

# Sex and Age Differences in Mate-Selection Preferences

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**Abstract** For nearly 70 years, studies have shown large sex differences in human mate selection preferences. However, most of the studies were restricted to a limited set of mate selection criteria and to college students, and neglecting relationship status. In this study, 21,245 heterosexual participants between 18 and 65 years of age (mean age 41) who at the time were not involved in a close relationship rated the importance of 82 mate selection criteria adapted from previous studies, reported age ranges for the oldest and youngest partner that they would find acceptable, and responded to 10 yes/no questions about a potential marriage partner. For nearly all mate selection criteria, women were found to be the more demanding sex, although men placed consistently more value on the physical attractiveness of a potential partner than women. Also, the effects of the participants' age and level of education were nearly negligible. These results demonstrate the robustness of sex differences in mate selection criteria across a substantial age range.

**Keywords** Age differences · Age preferences · Evolutionary psychology · Mate selection · Sex differences

Since the late 1920s, many studies have yielded insights into human mate selection preferences. Using a method that was originally developed by undergraduate Harold Christensen at Ricks College (Powers 1971), Hill (1945) asked students to rate the importance of 18 selection criteria for a potential mate and indicate the acceptable age range of a partner. This method is often referred to as the mate-selection questionnaire. He found that women emphasized ambition and industriousness, education and general intelligence, and good financial prospects more than men. In contrast, men placed considerably more emphasis on good cook and housekeeper, good looks, and desire for home life and children. Also, Hill (1945) found that men prefer a partner

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who is 2.3 years younger and women prefer a partner who is 3.4 years older than they are.

In the following years, several studies replicated this pattern using the mate-selection questionnaire. Feingold (1992) identified 24 studies and highlighted the robustness of these sex differences across samples. Buss et al. (2001) selected four studies (Hill 1945; Hoyt and Hudson 1981; Hudson and Henze 1969; McGinnis 1958), added two of their own studies from 1984–1985 and 1996, and documented only a few changes in these 18 mate selection preferences measured across five decades. Even very recent studies used these criteria to examine these sex differences (Amador et al. 2005; Eastwick et al. 2006; Furnham 2009; Johannesen-Schmidt and Eagly 2002; Toro-Morn and Sprecher 2003). In the best-known study of human mate preferences, David Buss (Buss 1989; Buss et al. 1990) surveyed 10,047 participants across 37 different cultures and documented consistent cross-cultural sex differences in the importance of good earning prospects and physical attractiveness. Another study (Sprecher et al. 1994) applied quite a different approach: 1,329 participants were instructed to indicate whether they would marry someone with one of 12 characteristics (e.g., “would earn much more than you”). This method complements the findings of studies using the mate-selection questionnaire (e.g., youth and physical attractiveness were more important for men than for women; earning potential was more important for women than men).

These findings are often, but not always, interpreted from an evolutionary perspective on human mate selection (Eagly and Wood 1999; Johannesen-Schmidt and Eagly 2002). According to one evolutionary model, the Sexual Strategies Theory (Buss and Schmitt 1993), sex-specific differences in parental investment (Trivers 1972) cause these sex-specific mate selection preferences. Among humans, women invest more in their offspring (e.g., gestation) than men. Therefore, women prefer committed, long-lasting relationships and seek partners who are able and willing to invest in them and their potential offspring. Because their minimum parental investment is considerably lower, men may produce more offspring and potentially increase their fitness by preferring young, physically attractive women.

However, the ability to reproduce is not equal across the lifespan. Women cannot give birth to their own children after the onset of menopause. Unlike women, men are not directly restricted biologically in their reproductive abilities, but not many men beyond 50 years old are able to mate with younger women in their peak reproductive years. Therefore, it would be interesting to investigate whether mate selection preferences vary with age, or if the sex differences in mate selection preferences stated by young college students persist in older participants. However, most studies in psychological research rely on young, well-educated college students (Henrich et al. 2010). This observation is also valid for the vast majority of mate selection studies. The first manuscripts on this topic were titled “Campus values in mate selection” (Hill 1945), “Campus values in mate selection: A repeat study” (McGinnis 1958), and “Campus values in mate selection: A replication” (Hudson and Henze 1969). Even in the often-cited cross-cultural study on mate selection preferences, the overall unit-weighted mean age was approximately 23 years (Buss 1989; Buss et al. 1990). Other studies (e.g., Sprecher et al. 1994) included only participants younger than 35 years ( $M=25$  years). Therefore, we currently do not know if there are age differences in mate selection preferences, and especially if the sex differences are larger than the age

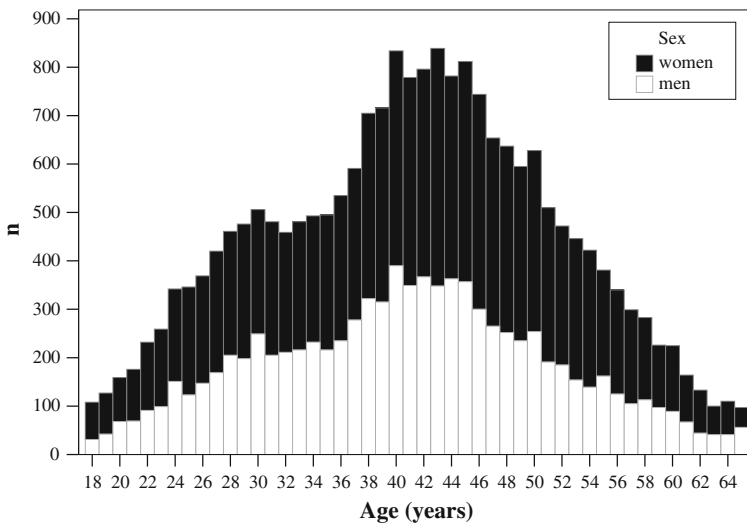
differences. A notable exception is the study by Buunk et al. (2002). They asked 127 participants between 20 and 60 years to rate seven mate selection criteria (income, education, physical attractiveness, self-confidence, intelligence, social position, and dominance) in different levels of relationship involvement (from “sexually fantasizing about” to “marrying” an attractive person of the opposite sex). Buunk et al. (2002) found few age differences in mate preferences, although older individuals set higher standards for a potential mate’s education.

