance attractiveness on perceived promiscuity ( $F_{(1,98)} = 25.98$ ,  $p < .001$ ,  $\eta^2 = .21$ ) and on movement harmony ( $F_{(1,98)} = 12.31$ ,  $p < .01$ ,  $\eta^2 = .11$ ). Attractive dancers were rated higher on promiscuity and movement harmony than unattractive dancers.

We did not find an effect of male raters' sociosexual orientation on ratings of attractiveness ( $F_{(1,97)} = 1.80$ ,  $p = .18$ , *n.s.*), promiscuity ( $F_{(1,98)} < 1$ ,  $p = .45$ , *n.s.*), or movement harmony ( $F_{(1,98)} < 1$ ,  $p = .55$ , *n.s.*).

A multiple regression analysis with men's perceptions of attractiveness (separately for mating context: STM vs. LTM), promiscuity and movement harmony of female dancers revealed that, promiscuity but not movement harmony predicted attractiveness perceptions especially in the STM context ( $R^2 = .94$ ,  $p < .001$ ), whereas in LTM context, movement harmony but not promiscuity predicted attractiveness perceptions ( $R^2 = .95$ ,  $p < .001$ ; see Table 2).

A further regression analysis with perceived harmony as dependent variable and perceived health, dynamic, activity and variety as predictors indicated that health judgments ( $B = 1.53$ ,  $SE B = .34$ ,  $\beta = 1.59$ ,

**Table 1**  
Descriptive statistics of men's perceptions of the high attractive and low attractive female dancers.

		High attractive dancers		Low attractive dancers	
		M	SD	M	SD
Attractiveness	STM	4.94	0.69	2.50	0.83
	LTM	3.98	0.92	2.32	0.82
Promiscuity		4.44	1.03	2.34	0.78
Harmony		4.57	0.95	2.51	0.75

Note: STM = short-term mate; LTM = long-term mate.

**Table 2**

Multiple regression analyses for variables predicting men's attractiveness perceptions depending on mating-context.

	STM			LTM		
	B	SE B	$\beta$	B	SE B	$\beta$
Promiscuity	1.57	.22	<b>1.22**</b>	.24	.12	.29
Harmony	-.40	.21	-.32	.57	.12	<b>.72*</b>

Note: STM = short-term mate; LTM = long-term mate.

Significant p-values are marked as bold and with asterisk.

\*  $p < .01$ .

\*\*  $p < .001$ .

$p < .01$ ) and activity judgments ( $B = -1.32$ ,  $SE B = .51$ ,  $\beta = -1.53$ ,  $p < .05$ ) predicted the harmony ratings of female dance movements ( $R^2 = .88$ ,  $p < .05$ ).

### 4. Discussion

We investigated men's assessments of previously categorized high attractive and low attractive female dancers in relation to male mating context (STM vs. LTM) and male sociosexual orientation. We found that men's attractiveness perceptions of women's dance movements depend on men's mating context but not on men's sociosexual orientation. Men judged high attractive dancers (but not low attractive dancers) higher on attractiveness when judging them as a potential short-term mate (STM; e.g., a “one-night stand”) than when judging them as a potential long-term mate (LTM; e.g., a “committed relationship”). Promiscuity judgments predict attractiveness perceptions of the dancers in the STM context, whereas movement harmony perceptions predict attractiveness ratings in the LTM context. Thus, in addition to mating context-related differences in men's emphasis of female facial and body attractiveness, especially in the STM context, men also show such differential emphasis in their attractiveness assessments of women's dance movements. The results are consistent with research reporting greater attraction to female body attractiveness when choosing a potential STM (Confer et al., 2010) and with research reporting that men compromise on attractiveness in a LTM context more than in a STM context (Kenrick et al., 1990; Regan, 1998).

