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ORIGINAL PAPER

Cross-Cultural Comparison of Sensory Preferences in Romantic Attraction

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Abstract

Various physical characteristics of a partner—visual, auditory, tactile and kinetic, olfactory, and gustatory—can affect human mate choice and romantic attraction. Evolutionary factors, as well as socioeconomic and cultural parameters play their role in these sensory preferences. A series of studies in societies varying in social, economic, and cultural parameters (10 samples in six countries with 2740 participants in total) explored cross-cultural similarities and differences of sensory preferences that people have in their romantic attraction. The results revealed that social development of countries and their cultural parameters allow prediction of preferences of certain sensory parameters in one's romantic partner's appearance. The most general distinctions of sensory preferences are in the societies with different degree of modernization, along with corresponding social and cultural parameters. The stable biologically and evolutionarily determined characteristics of physical appearance, such as *smell*, *skin*, *body*, etc., are important for one's sensory preferences in romantic attraction in less modernized societies, which are characterized by greater power distance, lower individualism, indulgence, and emancipative values. On the other hand, the characteristics of romantic partner's appearance, which are more flexible and easier to change, such as *expressive behavior*, *dress*, *dance*, etc., are more important in more modernized societies with lower Power Distance, high value of Individualism, Indulgence, and Emancipation.

Keywords Romantic attraction · Sensory preferences · Socioeconomic and cultural parameters · Cultural values · Modernization of societies

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Introduction

Sensory Preferences in Romantic Physical Attraction

Various physical characteristics of a partner play their role in mate choice. Studies demonstrated that the other person's physical appearance, attractiveness, and beauty substantially determine romantic attraction in both sexes, although males typically place relatively greater emphasis than females on the physical characteristics of their partner (Feingold 1990; Karandashev 2017; Luo and Zhang 2009; Malach Pines 2001; Maner et al. 2003; Nevid 1984; Swami and Furnham 2008). Among those sensory factors are visual, auditory, tactile and kinetic, olfactory and gustatory.

Visual Preferences

Due to importance of visual senses in humans, most researchers in this field focused on visual appearance, rather than other sensory impressions. The findings revealed various aspects of the face and body that romantic partners see as attractive in each other (Patzer 1985; Swami and Furnham 2008; Swami et al. 2008).

Researchers found the evidence that visual impressions of physical attractiveness of women are especially important for men (Buss 1989, 1994; Buss et al. 1990; Ellis and Symons 1990; Feingold 1990; Greenlees and McGrew 1994; Landolt et al. 1995). Males pay special attention to the body shape, symmetry, weight, hair length (Gangestad and Thornhill 1997; Nevid 1984), and physical fitness of their prospective female partners (Hönekopp et al. 2007). The researchers have also discovered that skin tone, hair length, and hair color determine perception of women's physical attractiveness, health and fertility (Swami et al. 2008).

On the other hand, certain visually appealing masculine body characteristics of men make them more attractive for women. Among those are certain facial morphology (Johnston et al. 2001; Keating 1985), body shape (Hughes and Gallup 2003; Rhodes et al. 2005), height (Mueller and Mazur 2001; Pawlowski et al. 2000; Rhodes et al. 2005), and body muscle mass (Frederick and Haselton 2007; Lassek and Gaulin 2009). Men who possess the neotenous features of large eyes, the mature features of prominent cheekbones and a large chin, the expressive feature of a big smile, and high-status clothing are perceived as being more attractive (Cunningham et al. 1990).

Auditory Preferences

Auditory perception of voice and other sounds of a partner's behavior, as well as music and nature's sounds, accompanying romantic encounters also affect attraction. People generally have certain auditory preferences in music, voices, and everyday sounds (McDermott 2012). Research findings demonstrated that some voices are more attractive for listeners than others and, according to vocal attractiveness stereotype, what sounds beautiful is good (Zuckerman and Driver 1989). In particular,

auditory stimuli are important for sexual attraction for women and men, but in different contexts (Herz and Cahill 1997). Researchers demonstrated various effects of voice on attraction and mating value. In particular, those with attractive voices have their first sexual intercourse earlier than their peers and they usually have more affairs and sexual partners (Hughes et al. 2004). The male voices with medium or lower fundamental frequency (pitch) are more attractive for women (Collins 2000; Hodges-Simeon et al. 2010, 2011; Riding et al. 2006; Zuckerman and Miyake 1993), and women prefer low pitched male voices (Feinberg et al. 2006; Puts 2005). According to some studies, males as well as females perceive low voices as sexy and use a lower pitched voice when speaking to the more attractive, opposite-sex person (Hughes et al. 2002, 2010; Tuomi and Fischer 1979).

Expressive voice, the way people speak affects romantic attraction and sexual success. In particular, male voices that are less monotonous, with medium or high variance of the fundamental frequency (Zuckerman and Miyake 1993) and high or medium pitch variation (Ray et al. 1991) are perceived as attractive. This gives the impression that males are dynamic, feminine, and aesthetically inclined (Addington 1968). However, these effects may be multifaceted and mediated by other variables (Brown et al. 1973, 1974; Hodges-Simeon et al. 2011).

Tactile and Kinetic Preferences

The role of tactile senses and kinetics is especially obvious in sexual attraction. Studies revealed that tactile stimuli more than any other sensory experience affect women's sexual attraction (Herz and Cahill 1997), make them sexually aroused (Ellis and Symons 1990; Symons 1979), while for males, visual and tactile stimuli are both important (Herz and Cahill 1997).

Typical tactile and kinesthetic expressions of romantic attraction are touching, holding hands, hugging, kissing, and certainly all kinematics and sensual feelings involved in a sexual intercourse (Marston et al. 1998). In surveys, many college students reported backrubs, massages, caressing, stroking, cuddling, holding hands, hugging, kissing on the lips and on the face as their expression of physical affection (Gulledge et al. 2003). Romantic couples frequently use kinesics as nonverbal idioms in their intimate talks, including posture, body movement, gestures, eye contact, eye movement, and facial expressions (Hopper et al. 1981). They may communicate their love, for instance, by twitching the nose (meaning "You're special") or pulling on the right earlobe (meaning "I love you").