Taken together, the studies described so far were restricted in one or more ways. First, most studies used only a very restricted set of 18 items originally developed by an undergraduate in the late 1920s (Powers 1971), and subsequently used by Hill (1945) and others. However, we do not know if these mate selection criteria are important today, or if they have ever been important. Also, because we have information about a limited set of items, it follows that we have limited insights into the variety of mate selection preferences. Furthermore, since earlier studies used this limited set of items, most statistical analyses were based solely on single-item analyses with limited power (see Buss and Barnes 1986; Fletcher et al. 1999; Shackelford et al. 2005). Second, as noted above, only a few investigators (e.g., Buunk et al. 2002) systematically investigated age differences in these mate selection criteria; most relied solely on young college students. Third, many studies do not specify relationship status, or they collapse different statuses for analysis (Surra et al. 2007). This could be a problem if one is interested in mate selection preferences across the lifespan. Usually, there is a lower prevalence of married individuals among 18-year-old students than in a sample of 50-year-old participants. Consequently it is difficult to distinguish the effects of age from the effects of relationship status, even in very small samples.

This study solved the three problems mentioned above. A very large sample ( $n=21,245$  participants) across a wide age range (18–65 years), all of whom indicated they were not in a committed relationship, rated the importance of 82 mate selection criteria, reported age ranges for the oldest and the youngest partner they would accept, and answered 10 questions regarding a potential marriage partner (adapted from Sprecher et al. 1994). This sample allowed us to determine the degree of sex and age differences, as well as whether sex or age differences are more important in terms of preferences in a potential long-term mate.

## Participants

Initially, 23,935 participants completed an online survey with one or no missing values. We excluded participants who indicated they were gay or lesbian ( $n=249$ ) or bisexual ( $n=598$ ). We also excluded 26 participants who gave invalid responses (e.g., age 655 years), and 11 participants younger than 18 years of age. Since only a few were over 65 years of age ( $n=382$ ), we excluded these participants from our analyses as well. Finally, 828 participants said they were in a close relationship and 596 participants were married. To avoid possible confounds between age and relationship status, we excluded these participants, too. Therefore, the remaining sample consisted of 21,245 participants between 18 and 65 years old ( $M=41.16$ ,  $SD=10.54$ ) who stated that they were not in a close relationship. As Figure 1 shows, this sample included at least 97 participants (age 65) for any given age.



**Fig. 1** Distribution of age and sex of participants

Participants in the sample were well-educated (compared with the population in Germany in 2008, Statistisches Bundesamt Hrsg. 2010). Only 122 participants reported no formal education (0.6% vs. Germany 3.9%), 3,354 reported having a lower secondary school graduation (*Hauptschulabschluss* 15.8% vs. Germany 39.3%), 8,807 had an intermediate secondary school graduation (*Mittlere Reife/Fachhochschulreife* 41.5% vs. Germany 21.1%), 3,569 had upper secondary school graduation (*Allgemeine Hochschulreife/Abitur* 16.7% vs. Germany 24.4%), and 5,393 had a university degree (25.4% vs. Germany 7%).

## Materials and Procedure

This online survey was hosted and advertised by a large German online dating service as “Mate Selection Preferences Study 2008.” A short introduction described the aims of the study and ensured the participants’ anonymity. In particular, no data would be linked to the participant’s profile on the online dating service.

On the next pages, participants evaluated the importance of 82 mate selection criteria for a partner in a long-term relationship (1 = unimportant to 5 = very important). These criteria were based largely on previous research from a prototype perspective (Storz 2001). According to prototype theory (Rosch 1973), many natural language concepts cannot be defined in the classical sense (i.e., in terms of necessary and sufficient features), but instead are organized around the best examples, which Rosch referred to as prototypes. In two studies, Storz (2001) found that the typical partner for a long-term relationship can be described as a prototype with a specific set of mate selection criteria. This study used these empirically derived mate selection criteria for a typical long-term relationship partner. Next, participants indicated the oldest and the youngest partner who would be accepted (in years; adopted from Hill 1945). Then, participants answered 10 questions (yes/no) about whether she/he could

imagine marrying someone who, for example, earns much more than the participant (adopted from Sprecher et al. 1994). On the next page, participants completed one scale not relevant in this paper, the Relationship Orientation Questionnaire (Schwarz and Hassebrauck 2007). This scale measures two broad dimensions of relationship preferences regarding long-term and short-term relationships. Finally, participants completed some demographics (age, sex, relationship status, level of education, and sexual orientation).

## Results

First, instead of relying on single-item analyses, we present the factorial structure of the 82 mate selection preferences (for basic information on single-item analyses [means of men and women, Cohen's  $d$ ] see Table 1). Then, we predict the mean composite ratings from the factorial structure of the mate selection preferences from sex and age. Next, we analyze the oldest and the youngest partner items and the questions regarding a potential marriage partner (adopted from Sprecher et al. 1994). Owing to the large sample size ( $n=21,245$ ), many effects reach statistical significance but are rather unimportant if one considers effect size measures, on which we focus here (ANOVA: partial  $\eta^2$ , Cohen's  $d$ ; linear regression analysis:  $R^2$ ; logistic regression: Wald's  $\chi^2$  and confidence interval for the odds ratios).