Selection pressures may have shaped men's preferences for female features that signal health and fertility (Buss, 1989). These adaptations are also context-dependent and men appear to have distinct STM and LTM strategies that are differentially activated when selecting a mate in a specific context (Buss & Schmitt, 1993). Men show greater preference for obvious signals of sexual availability when seeking a short-term mate (Oliver & Schedikides, 1992) more than when seeking a long-term mate. This preference could solve the short-term problem for men of securing sexual access to potential mates. This assumption is supported by the fact that men's promiscuity judgments of attractive female dance movements predict the overall attractiveness judgments of the high attractive dancers only in the STM context, whereas in the LTM context men's movement harmony ratings predict the overall attractiveness judgments. Hence, context-related differences in men's preferences for women's dance attractiveness may be produced by adaptations that motivate increased attraction to healthy and fertile women.

Women's body attractiveness affects men's attractiveness perceptions of women, and specific bodily characteristics like Waist-to-Hip Ratio (WHR; Singh, 1993) and Body Mass Index (BMI; Tovee, Maisey, Emery, & Cornelissen, 1999) predict men's attractiveness perceptions of female bodies. Our results suggest that attractive female dancers display greater variation in their lower body parts (e.g., waist and hips), displaying more hip swings that may draw attention to waist and hips. We speculate that hip swings and variation in lower body movement may draw men's attention to these body areas and that such movement signals interest in short-term sex (promiscuity), whereas

harmonic dance movements seem to signal less promiscuous interest, which is more desirable in a LTM context.

No previous research has investigated specific movement components of women's dances that affect men's perceptions of women's dance quality. Cazzato et al. (2012) reported that harmony ratings of dynamic poses predict "liking" evaluations of the same poses of both sexes. We also found a relationship between perceived movement harmony and attractiveness as well a relationship between movement harmony and health perceptions. Dancers with more harmonic dance movements were perceived to be healthier than dancers displaying less harmonic dance movements. We cannot yet quantify (in kinematic terms) which dance movement characteristics are perceived as harmonic. However, we consider that it is a combination of various features, like health, that contribute to the perception of movement harmony when expressed by dancers. In a study of the biomechanics of men's dance movements, Neave et al. (2011) reported that "good" dancers can be characterized by large and variable movements in the trunk and head/neck region. The researchers concluded that such movements signal aspects of vigor and strength, and are therefore preferred by women. There may be similar characteristics of harmonic female dance movements, which men associated with health. This, however, has yet to be demonstrated.

The adaptive shift in men's mating psychology – with individuals interested in STM pursuing low-commitment and transient sexual relationships with multiple partner and individuals interested in LTM pursuing single, high-investment relationships (Buss & Schmitt, 1993) – is also reflected in differences in men's sociosexual orientation. Unrestricted men prioritize female body attractiveness more than do restricted men (Confer et al., 2010) and they show a higher ability to assess female coital acceptability on the basis of physical appearance (Townsend & Waserman, 1998). Thus, we considered self-reported sociosexual orientation of male judges, but failed to detect an effect of men's sociosexual orientation in their evaluations of women's dances.

The present study provides an initial approach to addressing mating context (STM vs. LTM)-dependent differences in men's attraction to women's dance movements, with the results indicating that men seeking a potential short-term mate are more attracted to female dancers signaling promiscuity. Our results show that female dance movement also influences men's perceptions of mate quality, including overall attractiveness and individual differences including promiscuity and movement harmony. Movement harmony is furthermore predicted by health judgments, which corroborates our assumption that body movement signals quality in terms of health. Further research is needed to specify which of women's dance movements produce differences in men's attractiveness perceptions and, more precisely, which dance movements demonstrate promiscuity and which movement harmony.

Finally, we cannot rule out the possibility that certain characteristics of dance movements drive people's perceptions; i.e., it may be that people make rapid assessments about the quality of a person's dance movements based on features that signal core biological qualities (such as age and health), and subsequently link their attributes to these initial assessments. Rapid trait attributions to movement qualities have been well known since the classic observation by Heider and Simmel (1944), who demonstrated that basic features of objects (size and shape), together with movement, were sufficient to cause social attributions. It would be interesting to deconstruct dance movements into a list of kinematic features and identify which of these features best predict perceptions of movement harmony. Such research would provide detailed information about people's concepts of harmonic movements, and how these concepts are related to assessments of other aspects of social perception.

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