Olfactory and Gustatory Preferences

Romantic and sexual emotions are frequently associated with olfactory and gustatory sensory images (Shaw 2008; Vroon et al. 1997). Studies showed that pleasant odor reinforces, while unpleasant odor diminishes interpersonal attraction. An individual perceives another person as less attractive with concurent exposure with a noxious scent, while more attractive in the presence of a pleasant one. An unpleasant odor decreases attraction more than a pleasant odor increases it (Pierce et al.

2004; Sodavari et al. 2014). Thus, the absence of a bad smell is more important than the presence of a good one.

Bodily odors play their affective and sexual role in attraction (Cupchik et al. 2005; Pazzaglia 2015; Singh and Bronstad 2001). Men state that body scents of their partners certainly influence their interest and arousal; this effect is even stronger in women (Herz and Cahill 1997; Regan and Berscheid 1995). For women, olfactory senses are the most influencial, while for men–olfactory and visual sensory signals are equally important (Herz and Cahill 1997). In addition to natural smells, artificial odorants and parfumes can increase the attractiveness of a partner (Baron 1981; Mogilina et al. 2013).

The chemical senses of olfaction and gustation correlate to each other (Pinel 1997), therefore it is reasonable to expect that sense of taste should also contribute to romantic attraction. The common usage of metaphoric words associated with taste (e.g., "sweetie" and "honey"), while talking about love, provide evidence of this.

A few studies demonstrated that taste sensations affect romantic perception (Saegert et al. 1983; Ren et al. 2015). One's dopamine level, being increased from the sweet taste of food, transfer and boost emotional feelings of passionate love (Hajnal et al. 2004; Fisher et al. 2005; Ren et al. 2015).

Interaction of Sensory Experiences in Romantic Attraction

Various senses work in complex determining romantic attractiveness, even though some may be more prevalent than others (e.g., Bonnough and Moore 2017). Studies found that individual sensory impressions of different modality work in complexes interacting in their effects on the perception of physical attractiveness (Baron 1981; Cartei et al. 2014; Pisanski et al. 2016; Hughes et al. 2002, 2004, 2008; Thornhill and Gangestad 1999).

Thus, sensory characteristics of different modalities correlate and interact with each other. Therefore, in this study, we expected that various sensory impressions work together in certain clusters determining romantic physical attraction.

Evolutionary and Cultural Factors of Mating Preferences

Evolutionary interpretation of the role of sensory perception in mating has received substantial support in many studies (Apicella et al. 2007; Barber 1995; Buss 1989, 1994, Buss et al. 1990; Pawlowski et al. 2000; Thornhill and Gangestad 1999; Thornhill and Grammer 1999, etc.). Physical characteristics of different sensory modality, being sexually dimorphic, inform about the genetic quality of prospective partners and signal about their reproductive potential. Studies have revealed that mates may prefer some traits in their partners across cultures (e.g., Buss et al. 1990; Shackelford et al. 2005). Therefore, from evolutionary perspective, we hypothesized that sensory factors of attraction should be cross-culturally universal.

On the other side, sensory factors of romantic attraction differ cross-culturally. Cultural traditions, norms, and socially learned patterns of behavior make

difference in this regard (e.g., Little et al. 2011; Norenzayan et al. 2006). They play a social function when perception of physical traits inform about economic or social factors, such as income, social status, etc. It is well documented that society and culture profoundly influences various sensory aspects of nonverbal behaviors, gestures, gaze, interpersonal space, vocal characteristics, facial emotional expressions, hand and arm movements (see a review in Matsumoto 2006). Therefore, in this study it was reasonable to expect that the preferred sensory perceptions in romantic physical attraction can be culturally specific and stem from distinctive paths of cultural and social evolution. Culture can increase the degree of attractiveness of some physical traits and their liking due to repeated sensory exposure of certain physical characteristics of different sensory modality. Society also puts forth norms by means of the positive context that surrounds appearances and behaviors (such as media). Cultures display different aesthetic preferences in art (Masuda et al. 2008), advertising media represents beauty differently (Frith et al. 2005). For instance, a cross-cultural analysis revealed that women's beauty in the U.S. is more focused on the body and clothing, whereas in Singapore and Taiwan–on a pretty face and cosmetics (Frith et al. 2005). All these public and cultural representations may reflect on romantic attraction and contribute to the development of mate preferences. Recent studies (Karandashev 2017; Low 2008; Reinarz 2014; Smith 2007) suggested sociocultural interpretations of the role of sensory modalities in everyday life from historical and sociological perspective. Various research findings suggest that cultures have their effect on romantic attraction and mate preferences, resulting also from regional ecology and social environment (Malach Pines 2001; Pisanski and Feinberg 2013).

The Purpose of This Study

The purpose of the study presented in this article was to explore several socioeconomic and cultural parameters that can explain sensory preferences in romantic partners. Sensory preferences in certain characteristics of a past, current, or prospective mating partner were independent variables, measured with a specially developed survey (described in the following section) administered among respondents in six countries (ten regions). Several cultural and social variables were compiled independently from other data bases measured on the country/region level by other researchers. We expected that societal attitudes, beliefs, norms, and values expressed in those cultural parameters—as country/region level variables–might affect people's mating preferences—as individual level variables. We admit that such an approach has limitations since not all individuals—participants of the study—may share such cultural attitudes. Yet, such approach has exploratory value since prevalence of certain cultural attitudes and values among people in a country makes more likely for an individual to follow those. One can see in the following sections many examples of this approach.

Cultural Dimensions of Societies

The first group of such parameters included cultural dimensions of *individualism-collectivism*, *power distance*, *uncertainty avoidance*, *long-term orientation*, and *indulgence* vs *restraint* (according to Hofstede 1980, 1991, 2011), *emancipative values* (Inglehart and Welzel 2005).

Earlier studies found that individualism and collectivism are important cultural factors of romantic love and mate selection (Dion and Dion 1993, 1996): in societies with prevalence of individualism people place greater emphasis on romantic love for establishing and maintaining a marriage (Dion and Dion 1993; Levine et al. 1995), and declare higher sexual frequency in stable couples (Ubillos et al. 2000). Individualistic societies promote "ludic", playful style of love (Smith and Klases 2016, p. 102). In mate selection criteria, people from collectivistic Chinese culture emphasize status and family orientation, while American participants are more focused on personality traits and attractiveness (Chen et al. 2015).