### Factorial Structure of Mate Preferences

One assumption of principal component analyses (PCA) is (multivariate) normality among the variables. Deviations from normality result in lower correlations between the variables. An inspection of the 82 mate selection preferences shows that most variables deviate significantly from the assumption of normal distribution. In this sample, however, all overall measures indicate sufficient intercorrelations in these data. Visual inspections of the anti-image correlations showed that nearly all variables reached a sufficient partial correlation (Hair et al. 2006 suggest a critical value of 0.7). Only one variable deviates from this "rule of thumb" (wants children: 0.64), but we decided to include this variable because of its theoretical importance (especially for detecting age differences). Consequently, the Kaiser-Meyer-Olkin measure of sampling adequacy, as well as the Bartlett measure of sphericity, showed that the data are appropriate to conduct a PCA (KMO = 0.971;  $\chi^2_{3321}=709,642.31, p<0.001$ ).

The resulting PCA of the 82 mate selection preferences showed 14 factors with an Eigenvalue larger than 1 (19.130, 4.767, 3.172, 3.041, 2.210, 1.961, 1.747, 1.517, 1.498, 1.373, 1.329, 1.125, 1.069, and 1.011). A parallel analysis (200 data sets, 99<sup>th</sup> percentile; O'Connor 2000) suggested extracting 12 factors (random data eigenvalue 13<sup>th</sup> factor 1.072). We conducted Promax and Varimax rotation (Fabrigar et al. 1999) and found virtually the same factor loadings (only four factor loadings differed substantially between the two rotations). Therefore, we present the factor loading structure from the Varimax rotation in Table 1 from the 12

**Table 1** Factor analysis of mate selection preferences (Varimax-rotation)

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Women	Men	Cohen's <i>d</i>
Affectionate	0.710												4.47	4.39	0.12
Emotional	0.700												4.40	4.25	0.22
Loving	0.695												4.53	4.39	0.21
Empathic	0.661												4.41	4.21	0.28
Romantic	0.625												3.87	3.88	-0.01
Warmhearted	0.604												4.38	4.18	0.28
Understanding	0.523												4.42	4.20	0.31
Considerate	0.480												4.28	3.97	0.43
Self-confident		0.605											4.11	3.78	0.44
Assertive		0.589											3.70	3.29	0.49
Has a mind of his/her own		0.576											4.39	4.13	0.36
Goal-orientated		0.534											3.82	3.49	0.40
Critical		0.530											3.39	3.35	0.05
Ambitious		0.520											3.49	3.16	0.36
Individual		0.469											3.54	3.43	0.13
Able to face conflicts		0.439											4.16	3.86	0.38
High-principled		0.430											4.32	4.04	0.38
Pleasant			0.594										4.03	3.86	0.23
Straightforward			0.584										3.86	3.83	0.04
Friendly			0.567										4.27	4.17	0.14
Willing to compromise			0.541										4.11	3.91	0.28
Helpful			0.512										4.19	3.96	0.33
Kind			0.506										4.07	4.07	0

Table 1 (continued)

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Women	Men	Cohen's <i>d</i>
Well-balanced			0.417										3.99	3.80	0.25
Able to adapt			0.411										3.62	3.57	0.06
High level of education				0.718									3.54	3.06	0.49
Educated				0.718									4.03	3.63	0.49
Intelligent				0.676									4.30	3.92	0.49
Literate				0.640									3.38	3.06	0.34
Ingenious				0.601									3.78	3.60	0.22
Tolerant				0.467									3.88	3.63	0.29
Wealthy					0.828								2.78	2.11	0.67
Rich					0.819								2.36	1.82	0.53
Has a high status					0.668								2.73	2.31	0.40
Successful in his/her career					0.663								3.57	2.81	0.83
Generous					0.473								3.57	3.05	0.54
Good looks						0.810							3.56	3.80	-0.28
Sexy looks						0.807							3.15	3.62	-0.48
Attractive						0.789							3.79	3.96	-0.21
Erotic						0.645							3.96	4.11	-0.18
Exciting						0.479							3.63	3.71	-0.09
Neat							0.627						3.63	3.63	0
Has good manners							0.583						4.33	3.93	0.51
Polite							0.555						4.23	3.92	0.40
Industrious							0.539						3.83	3.54	0.35
Well-dressed							0.406						3.69	3.41	0.32
Well-tended							0.402						4.57	4.26	0.45

Table 1 (continued)

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Women	Men	Cohen's <i>d</i>
Witty								0.803					3.95	3.77	0.21
Funny								0.769					4.05	3.94	0.14
Humorous								0.705					4.27	4.02	0.34
Venturesome									0.630				3.88	3.61	0.34
Spontaneous									0.563				3.77	3.61	0.19
Outgoing									0.485				3.89	3.58	0.39
Interested in a wide range of things									0.404				3.85	3.66	0.23
Good cook										0.585			2.68	2.97	-0.28
Musical										0.538			2.40	2.45	-0.05
Creative										0.482			3.28	3.36	-0.09
Domestic										0.465			3.16	3.17	-0.01
Honest											0.684		4.83	4.71	0.23
Faithful											0.649		4.78	4.68	0.16
Reliable											0.474		4.71	4.49	0.35
Similar in interests												0.763	3.75	3.59	0.18
Similar in opinions												0.749	3.76	3.52	0.28
Similar ideas of a relationship												0.538	4.46	4.21	0.35



extracted factors (of the 82 mate selection criteria; 18 did not load substantially on one factor).

Eight mate-selection criteria loaded higher onto Factor I (compared with the other factors). Table 1 shows that these criteria all relate to a *kind and understanding* partner (e.g., affectionate, emotional, loving). The nine mate selection criteria that loaded high on Factor II represent a *dominant* partner (e.g., self-confident, assertive, has a mind of his/her own). The eight criteria loaded high on Factor III relate to a *pleasant* partner (e.g., pleasant, straightforward, friendly). The six criteria that loaded high on Factor IV all relate to an *intellectual* partner (e.g., high level of education, educated, intelligent), and the five criteria that loaded high on Factor V indicate preferences for a *wealthy and generous* partner (e.g., wealthy, rich, generous). Five criteria that loaded high on Factor VI reflect preferences for a *physically attractive* partner (e.g., good looks, sexy looks, attractive). The six criteria on Factor VII identified preferences for a *cultivated* partner (e.g., neat, has good manners, polite). Three criteria loaded high on Factor VIII (witty, funny, and humorous) and reflect preferences for a *humorous* partner. The four criteria that loaded high on Factor IX identify preferences for a *sociable* partner (e.g., venturesome, spontaneous, outgoing). The four criteria that loaded high on Factor X represent preferences for a creative (creative and musical) and domestic (good cook and domestic) partner. This factor was labeled as *creative and domestic*. Three criteria loaded high onto Factor XI all related to a *reliable* partner (honest, faithful, reliable). Finally, three criteria (similar interests, similar opinions, similar ideas of a relationship) that loaded high on Factor XII reflect preferences for a *similar* partner.

### Effects of Sex and Age on Mate Selection Preferences

Next we computed unit-weighted scales based on the factorial structure of the mate selection criteria (Varimax rotation). Table 2 gives an overview of the internal consistencies and correlations of these scales, as well as descriptive statistics.

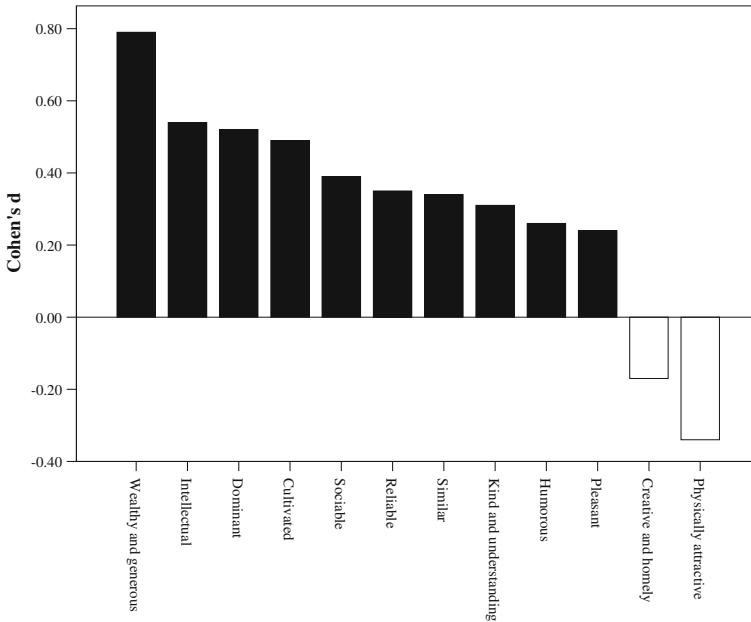
We conducted several hierarchical regression analyses to predict responses in the mate selection preference scales from sex and age (Step 1), and sex  $\times$  age interaction (Step 2). In these analyses, the sex of participants was coded to 0 for men and 1 for women, and age was centered to the mean ( $M=0$ ,  $SD=10.54$ ). This analytical strategy is most appropriate for these data (Cohen et al. 2003). Across all 12 hierarchical regression analyses (final models included the interaction term), the sex of participants was the strongest predictor, and was a significant predictor in all analyses ( $p<0.001$ ;  $\beta$  ranged from  $-0.084$  to  $0.359$ ). Figure 2 shows that most mate selection preference composites are more important for women than men ( $d$  ranged from  $0.24$  to  $0.79$ ), whereas two are relatively more important for men than women (*physically attractive* partner:  $d=-0.34$  and *creative and domestic* partner  $d=-0.17$ ).

The participant's age was also a significant ( $p<0.001$ ) predictor in 11 analyses, but compared with the participant's sex, it was rather weak ( $\beta$  ranged from  $-0.001$  to  $0.159$ ). In only one case could the mean importance of the mate selection criteria be better predicted from age alone than from the sex of participants (*creative and domestic*). The older the participant, the more important is a *creative and domestic* partner ( $b=0.010$ ,  $SE=0.001$ ,  $\beta=0.159$ ,  $p<0.001$ ).

**Table 2** Intercorrelations between mate selection preference composites

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	M	SD
I. Kind and understanding	(0.86)												4.28	0.52
II. Dominant	0.44	(0.83)											3.77	0.53
III. Pleasant	0.67	0.55	(0.82)										3.97	0.52
IV. Intellectual	0.28	0.58	0.33	(0.83)									3.68	0.64
V. Wealthy and generous	0.20	0.43	0.29	0.49	(0.83)								2.76	0.80
VI. Physically attractive	0.31	0.37	0.32	0.27	0.28	(0.82)							3.71	0.68
VII. Cultivated	0.52	0.55	0.59	0.42	0.47	0.35	(0.78)						3.93	0.56
VIII. Humorous	0.39	0.40	0.42	0.28	0.18	0.33	0.34	(0.81)					4.01	0.69
IX. Sociable	0.41	0.63	0.52	0.48	0.35	0.39	0.43	0.45	(0.74)				3.75	0.61
X. Creative and domestic	0.35	0.36	0.41	0.28	0.36	0.30	0.37	0.24	0.35	(0.56)			2.93	0.66
XI. Reliable	0.53	0.34	0.45	0.18	0.08	0.13	0.46	0.28	0.22	0.14	(0.67)		4.71	0.46
XII. Similar	0.42	0.36	0.48	0.28	0.26	0.21	0.37	0.26	0.36	0.31	0.31	(0.68)	3.90	0.64