According to other studies, Hofstede' dimensions of low *power distance* and low *uncertainty avoidance* allow to predict mating behavior. In particular, these societal dimensions are associated with higher sexual frequency reported by people (Ubillos et al. 2000).

These cultural dimensions are closely related to emancipative values (Inglehart and Welzel 2005). Therefore, we collected the indexes of *emancipative values* from the World Values Survey as additional parameters characterizing cultures (World Values Survey 2010–2014).

Cultural Values

Cultural values of societies are also the important correlates of mate choice and partner preferences (Goodwin et al. 2012; Goodwin and Tinker 2002). Researchers (Goodwin et al. 2002) showed that Schwartz' cultural value orientations, such as *intellectual autonomy* and *affective autonomy* vs. *embeddedness*, *egalitarianism* vs. *hierarchy* and *harmony* vs. *mastery* (Schwartz 2006), predict the quality of sexual behavior. Egalitarian values vs. Hierarchy are the most studied in terms of romantic relationships (Kornrich et al. 2013). We hypothesized that these cultural values can predict sensory preferences in romantic attraction.

Socioeconomic Factors of Mating

Although the role of these factors may seem not immediately evident in mating preferences, yet the research showed that they influence societal values (Inglehart and Baker 2000; Spaiser et al. 2014), which in turn can affect mating preferences.

Based on the previous research (Schmitt et al. 2004; Ubillos et al. 2000), we also expected that several socioeconomic parameters could predict the preferences in mating and romantic relationship. In particular, according to earlier studies, GDP per capita as an indicator of economic development and Human

Development Index (HDI) as an indicator of social development are associated with frequency of sexual relationships in couples (Ubillos et al. 2000). Lower HDI, lower GDP per capita, and higher fertility rates are associated with insecure romantic attachment (Schmitt et al., 2004). Several studies demonstrated that the tough conditions of living, associated with low socioeconomic development, affect romantic preferences and mate choice. According to evolutionary theory of socialization (Belsky et al. 1991), conditions of maturation affect adolescent sexual behavior and adult pair bonding. A stressful rearing environment fosters insecure attachment, early pubertal development/maturation in adolescence and unstable pair bonds, frequent dating, early marriage and limited investment in child rearing (Belsky et al. 1991, 2010).

In the societies with low socioeconomic development, *survival values* emphasize economical and physical security (Inglehart and Baker 2000) and, therefore, affect social behavior of people accordingly. The societies with high socio-economic development (more typical for developed post-industrial countries), on the other hand, emphasize *self-expression values* with focus on quality of life and subjective well-being (Inglehart 2015, p. 349). This societal transition from the societies characterized by *survival values* to the societies characterized by *self-expression values* Inglehart and his colleagues named as *modernization* (Inglehart 1997, 2015; Inglehart and Baker 2000; Inglehart and Welzel 2005).

When survival is uncertain, people prefer predictable behavior, less cultural diversity, and sticking to traditional gender roles and sexual norms, while in the societies where survival is not a problem, ethnic and cultural diversity is well accepted and positively valued since it is interesting and stimulating (Inglehart and Baker 2000). In societies where economic circumstances are tough, people emphasize such characteristics as ability to provide security and care, while in societies where survival pressures are lower, people prefer such characteristics as being socially attractive, passionate, romantic, and self-expressive (Goodwin et al. 2012).

The same can refer to the diversity of physical appearance. Therefore, we hypothesized that socio-economical parameters should affect sensory preferences in perception of partners' physical appearance:

1. The predictable and stable parameters of partner's appearance supporting survival would be preferable in less modernized societies: with lower socioeconomic development, insecure living conditions, and prevalence of survival values.
2. The culturally more flexible parameters of partner's appearance, such as expressive behavior, would be valued in more modernized societies: with higher socioeconomic development, wealthier, and prevalence of expression values.

In other words, we hypothesized that in less modernized societies, where survival (biological or social) is a problem, people should prefer the biologically determined sensory parameters that evidence good physical health, while in more modernized societies, where expression is a high value, people should prefer the culture-based parameters of romantic partner, which are flexible and open to change.

Biologically Determined and Socially Determined Sensory Parameters

In this study, we distinguish the sensory parameters of a romantic partner's appearance which are (1) biologically determined, stable, difficult to change such as *body*, *smell*, *skin*, *eyes*, *lips*, and (2) those which are much more flexible and easier to change, such as expressive behavior (*expressive face* and *speaking*), *smile*, *dancing*, and *dress*. The earlier studies (Barber 1995; Buss et al. 1990; Thornhill and Grammer 1999; Wedekind and Füri 1997) demonstrated that the parameters of the first group play an important evolutionary role providing valuable information for mate selection. The parameters of the second group are more flexible, dynamic, and capable to change depending on social and cultural context. In modern society, interaction between partners is more important than in traditional society, as it was shown with an example of comparison between the UK and China (Wong and Goodwin 2009). The main hypothesis was that biologically determined stable parameters of romantic partner's appearance, such as *body*, *smell*, etc., are more important for people in traditional societies, while flexible and dynamic parameters of romantic partner's appearance, such as *expressive behavior*, *smile*, etc., are more important for people in modern societies.

In particular, the importance of flexible and dynamic parameters, such as *dress*, *dancing*, *smile*, *expressive face* and *speaking*, was expected to correlate positively with indexes of socioeconomic development, with Emancipative values, Individualism—as the parameters of so-called modern societies, and negatively with Power Distance, Uncertainty Avoidance, Hierarchy–as the parameters of so-called traditional societies. On the other hand, higher importance of biologically based stable parameters such as *smell*, *skin*, *body*, *eyes*, *lips*, was expected to correlate positively with Power Distance, Long Term Orientation and negatively—with indexes of socioeconomic development, Emancipative values and Individualism.

Methods

Participants

Participants were 2740 students (M age = 22.23, SD = 7.68), among those are 1844 women (M age = 22.35, SD = 8.32) and 896 men (M age = 21.99, SD = 6.23). Men and women who were in heterosexual romantic relationships (now, in the past, or interested in the future) participated in the survey as volunteers or received course credit. Authors collected data in six countries. In the USA and Russia, the data was collected from two or more regions (resulting in total 10 cultural samples). Table 1 provides summary information about sample size and ages for each region. Since some socioeconomic or cultural variables were not available for some countries/regions, the number of participants varied in those analyses.