All correlations are significant at  $p < N=21,245$ . Cronbach's alphas are shown in parentheses in the diagonal



**Fig. 2** Sex differences (Cohen's *d*) in mate selection preference composite scores

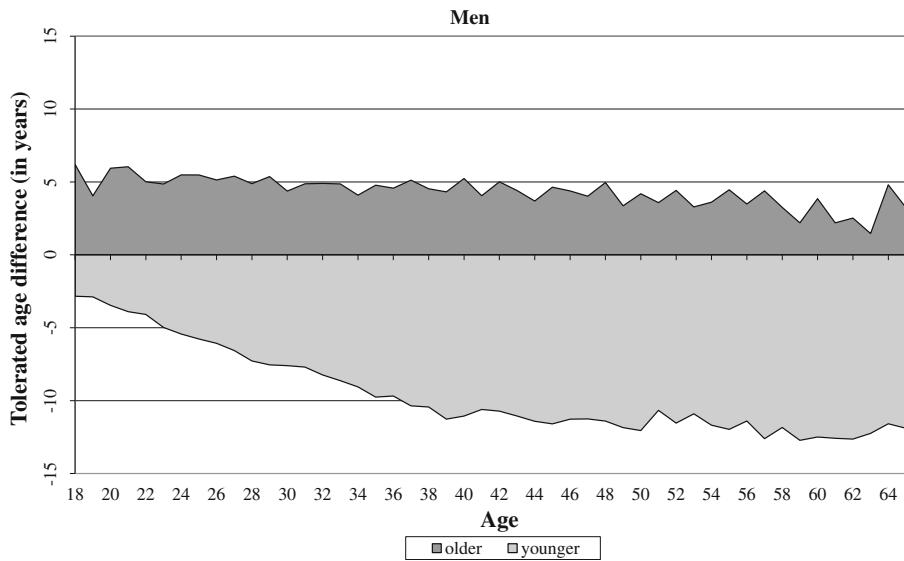
Three analyses showed significant ( $p < 0.001$ ) but negligible ( $\Delta R^2 < 0.001$ ) interactions between the sex of participants and age in terms of additional explained variance.

Taken together, there are very strong indications for sex differences in mate selection preferences, very weak indications for the effects of age, and even weaker indications for the interaction between sex and age.

### Effects of Sex and Age on Oldest and Youngest Partner Accepted

Figure 3 shows the mean oldest and youngest partner men of a given age will accept. Across all ages, men tolerate women that are slightly older than they are ( $M = 4.45$  years,  $SD = 6.68$ ), but they accept women substantially younger than they are ( $M = 9.99$  years,  $SD = 4.71$ ). Furthermore, the older men are, the younger (relative to the men) the women could be ( $r = 0.42$ ,  $p < 0.001$ ). There is also a smaller trend in terms of the oldest acceptable partner ( $r = -0.08$ ,  $p < 0.001$ ). Therefore, men accept younger women (relative to their own age), and this acceptance even increases with age, whereas the acceptance for older women is relatively constant.

At first glance, women show a complementary pattern. Across all ages, women accept men who are substantially older than they are ( $M = 8.23$  years,  $SD = 5.90$ ), and they also tend to accept men who are only slightly younger than they are ( $M = 4.92$  years,  $SD = 4.72$ ). However, if one takes age into account, trends similar to those in men are observed (Fig. 4). The older women are, the younger (relative to themselves) the men could be ( $r = 0.48$ ,  $p < 0.001$ ). However, there is also a trend for the oldest partner accepted ( $r = -0.20$ ,  $p < 0.001$ ). Therefore, women accept younger



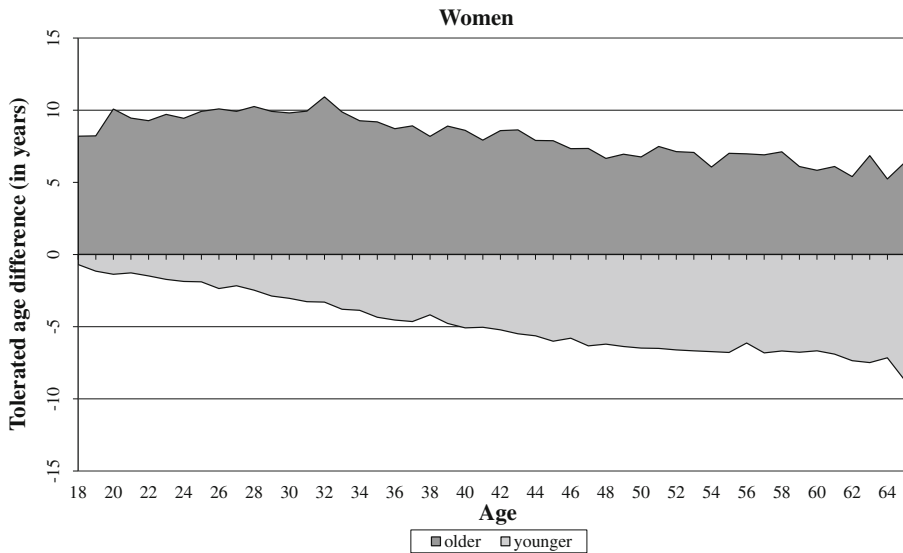
**Fig. 3** Men's tolerated age difference for older or younger partner

men (relative to themselves) as they grow older, whereas the acceptance for older men lessens as they grow older.

#### Effects of Sex and Age on Marriage Partner Characteristics

Finally, we explored the effects of sex and age on the 10 marriage partner characteristics (adopted from Sprecher et al. 1994). We conducted separate logistic regression analyses for each question comparable to the hierarchical multiple regression analyses reported before (Cohen et al. 2003). For ease of interpretation we present odds ratios (OR). An OR greater than 1 indicates that as the predictor increases, the odds of the outcome increase. Conversely, a value less than 1 indicates that as the predictor increases, the odds of the outcome decrease. Finally, OR equal to 1 indicates that this predictor does not significantly predict the odds of the outcome.

These analyses show very strong sex differences (Wald  $\chi_1^2$  varied across analyses between 5.22 and 4221.56,  $M=1422.23$ ,  $SD=1910.90$ ). Ninety-one percent of men could imagine marrying someone who earns much less than they do, whereas only 37.9% of women could imagine this (OR=0.06, Wald  $\chi_1^2=4576.73$ ). This is especially noteworthy when comparing these responses with the question of whether they could imagine marrying someone who earns much more than they do. Here, 95.8% of women and 92.8% of the men could imagine this (OR=1.85, Wald  $\chi_1^2=88.42$ ). Similarly, men could imagine marrying someone who has a lower level of education (87.4%), whereas most women could not (43.0%, OR=0.11, Wald  $\chi_1^2=3617.02$ ). Again, both sexes could imagine marrying someone who has a higher level of education than their own (men: 94.9% vs. women: 96.3%, OR=1.45, Wald  $\chi_1^2=26.32$ ). A very similar pattern can be found when the participants were asked whether they could imagine marrying someone who does not have regular employment.



**Fig. 4** Women's tolerated age difference for older or younger partner

Again, most men could (75.3%), and most women could not (28.0%,  $OR=0.13$ , Wald  $\chi_1^2=4221.56$ ). Also, men could imagine marrying someone with a different skin color (74.1%), whereas women in this sample did not agree to the same degree (51.8%,  $OR=0.38$ , Wald  $\chi_1^2=1033.80$ ). Finally, more women (47.7%) than men (35.2%) could imagine marrying someone who is not good looking ( $OR=1.68$ , Wald  $\chi_1^2=329.10$ ).

As the odds ratios indicate, the effects of age were much smaller (Wald  $\chi_1^2$  values varied across analyses between 0.13 and 884.53,  $M=163.49$ ,  $SD=126.06$ ). Two effects are noteworthy. The older participants could imagine marrying someone with children ( $r=0.92$ ,  $p<0.001$ ,  $OR=1.10$ , Wald  $\chi_1^2=884.53$ ) and someone who has been married ( $r=0.87$ ,  $p<0.001$ ,  $OR=1.11$ , Wald  $\chi_1^2=537.81$ ).

Comparing the model fits from the first step (sex and age as predictors) shows that in all analyses both predictors could predict significantly ( $\chi^2>164.505$ ,  $p<0.001$ ) and substantially (Cox & Snell  $R^2$  varied between 0.008 and 0.285,  $M=0.103$ ; Nagelke  $R^2$  varied between 0.002 and 0.385,  $M=0.156$ )<sup>1</sup> the odds of the outcome, whereas in seven of the ten analyses the interaction terms contribute significantly ( $p<0.05$ ) to the odds of the outcome, but they are negligible in terms of explained variance (max.  $\Delta$  Cox & Snell  $R^2<0.004$ , max.  $\Delta$  Nagelke  $R^2<0.005$ ).

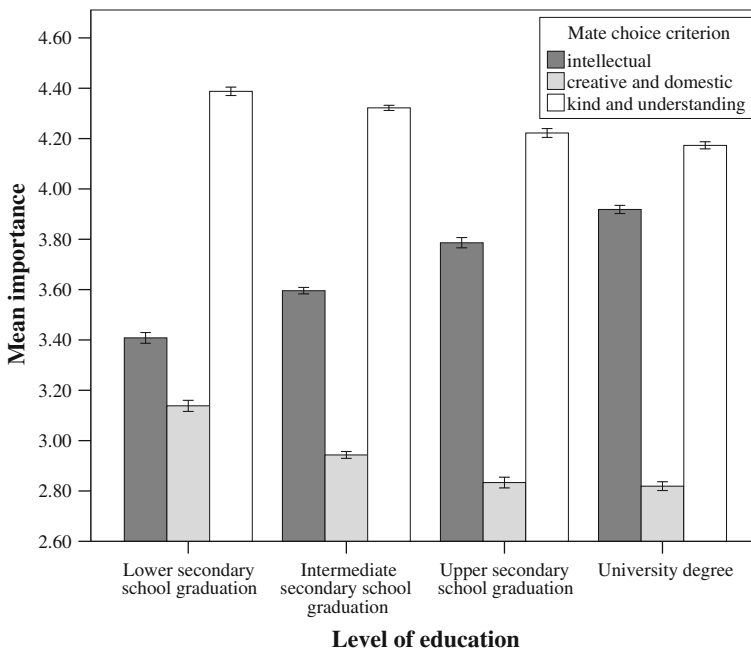
#### Effects of Sex and Education Level

One might argue that we have neglected one potential confounding factor—education level. Higher education enables access to resources. Older women

<sup>1</sup> Cox  $R^2$  and Nagelke  $R^2$  values were very low for the questions most of the participants agreed (men and women >90%).

who have lower education levels have different access to resources than women with higher education. Therefore, one would expect an interaction between sex and education level on mate selection preferences. To rule out this possibility, we conducted additional analyses that considered education level. One group was too small for analysis (participants without formal education,  $n=122$ , 0.6%), so we excluded these participants from the sample, resulting in a reduced sample of  $n=21,123$ .