Table 1 Descriptive characteristics of sample

Region and country	Sample size			Age	
	Men	Women	Overall	*M*	*SD*
Middle West, USA	40	104	144	21.66	5.15
South East, USA	110	225	335	20.53	2.84
North East, USA	28	60	88	21.40	5.15
Hawaii, USA	89	250	339	21.93	4.57
Kingston, Jamaica	20	142	162	34.88	9.05
Porto, Portugal	79	152	231	23.86	6.74
Paris, France	86	103	189	22.54	2.95
Tyumen, Russia	83	105	188	20.13	1.04
Petersburg, Russia	30	107	137	19.54	.78
Tbilisi, Georgia	154	225	379	21.25	2.09
Total	719	1473	2192	22.46	5.75

Measures and Variables of Sociocultural Development of Countries/Regions

Indexes of socioeconomic development Human Development Index and GDP per capita obtained from Human Development Report (United Nations Development Program 2015).

Hofstede's cultural dimensions were obtained from https://geert-hofstede.com. There was no data for Georgia at all, and no data on Long-Term Orientation and Indulgence for Jamaica.

Values. Indexes of Emancipative Values were obtained from World Values Survey, Wave 6 (2010–2014). Indexes for cultural values of Egalitarianism and Hierarchy, Harmony and Affective Autonomy were generously provided by S. Schwartz.

Measures and Variables of Romantic Attraction

The survey included Sensory Experience Scale (SES), several background and demographic questions. The socioeconomic and cultural variables were obtained from corresponding sources, cited above.

Sensory experience scale (SES) consisted of 54 questions rating visual, auditory, tactile-kinesthetic, olfactory preferences regarding romantic partner. Examples of items: "This person has expressive eyes", "This person's singing is nice". Participants used 5-point Likert-type scale ranging from 1 (*not important*) to 5 (*most important*).

Table 2 Ranks of sensory preferences of men and women across cultures

Men (n = 719)	Women (n = 1473)
Body (3.47)	Smell (3.40)
Smell (3.41)	Body (3.20)
Lips (3.37)	Smile (3.18)
Smile (3.31)	Expressive face and speaking (3.14)
Expressive face and speaking (3.26)	Lips (3.11)
Skin (3.20)	Voice (3.05)
Eyes (3.12)	Eyes (2.93)
Voice (3.09)	Dance (2.90)
Facial structure (2.99)	Skin (2.89)
Hair (2.95)	Dress (2.78)
Dress (2.94)	Facial structure (2.71)
Dance (2.90)	Hair (2.67)
Sing (2.53)	Sing (2.37)

Results

General and Gender Specific Sensory Preferences in the Appearance of Romantic Partners

Regression analysis did not reveal the effect of participants' age in the countries' samples on the results, therefore this parameters was not considered as a confound variable and did not affect the results.

As for the general cross-culturally universal tendencies, the Table 2 shows the average ratings of sensory parameters, which participants place on different sensory characteristics in their perception of romantic partner.

These data present the means across countries from the top priority to the low–separately for men and women. One can see that the ranks of importance are relatively similar for both genders. Body and smell are at the top of biologically based sensory characteristics. Several expressive characteristics, such as expressive face, speaking, and smile, are important for both genders. One can notice several definite gender differences in sensory preferences. On average, among men the importance of many sensory characteristics in their partners is higher than among women In particular, lips and eyes are certainly more important for men in their female partners than for women in their male partners.

The *t*-tests also revealed the gender similarities and differences across cultural samples. Men and women across cultures, which we studied, place similar value on certain sensory characteristics of the appearance of their partners. Although no statistically significant gender differences were revealed in such sensory parameters

as *smell* (male = 3.41, female = 3.40), *voice* (male = 3.09, female = 3.05), *dance* (male = 2.90, female = 2.91), yet, in many other parameters men pay more attention to their female partners' sensory appearance than women do to their male partners. According to *t* test (with $p \leq .01$), men place higher importance in the appearance of their romantic partners compared to women on such characteristics as *body* (male = 3.47, female = 3.20), *lips* (male = 3.37, female = 3.11), *smile* (male = 3.31, female = 3.18), *expressive face* and *speaking* (male = 3.26, female = 3.14), *skin* (male = 3.20, female = 2.89), *eyes* (male = 3.12, female = 2.93), *facial structure* (male = 2.99, female = 2.71), *hair* (male = 2.95, female = 2.67), *dress* (male = 2.94, female = 2.78), and *singing* (male = 2.53, female = 2.37).

These averaged results, however, show only a general frame of sensory preferences across cultures and do not take into account the cultural differences. Therefore, the next step of analyses targeted at this aspect of data. First, we classified the sample of our countries/regions into clusters, according to socioeconomic and cultural parameters of modernization. Then, we ran ANOVA to investigate the similarities and differences in the sensory preferences between those cultural clusters.

Cluster Analysis of Socio-Economic and Cultural Development of Countries/Regions

Using cluster analysis (with the method of k-means), we divided the sample of our countries/regions in three clusters, which embraced the range of relatively less and more modernized societies. According to the means of socio-economic and cultural parameters, first and third clusters were opposite to each other and included (1) less modernized (with prevalence of survival values) and (2) more modernized (with prevalence of self-expression values). The countries in the second (middle) cluster frequently fall in between first and third opposite clusters–in some cases closer to one or another. Table 3 presents the distribution of countries/region in these three clusters. Despite this general cluster distribution of countries according to the degree of modernization, the values of some cultural variables were relatively independent of this modernization trend. Nevertheless, the general tendency was evident.

Many socio-economic and cultural variables–from cluster one to cluster two and further to cluster three—highly positively or negatively correlate to each other. These correlations allowed us to profile clusters one and three as the distinctively different in terms of modernization.

The characteristics of less or more modernized societies reported in other studies (Inglehart 1997; Inglehart and Baker 2000; Inglehart and Welzel 2005; Spaiser et al. 2014) and the degree of inter-correlations between socio-cultural variables in our study allowed us to find the common features of our countries/regions in the clusters.

Table 3 Three clusters of modernization in the sample of countries/regions (with corresponding social and cultural variables)

Social and cultural dimensions	Cluster one—less modernized countries (survival values)	Cluster two—medium position of modernization	Cluster three—more modernized countries (self-expression values)
HDI—on the scale from 0 to 1.0	Jamaica .719 Georgia .754 Tyumen .798 Petersburg .798		
		Portugal .830 France .888	
			MidWestUS .915 SouthEastUS .915 Hawaii .915 NorthEastUS .915
GDP—on a scale from 584 (Central African Republic) to 127,562 (Quatar)	Georgia 6946 Jamaica 8607 Tyumen 23,564 Petersburg 23,564		
		Portugal 25,596 France 37,154	
			MidWestUS 51,340 SouthEastUS 51,340 Hawaii 51,340 NorthEastUS 51,340
Emancipative values –the scale from .22 (Yemen) to .66 (Slovenia)	Georgia .35		
		Petersburg .40 Tyumen .49	
			MidWest US. 54 South East US .54 Hawaii .54 NorthEast US .54
Individualism—on the scale from 1 to 100	Portugal 27 Jamaica 39 Tyumen 39 Petersburg 39		
		France 71	
			Midwest US 91 South East US 91 North East US 91 Hawaii 91
Indulgence—on the scale from 1 to 100	Tyumen 20 Petersburg 20 Georgia 32 Portugal 33		
		France 48	
			Midwest US 68 South East US 68 Hawaii 68 North East US 68

Table 3 (continued)

Social and cultural dimensions	Cluster one—less modernized countries (survival values)	Cluster two—medium position of modernization	Cluster three—more modernized countries (self-expression values)
Affective autonomy—on the scale from 1 to 7	Georgia 3.69 Portugal 3.84 Tyumen 4.08 Petersburg 4.08		
		South East US 4.22	
			MidWest US 4.34 France 4.43
Egalitarianism—on the scale from 1 to 7	Tyumen 4.12 Petersburg 4.12		
		Georgia 4.59 MidWest US 4.51 South East US 4.51	
			Portugal 5.03 France 4.96
Hierarchy—on the scale from 1 to 7	Tyumen 2.95 Petersburg 2.95 South East US 2.81 MidWest US 2.71		
		Georgia 2.45 France 2.45	
			Portugal 1.94
Harmony—on the scale from 1 to 7	Georgia 4.09 Portugal 3.98 France 3.92		
		Tyumen 3.54 Petersburg 3.54	
			MidWest US 3.18 South East US 3.15
Long term orientation—on the scale from 1 to 100	Tyumen 81 Petersburg 81		
		France 63	
			Georgia 38 Portugal 28 Midwest US 26 South East US 26 Hawaii 26 North East US 26
Uncertainty avoidance (on a scale from 1 to 100)	Portugal 99 Tyumen 95 Petersburg 95 France 86		
			South East US 46 Hawaii 46 Midwest US 46 North East US 46
		Jamaica 13	

Table 3 (continued)

Social and cultural dimensions	Cluster one—less modernized countries (survival values)	Cluster two—medium position of modernization	Cluster three—more modernized countries (self-expression values)
Power distance—on a scale from 1 to 100	Tyumen 93 Petersburg 93		
		Portugal 63 France 68	
			Jamaica 45 Midwest US 40 Hawaii 40 South East US 40 North East US 40

The socio-economic and cultural indices, which highly correlate to each other in our sample of countries/regions, are at the top section of Table 3. Those indices, which highly negatively correlate with them, are at the bottom section, whereas those indices with moderate or low correlation with two previous groups are in the middle. Only the indices from the top and bottom sections were used to create three clusters of modernization. Clusters one, two, and three are distinctively different in the means of socio-economic and cultural variables that are represented in some cases in ascending, while in other—in descending order of the countries/regions in those clusters.

For those countries/regions in the cluster one, the following characteristics are typical: *on the one end,* relatively low HDI and GDP, low Individualism and Indulgence, low Emancipative Values and Affective autonomy, whereas *on the other end*, relatively high Power Distance, high Uncertainty Avoidance and Long Term Orientation, high value of Hierarchy and Harmony. Generally, these features of countries/regions in cluster one characterize them as less modernized–with relatively high importance of survival values.

For those countries/regions in the cluster three, the value of aforementioned socio-cultural characteristics was opposite: *on the one end,* relatively high HDI and GDP, high Individualism and Indulgence, high Emancipative Values and Affective Autonomy, whereas *on the other end*, the relatively low indices of Power Distance, Uncertainty Avoidance, Long Term Orientation, Hierarchy and Harmony. Generally, these features of countries/regions in cluster three characterize them as more modernized–with relatively high importance of self-expression values.

Based on these variables, the regions of such countries as Russia and the US are typically (even though not always) in two opposite clusters—consequently, in cluster

one and three. Georgia and Jamaica tend to be closer to the cluster one on majority of variables, with some exceptions.

The means of socio-economic and cultural variables of the countries/regions in the cluster two are in between of those two opposite clusters. In some cases, they are distinctively different from cluster one and three, in others, they are close to cluster one or three. France on the majority of variables distinctively came in the cluster two, while the position of Portugal on some variables was closer to cluster one, on others—to cluster three, yet on the others—to cluster 2. Since the most characteristic indices of modernization for Portugal were in the middle, we classified Portugal in the cluster two.

Modernization (Inglehart 1997; Inglehart and Baker 2000; Inglehart and Welzel 2005; Spaiser et al. 2014) in a country does not develop on the same pace in different parameters; some of those parameters might be more or less advanced. The division of counties/regions in three clusters for our analysis was based on the cluster analysis, yet this division is not strict and not the same in all indices. Therefore, the frequency of cluster membership across all socio-economic and cultural parameters of modernization, which significantly correlate to each other (positively and negatively), was used for the final decision about cluster membership of each country in modernization spectrum.

ANOVA of Sensory Preferences Between Three Clusters of Countries

The ANOVA results of sensory preferences in romantic attraction for the three clusters of countries/regions, different in socio-economic and cultural indices, are reported separately for men and women (Tables 4 and 5).

The Tables 4 and 5 show many similarities in the sensory preferences of men and women in their partners, yet some differences. The results are generally in accord with our hypothesis demonstrating that relatively stable biological characteristics of appearance (such as *body, skin, smell*) are more important in the societies of survival (cluster one), compared to the societies of self-expression (cluster three).