First, we conducted a 2 (sex)  $\times$  4 (level of education) MANCOVA with age as covariate on the 12 mate selection preference composites. These analyses confirmed the importance of sex differences in mate selection preferences. We found a large multivariate effect of sex (multivariate  $F_{12, 21103}=760.95$ ,  $p<0.001$ , partial  $\eta^2=0.30$ ), and only a small effect of education level (multivariate  $F_{36, 63315}=138.64$ ,  $p<0.001$ , partial  $\eta^2=0.07$ ). Most importantly, we found only a very small interaction between sex and level of education (multivariate  $F_{36, 63315}=9.01$ ,  $p<0.001$ , partial  $\eta^2=0.005$ ). Univariate analyses showed only three variables where education level explained more variance than sex did (Fig. 5). First, the higher the education level, the more important was an *intellectual* partner ( $F_{3, 21114}=626.05$ ,  $p<0.001$ , partial  $\eta^2=0.082$ , all pair-wise comparisons  $p<0.001$ ). Second, the higher the education level, the less important was a *creative and domestic* partner ( $F_{3, 21114}=173.98$ ,  $p<0.001$ , partial  $\eta^2=0.024$ , pair-wise comparisons  $p<0.001$  with one exception: upper secondary school graduation vs. university degree,  $p=0.096$ ). Finally, the higher the education level, the less important was a *kind and understanding* partner ( $F_{3, 21114}=162.05$ ,  $p<0.001$ , partial  $\eta^2=0.023$ , all pair-wise comparisons  $p<0.001$ ).



**Fig. 5** Effects of level of education on preferences for an intellectual, creative and domestic, and kind and understanding partner

We also conducted similar MANCOVAs on the oldest and youngest partner age and found a very large sex difference (multivariate  $F_{2, 21034}=5520.17$ ,  $p<0.001$ , partial  $\eta^2=0.344$ ), a very small effect of education level (multivariate  $F_{6, 42070}=33.20$ ,  $p<0.001$ , partial  $\eta^2=0.005$ ), and a very small interaction between sex and education level (multivariate  $F_{6, 42070}=25.79$ ,  $p<0.001$ , partial  $\eta^2=0.004$ ).

To explore the effects of sex and education level on these marriage partner characteristics, we conducted similar logistic regression analyses, from sex, education level (dummy coded: baseline group lower secondary school graduation), and age in Step 1, and added the sex $\times$ education level interactions in Step 2. In six of ten analyses, the interaction terms contribute significantly ( $p<0.05$ ) to the odds of the outcome variables but were negligible in terms of explained variance ( $\Delta$  Cox & Snell  $R^2<0.004$ ,  $\Delta$  Nagelke  $R^2<0.005$ ).

Therefore, the effects of education level on mate selection preferences were very low compared with the large effects of sex, and no substantial interactions between sex and education level were found.

## Discussion

Most studies of mate selection preferences investigate only a very restricted set of variables, primarily young participants, and do not specify relationship status, or they collapse different statuses for analysis. In this research, 21,245 participants between 18 and 65 years of age who were not currently involved in a close relationship answered questions about the importance of 82 mate-selection criteria for a long-term relationship, the oldest and youngest partner they would accept, and whether they would marry a partner with certain characteristics. Given this wide range of participants and mate selection criteria, this study is the most comprehensive work on mate selection criteria to date, as far as we know.

The sample allowed us to investigate sex and age differences in these mate selection criteria. Many findings from the literature regarding sex differences were replicated and extended. Women, more than men, prefer a partner who is wealthy and generous, intellectual, dominant, cultivated, sociable, reliable, similar, kind and understanding, humorous, and pleasant. This finding can be interpreted within the framework of Sexual Strategies Theory (Buss and Schmitt 1993). Because of their greater parental investment (Trivers 1972), women are generally the more demanding sex regarding most of the mate selection criteria. Men, on the other hand, prefer a physically attractive and a creative and domestic partner. This finding is often interpreted as a psychological mechanism in men to find women with high reproductive value (Buss 2012). In contrast to these strong sex differences, we found only one noticeable variation with age. The older the participants are, the more important a creative and domestic partner is, but we found no interactions between sex and participants' ages. This is especially noteworthy because few studies have explored whether mate selection criteria vary with age. Buunk et al. (2002) for example, also found few age differences in mate selection criteria for participants between 20 and 60 years of age. Thus, mate selection criteria seem to be relatively stable over the life course.

We also found interesting results for the oldest and youngest acceptable partner. In general, men accept women who are approximately 10 years younger, but only

4.5 years older, than they are; women accepted men who are approximately 8 years older and 5 years younger. At first glance, this looks like a complementary pattern. This pattern changes when how these tolerated age spans vary with the participant's age is considered. As men grow older, they accept even younger women, but their tolerated age span regarding the oldest partner they would accept is unrelated to their own age. On the other hand, women tend to accept younger men as they grow older, but the oldest partner they will accept decreases as they age. One possible explanation is a sex difference in life expectancy. In Germany, women live five years longer than men on average. Therefore, it seems reasonable that, as women grow older, their tolerance for an older partner decreases. This could also explain why women tend to accept even younger men as they grow older. Thus, especially for older women, the field of eligible mates is rather small (and gets smaller as women age).