Some indices of Hofstede are especially important as the parameters of modernization predicting sensory preferences in romantic attraction. In particular, biologically determined sensory parameters are more important in regions with higher Uncertainty Avoidance and Power Distance (such as Tyumen and Petersburg), whereas socially determined sensory parameters are more important in regions with higher Individualism and Indulgence (such as the US). However, it seems that Long Term Orientation is not associated with modernization. For instance, the high value of this parameter is in Japan (88), Germany (83), and Russia (81), whereas the lower value–in the US (26), Nigeria (13), and Egypt (7) (Hofstede 2015).

Table 4 Social and cultural development of the countries/regions and sensory parameters of romantic attraction: men's preferences in women's appearance

Sensory parameter	Cluster one—less modernized countries (survival values)	Cluster two—medium position of modernization	Cluster three—more modernized countries (self-expression values)	Overall (ANOVA)
Biologically determined sensory parameters				
Smell		Portugal 3.82		$F(9, 709) = 14.94$ $p < .001$
	Tyumen 3.80 Georgia 3.71 Petersburg 3.68 Jamaica 3.61			
		France 3.33		
			SouthEastUSA 3.30 Hawaii 2.86 MidWestUSA 2.70 NorthEastUSA 2.62	
Skin		France 3.45 Portugal 3.40		$F(9, 709) = 1.980$ $p = .039$
	Petersburg 3.37 Jamaica 3.21 Georgia 3.21 Tyumen 3.20			
			Hawaii 3.07 SouthEastUS 3.06 MidWestUS 3.01 NorthEastUS 2.87	
Body		France 3.81		$F(9, 709) = 14.79$ $p < .001$
	Petersburg 3.73 Tyumen 3.70 Georgia 3.67			
		Portugal 3.66		
	Jamaica 3.60			
			SouthEastUS 3.56 Hawaii 2.80 MidWestUS 2.71 NorthEastUS 2.68	
Eyes			Hawaii 3.37	$F(9, 709) = 3.60$ $p < .001$
	Georgia 3.29			
		France 3.23 Portugal 3.16		
	Petersburg 3.14			
			NorthEastUS 3.12 MidWestUS 3.02	
	Tyumen 2.94			
			SouthEastUS 2.85	
	Jamaica 2.54			

Table 4 (continued)

Sensory parameter	Cluster one—less modernized countries (survival values)	Cluster two—medium position of modernization	Cluster three—more modernized countries (self-expression values)	Overall (ANOVA)
Lips		Portugal 3.72 France 3.69		$F(9, 709) = 8.28$ $p < .001$
	Jamaica 3.69 Georgia 3.48 Tyumen 3.45 Petersburg 3.42			
			SouthEastUS 3.24 Hawaii 2.95 MidWestUS 2.81 NorthEastUS 2.78	
Socially determined sensory parameters				
Dress	Jamaica 3.23			$F(9, 709) = 4.56$ $p < .001$
			NorthEastUS 3.20 Hawaii 3.10	
		France 3.06		
	Georgia 3.03		SouthEastUS 3.01 MidWestUS 2.99	
		Portugal 2.78		
	Tyumen 2.54 Petersburg 2.39			
Dance			Hawaii 3.49 NorthEastUS 3.18 MidWestUS 3.07	$F(9, 708) = 6.78$ $p < .001$
	Petersburg 2.99 Georgia 2.92			
			SouthEastUS 2.81	
		Portugal 2.73		
	Jamaica 2.70 Tyumen 2.65			
		France 2.59		
Expressive face and speaking		Portugal 4.03 France 3.57		$F(9, 709) = 18.01$ $p < .001$
	Petersburg 3.38			
			SouthEastUS 3.33	
	Georgia 3.22 Jamaica 3.15 Tyumen 3.11			
			MidWestUS 2.86 Hawaii 2.75 NorthEastUS 2.71	

Table 4 (continued)

Sensory parameter	Cluster one—less modernized countries (survival values)	Cluster two—medium position of modernization	Cluster three—more modernized countries (self-expression values)	Overall (ANOVA)
Smile		Portugal 4.05 France 3.67		$F(9, 709) = 16.32$ $p < .001$
			SouthEastUS 3.40	
	Georgia 3.37 Petersburg 3.33 Tyumen 3.14 Jamaica 3.02			
			MidWestUS 2.92 Hawaii 2.70 NorthEastUS 2.64	

The data in the cluster two (medium) are not always straight on this tendency line. The value of *skin* in men's preferences of women's appearance is higher in cluster two (France and Portugal) than in countries and regions of the clusters three or one. The other cultural parameters (features), besides a complex degree of modernization, may play the roles in those cases.

Some variables, however, do not perfectly fit to these tendencies; the *eyes* and partially *lips* are among those. Inconsistency in the value of these sensory parameters might be due to the complex nature of these sensory parameters. Although we classified them as the stable biologically based characteristics (in terms of color, shape, etc.), yet the *eyes* and *lips* may bear an important expressive function—they can speak non-verbally.

The results in the Tables 4 and 5 also demonstrate that flexible socially and personally determined characteristics of appearance (such as *expressive face*, *smile, dress*, *dancing*) are more important in the societies of self-expression (cluster three), compared to the societies of survival (cluster one). However, it was a strange that our data showed opposite tendency regarding *expressive face and speaking*, as well as *smile*: in the US (cluster three), the culture well known for expressive behavior, the value of this parameter was lower than in Russia (cluster one), the culture well known for the lack of expressiveness.

The data in cluster two (medium position in modernization) are not always straight on this tendency line. The other cultural parameters (features), besides a complex degree of modernization, might play the roles in those cases. In reference to some biologically based sensory preferences, the results of the study are not clearly distributed (Tables 4 and 5) between clusters of modernization. In particular, the value of *skin* in women's preferences of men's appearance in the USA—modern country—in some regions (North East and Hawaii) is higher, while in others (South East) is lower than in less modernized countries, such as France and Portugal, and in the countries with low cultural modernization, such Jamaica, Russia, and Georgia.

Table 5 Social and cultural development of the countries/regions and sensory parameters of romantic attraction: women's preferences in men's appearance

Sensory parameter	Cluster one—less modernized countries (survival values)	Cluster two—medium position of modernization	Cluster three—more modernized countries (self-expression values)	Overall (ANOVA)
Biologically determined sensory parameters				
Smell	Petersburg 4.10 Tyumen 3.85 Jamaica 3.76 Georgia 3.77			$F(9.\ 1464) = 56.24$ $p < .001$
		France 3.75 Portugal 3.75		
			SouthEastUS 3.33 MidWestUS 2.81 Hawaii 2.52 NorthEastUS 2.64	
Skin			Hawaii 3.50 NorthEastUS 3.38 MidWestUS 2.91	
	Georgia 2.91 Jamaica 2.87	Portugal 2.91		$F(9.\ 1464) = 23.20$ $p < .001$
		France 2.86		
	Petersburg 2.69 Tyumen 2.47			
			SouthEastUS 2.36	
Body	Petersburg 3.51 Tyumen 3.48 Georgia 3.42			$F(9.\ 1463) = 8.69$ $p < .001$
		France 3.41		
	Jamaica 3.10		Hawaii 3.10 SouthEastUS 3.04 NorthEastUS 2.99 MidWestUS 2.93	
		Portugal 3.07		
Eyes		France 3.13 Portugal 3.01	Hawaii 3.46 NorthEastUS 3.13 MidWestUS 2.95 SouthEastUS 2.55	$F(9.\ 1464) = 23.22$ $p < .001$
	Georgia 3.01 Petersburg 2.65 Jamaica 2.61 Tyumen 2.56			
Lips		Portugal 3.56 France 3.32		$F(9.\ 1462) = 7.71$ $p < .001$
	Jamaica 3.25 Petersburg 3.23 Tyumen 3.09			
			SouthEastUS 3.07 Hawaii 2.98	
	Georgia 2.95			
			MidWestUS 2.88 NorthEastUS 2.81	

Table 5 (continued)

Sensory parameter	Cluster one—less modernized countries (survival values)	Cluster two—medium position of modernization	Cluster three—more modernized countries (self-expression values)	Overall (ANOVA)
Socially determined sensory parameters				
Dress			Hawaii 3.42 NorthEastUS 3.25 MidWestUS 3.01	$F(9.\ 1463) = 35.34$ $p < .001$
	Jamaica 2.99			
			SouthEastUS 2.85	
		France 2.59		
	Georgia 2.47			
		Portugal 2.44		
	Petersburg 2.32 Tyumen 2.20			
Dance			Hawaii 3.25 NorthEastUS 3.14 MidWestUS 2.97	
	Jamaica 2.93 Petersburg 2.91 Georgia 2.87 Tyumen 2.84			
		France 2.83		$F(9.\ 1463) = 8.09$ $p < .001$
			SouthEastUS 2.70	
		Portugal 2.63		
Expressive face and speaking		Portugal 3.87 France 3.59		$F(9.\ 1464) = 43.99$ $p < .001$
			SouthEastUS 3.40	
	Georgia 3.18 Petersburg 3.13 Jamaica 3.00 Tyumen 2.98			
			MidWestUS 2.93 NorthEastUS 2.73 Hawaii 2.58	
Smile		Portugal 3.84 France 3.62		$F(9.\ 1464) = 36.94$ $p < .001$
			SouthEastUS 3.47	
	Georgia 3.39 Petersburg 3.21 Tyumen 3.16 Jamaica 2.92			
			MidWestUS 2.91 NorthEastUS 2.66 Hawaii 2.55	

Discussion

General and Gender Preferences in the Sensory Parameters of Romantic Partners

The importance of many sensory parameters is similar for men and women revealing small differences in the means. Among those are *body*, *smell*, *lips*, *smile*, *expressive face* and *speaking*. Some physical characteristics, such as *body*, *smell,* and *lips* may serve as signals of reproductive quality (Barber 1995; Thornhill and Grammer 1999; Wedekind and Füri 1997), while others, such as *smile* and *expressive face* and *speaking* may indicate sympathy, interest and pleasure contributing to the enhancement of romantic relations (Karandashev 2017).

In all cases, where our data revealed statistically significant gender differences, men evaluated the importance of their romantic partner's sensory parameters higher than women did. This goes in accordance with a number of studies (see for review Regan et al. 2000) demonstrating that men have higher demands on the parameters of female physical appeal than women do.

The results of the study are in support of our main hypothesis: biologically determined sensory parameters are more important in less modernized countries—with priorities of survival values, whereas socially determined sensory parameters are more important in more modernized countries—with priorities of self-expression values. This general tendency, however, is not always straight. *Less modernized societies* tend to respect the societal structure, group cohesion, and customary norms. They are conservative, discouraging emancipation and individualistic self-expression. *More modernized societies* are less conservative in the following of societal norms, more flexible, and fluid in this regard, they respect individualism, emancipation, and open to a variety of ways of self-expression.

The Importance of Biologically Determined Sensory Parameters

Such biologically determined and stable characteristics of partner's physical appearance as *body*, *skin*, and *smell* are important in less modernized societies: less socioeconomically developed, with low Individualistic and Emancipative values, and high value of Power Distance. In the less developed societies with survival concerns, people frequently experience worse health problems (Marmot 2005) and therefore, a partner's body and smell may serve as the signs of good genes indicating the potential for good health (e.g., Barber 1995; Thornhill and Grammer 1999; Wedekind and Füri 1997). Therefore, according to Inglehart and Baker (2000), the evolutionary value of these sensory parameters, indicating the good health of mates, is higher. They play an important signaling role. In the societies with priorities of survival values people pay more attention to such biologically determined and stable characteristics in their romantic partners as *body*, *skin*, and *smell.* Romantic encounters and mating with lack of personal and intimate contacts need other orientations, such as physical appearance. These parameters also provide easy categorization based on visually observed indicators.

In particular, in Tyumen and Petersburg regions of Russia, the country of Portugal, where the indices of Power Distance and Uncertainty Avoidance are high, the participants consider such biologically determined and stable characteristics in their romantic partners as *body*, *skin*, and *smell* of a higher value compared with the participants in the country where these indices are low (the US).

On the other side, the higher social and economic indices associated with modernization are, the less important the stable biologically based parameters of romantic partner's appearance are. In modern egalitarian and individualistic societies, people care much less about sensory parameters of partner's appearance. For example, people living in modern societies learned how to correct, mask, or modify smell by frequent taking showers or using perfumes. The other physical characteristics can also be modified—the intentionally deception can be employed. For instance, Tooke and Camire (1991) studied the patterns of deception in sexual contexts in the sample of American students. The authors showed that females were prone to deceive males about their physical appearance, while males more often deceived females about commitment, sincerity and resource availability.