Also, we found several differences between the sexes when they were asked to imagine a marriage partner. Again, women are more demanding than men. Far fewer women than men could imagine marrying a partner who earns much less than they do, whereas there is more similarity between the sexes regarding a partner who earns more than they do. Women could not imagine marrying someone with a level of education lower than theirs, whereas most men would. Again, both sexes show a high level of agreement when considering a partner who has a higher level of education than they do. Also, women could not imagine marrying someone who did not have regular employment (a less relevant issue for men). This pattern shows that women are more demanding than men and look more at (potential) status and resources in their partners than men. Relative to women, men were less likely to marry someone who was not good looking but were more able to imagine marrying someone with a different skin color. Here, the effects of age were comparatively small. We found that as participants aged, they could better imagine marrying someone who has children and who was previously married. This pattern is particularly plausible since the field of eligible mates is reduced dramatically as people age, especially if they prefer a never-married partner who does not have children. Again, we could not find substantial interactions between sex and age of participants in these data.

Finally, we ruled out one potential confounding factor, level of education. Assuming that a higher level of education enables access to status and resources—especially since many older women did not have access to higher education when they were young—we could expect that women who have reached a high level of education may differ from those with lower levels of education (Eagly and Wood 1999; Gangestad 1993; Low 1990). From this perspective, one would expect that women with a low level of education (and hence restricted access to resources) would prefer a wealthy and generous partner. We could confirm some effects of level of education, but only with regard to an intellectual partner (more important at higher levels of education), a kind and understanding and a creative and domestic (less important at higher levels of education) partner, but we could not confirm interactions between age and sex, especially regarding the importance of resources. Level of education, however, is only a very broad measure of access to resources. Other, more direct measurements of control of resources did reveal effects on mate selection preferences (Moore et al. 2006; Moore et al. 2010).

Taken together, these results show large sex differences in mate selection criteria. Women are more demanding than men: many mate selection criteria are more



important for them than for men, and they could not imagine marrying a partner who does not have certain characteristics, especially a minimum of status and resources. Men, on the other hand, prefer younger, physically attractive, and creative and domestic women. This pattern is already well-documented in the literature. We also found only a few variations with age of participants or level of education, indicating very stable lifetime mate selection preferences.

### Limitations and Further Studies

One limitation may be that we (and other researchers in this domain) investigated preferences only in a questionnaire and not by observing actual behavior, e.g., in a speed-dating context (Finkel and Eastwick 2008; Finkel et al. 2007). However, our participants were all active users of an online dating portal in which the first contacts are verbal, either via the profile each user creates or via private messages sent to other users. Therefore, it seems very feasible that those verbal preferences have implications for concrete dating behavior.

Furthermore, many studies have shown different preferences for a partner in a long-term versus a short-term relationship (Buss and Schmitt 1993; Li et al. 20022; Li and Kenrick 2006; Schmitt 2005). This study thoroughly examined sex and age differences in preferences for a long-term partner. As far as we know, no comparable studies of preferences for a short-term partner have been conducted with as wide a range of mate selection criteria and of participants' ages.

It is not known whether current relationship status has an effect on mate selection preferences. In this study, only 6.7% of the participants reported being in a close relationship or married. Since this comparatively small sample did not allow us to test systematically for differences across relationship statuses, we decided to exclude these participants from the sample. However, it might be especially fruitful to explore possible effects of relationship status on mate selection preferences directly. Related studies have found that persons in committed, close relationships devalue the physical attractiveness of attractive persons of the opposite sex. This mechanism has been interpreted as one way to maintain close relationships (Lydon et al. 1999; Miller 1997; Simpson et al. 1990). It seems reasonable (but, as far as we know, remains unexplored) that similar mechanisms could be at work for participants in close relationships compared with participants in less-committed relationships.

Although one might question our sampling strategy with regard to inferences about the population, since the participants were recruited from an online dating service, we believe our sample is quite representative for (at least) German males and females for several reasons. First, representative samples from the German population in 2008 showed 65% used the Internet (Initiative D21 and Infratest 2011). Second, even though much more research is needed, the preliminary evidence suggests that users of online dating services do not differ significantly in their personalities from non-users (e.g., Aretz et al. 2010; Goldberg 2009; Kim et al. 2009). Third, even though individuals systematically misrepresent themselves in online dating contexts (Hall et al. 2010), which might influence responses in our questionnaire, we believe this is not the case in this study because we informed the participants that no information would be exchanged between their online profile and this completely

anonymous questionnaire. Thus, we cannot exclude any systematic misrepresentation in this study, but we believe it is highly improbable.

Further, with regard to level of education, we found in our data that the higher the level of education, the more the participants preferred an intellectual partner. This finding suggests that level of education was a valid measure. Moreover, the wide (and presumably valid) distribution of level of education in our sample allows us to assume that our sample is not perfectly representative in its most strict sense, but much more representative than most other studies on 18- to 22-year-old undergraduates' mate preferences usually found in the literature.

Finally, our results are restricted to participants between 18 and 65 years old. Unfortunately, we had only a few adults over 65 years of age ( $n=382$ ). For any other age, we have at least 97 participants in our sample (Fig. 1). However, it might be fruitful to explore systematically even older samples. Theoretically, older participants should invest less in mating effort and more in parenting, or even grandparenting, effort. At least in Germany, however, people older than 65 are usually retired. This event affects nearly all people and has profound impacts on one's social life. On the one hand, most retirees have more time for friends and family. On the other hand, retirees have to deal with reduced income and fewer social contacts (Luhmann et al. 2011). To our knowledge, if and how this life event affects mate selection preferences is not currently known.

Therefore, even though more than 70 years of research into human mate selection preferences has led to many insights, there is still much more to explore in the future.

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