In addition, due to the higher quality of medical care and higher standards of living in modern societies, the survival value became a less important need compared to previous generations. Survival plays a less crucial role in contemporary life.

The Importance of Socially and Culturally Determined Sensory Parameters

The results of the study showed that the flexible, socially determined sensory characteristics of a romantic partner (such as dress, dance, smile, expressive face and speaking) are viewed as more important among the participants in the countries and regions where the parameters of Power Distance and Uncertainty Avoidance are low and the indices of Individualism and Egalitarianism are high.

Eyes are the windows to the soul, along with mouth (Yuki et al. 2007). Therefore, romantic partners frequently consider them as the especially important means to communicate their emotions.

The importance of *eyes* as the factors of romantic attraction can be interpreted both biologically and culturally. On the one hand, their shape and color are biologically based parameters, yet they are culturally modifiable by their decoration and expression. The effect of this duality is noticeable in the ANOVA of this variable in different clusters of social and cultural variables. The participants in the societies with the lower cultural value of Hierarchy and the higher value of Egalitarianism–such as Portugal and France—pay more attention to the eyes and voice as the expressive vehicles of their partner's personality. These preferences are different among participants in Petersburg, Tyumen, and Jamaica—the societies with high cultural value of Hierarchy and low value of Egalitarianism.

These inferences are in accord with the earlier findings, which showed that in a modern society (such as the UK) the interaction between partners is more important than in a traditional society (such as China) (Wong and Goodwin 2009).

Such sensory factors of romantic attraction as *expressive face and speaking*, *smile, dress*, and *dancing* are also culturally or personally determined. Because of this, they

are flexible and capable to change. These sensory factors tend to be more appreciated in modern egalitarian societies. People view each other as morally equal human beings with similar basic interests (Schwartz 2006). The cultural norms in such societies encourage to communicate openly and cooperate with each other. A smile plays an important role in interpersonal communication (González-Ibáñez et al. 2011), as the emotional expression in general (Schug et al. 2010) and as a sign of mutual interest and understanding (Bachorowski and Owren 2001). In the case of our study, we see that in the country with the lowest Hierarchy and the highest Egalitarianism—it is Portugal—the importance of *smile* and of *expressive face and speaking* are the highest.

It was surprising, however, that the importance of *expressive face, speaking*, and *smile* was lower in the US—the well-known expressive culture—compared to Russia—seemingly known as the culture of the lack of expressiveness (as in other Eastern cultures). This paradox, however, can be explained. In American culture, where expressiveness and smile are widely present, people consider this behavior as natural and, therefore, do not value it much (nothing special), while in Russian culture, where such expressive and smiley behaviors are scarcely present, it is more valuable when it is expressed by a partner.

The way, in which people dress, is another culturally determined sensory factor of romantic attraction. Dress is evaluated as an additional source of information about personality characteristics of a partner, about one's age, profession, social class, etc. (Roach-Higgins and Eicher 1992, p. 4). The fashion, the manner of dressing may serve as a cultural marker of social group and the status of a partner. For the participants in the countries with more emancipated cultures, dress also provides a possibility of self-expression. For example, the study of Hsu (2003) showed that the value of aesthetic clothing is lower in the culture with high Long-Term Orientation (Taiwan) and higher in the culture with low Long-Term Orientation (the US).

The results of our study coincide with such interpretation. They have also shown that people in less modernized societies (such as Russia in our sample) characterized by higher Power Distance, Long-Term orientation, and Uncertainty Avoidance pay less attention to how their partners dress. Different from this tendency, people in modernized countries (such as the United States)—with lower degree of these cultural characteristics and higher tendency towards Indulgence, Emancipative Values, Individualism,—appreciate *dress* more.

The other socio-cultural parameters, besides the complex estimation of modernization, may also play their role in the attitude to the dress of romantic partner. In our study, in terms of modernization, Jamaica is in the cluster 1—the same as Russia, yet men from Jamaica consider the importance of their romantic partner's dress high—the same as men in the US sample. The climate of a country can play its role. In the warmer climates—such as Jamaica—dress serves not only its main function of cold protection, but also works as the means of communication.

Conclusion

Thus, the overall ANOVA patterns of differences are between less modernized societies and more modernized societies. In less modernized societies—survival cultures, characterized by greater Power Distance, lower Individualism,

Indulgence and Emancipative values, people have higher preferences in evolutionary important biologically based stable characteristics of romantic partner's physical appearance, such as *smell*, *skin*, *body*, etc. Conversely, in more modernized societies—self-expression cultures, with lower Power Distance, high value of Individualism, Indulgence, and Emancipation, people have higher preferences in socially determined characteristics of appearance, such as *expressive behavior*, *dress*, *smile*, etc.

In summary, our findings allow interpretation from either evolutionary or cultural approaches and support the hypothesis that biologically stable parameters of romantic partner's appearance play an important role in less modernized societies, while flexible and dynamic parameters are important in more modern societies. In line with other studies (Buss et al. 1990; Lippa 2007; Stone et al. 2008; Neto et al. 2012) our findings suggest that in addition to evolutionary factors, social, economic development and culture contribute to mate preferences. As for gender differences across countries, men hold higher expectations concerning the partner's characteristics of physical attractiveness.

Strengths and Limitations of the Study

An advantage of our research is that we studied physical appearance as a multidimensional phenomenon, investigating its diverse aspects. When possible, we studied different regions in such large countries as Russia and the US, whereas in many cross-cultural studies these countries are treated as single cultural units, with one sample representing a whole country.

Participants of our study are urban citizens from countries with high or very high level of human development (United Nations Development Program 2015, p. 17) of upper-medium or medium individual economic status. These characteristics make it difficult to generalize the results of our studies to people living in less developed countries, in the countryside and to people with lower individual incomes.

Since our results are based on self-report data, one may point at the possibility of social desirability with regards to the importance of romantic partners' physical appearance. Participants' evaluation of the parameters of physical appearance of romantic partner may not coincide with the evaluation of these parameters in real communication. Future research using a design of a speed dating in cross-cultural aspect may clarify whether declared and actual evaluations of the importance of the romantic partner's parameters of physical appearance are congruent.

Compliance with Ethical Standards

Conflict of interest Authors declare that they have no conflict of interest.

Ethical Standards All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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