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ORIGINAL PAPER

Men's Mate Value Correlates with a Less Restricted Sociosexual Orientation: A Meta-Analysis

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Abstract

Men, relative to women, can benefit their total reproductive success by engaging in short-term pluralistic mating. Yet not all men enact such a mating strategy. It has previously been hypothesized that high mate value men should be most likely to adopt a short-term mating strategy, with this prediction being firmly grounded in some important mid-level evolutionary psychological theories. Yet evidence to support such a link has been mixed. This paper presents a comprehensive meta-analysis of 33 published and unpublished studies ($N = 5928$) in which we find that that self-reported mate value accounts for roughly 6% of variance in men's sociosexual orientation. The meta-analysis provides evidence that men's self-perceived mate value positively predicts their tendency to engage in short-term mating, but that the total effect size is small.

Keywords Mate value · Sociosexual orientation · Mating strategies · Strategic pluralism theory · Sexual behavior · Meta-analysis

Introduction

Women—like other mammalian females—have substantially higher obligatory parental investment (e.g., gestation, birth, and lactation), relative to men (Trivers, 1972). This differential investment has been a strong selection pressure on mating-related decisions and behaviors (i.e., "mating strategy") during human evolution: because of partner frequency and investment trade-offs, individual males benefit their reproductive success (i.e., the frequency of their genes in future generations) more than individual females from enacting a pluralistic, short-term, lower investment mating strategy (Marlowe, 1999; Trivers, 1972). Although human reproduction involves substantially more long-term pair bonds (i.e., monogamy) and high paternal investment compared to other mammals (Kaplan, Hill, Lancaster, & Hurtado, 2000), many researchers have nevertheless argued that men benefit their total reproductive success by pursuing relatively more short-term mating opportunities than women (Buss & Schmitt, 1993; Ellis & Symons, 1990; Schmitt & 118 Members of the International Sexuality Description Project, 2003; Schmitt & Buss, 2001; Symons, 1979).

Theory and research in human evolutionary biology suggest that mating strategies are highly dependent on cost–benefit trade-offs for short- versus long-term mating (e.g., Arnocky, Woodruff, & Schmitt, 2016; Marlowe, 1999; Schmitt, 2005). Therefore, individuals may vary drastically from one another in the mating strategies that they adopt, even within a particular cultural or environmental context (e.g., Arnocky et al., 2016). Because desirability as a mate—i.e., mate value—reduces the cost of short-term mating, it may be one important individual difference that influences higher adoption of men's short-term over long-term mating (Jackson & Kirkpatrick, 2007). Mate value is defined as the degree to which an individual would promote the

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reproductive success of another individual by mating with them (Sugiyama, 2005) and is a composite of ones standing on the breadth of traits that are desirable to potential partners, such as kindness, physical attractiveness, wealth, and social status (Buss, 1989; Fisher, Cox, Bennett, & Gavric, 2008).

Important mid-level evolutionary theories, including sexual strategies theory (SST; Buss & Schmitt, 1993) and strategic pluralism theory (SPT; Gangestad & Simpson, 2000), highlight the potential role of mate value in men's short-term mating. SST suggests that within the context of short-term mating, women prioritize specific mate-value traits in men, including extravagant displays of resources and a willingness to invest resources immediately, cues to genetic quality such as physical attractiveness (e.g., masculine and symmetrical features), along with cues of protection, such as physical strength, more than they do in longer-term mating (Buss & Schmitt, 1993). Similarly, within the framework of SPT, it has been argued that men of higher genetic quality should be more likely to enact a short-term mating strategy, and women might accommodate this short-term mating to secure good genes for potential offspring (Gangestad & Simpson, 2000).

Despite being firmly situated in two widely accepted evolutionary psychological frameworks, there is only mixed evidence supporting an association between men's mate value and their sociosexual orientation, which refers to the individuals' attitudes, desires, and behavior oriented toward engaging in short-term sexual activity outside of a committed relationship. An individual exhibiting a less restricted sociosexual orientation desires more pluralistic mating, casual sex, and is less likely to require love, commitment, and emotional closeness before engaging in sexual activity with a partner (Penke & Asendorpf, 2008; Simpson & Gangestad, 1991). The goal of this research was to test the link between self-perceived mate value and short-term mating by conducting a meta-analysis on the most comprehensive set of studies testing the above relationship. In accordance with theory, we predicted that men's mate value would correlate positively with a less restricted sociosexual orientation.

Some studies support the idea that men will enact a short-term mating strategy when mate value is high. For example, Lalumière, Chalmers, Quinsey, and Seto (1996) examined a measure of overall mating opportunity, which is often equated to a self-assessment of one's own overall mate value. The measure includes items such as "Members of the opposite sex are attracted to me." Higher mate value men had a stronger preference for casual sex and partner variety. This measure of mate value has also been found to correlate with higher scores on the Sociosexual Orientation Inventory (SOI-R) in a large ($N > 1000$) German-speaking sample (Penke & Asendorpf, 2008) as well as in an American sample ($N = 173$) (Jackson & Kirkpatrick, 2007) and a small ($N = 42$) UK sample (Longman, Surbey, Stock, & Wells, 2018), suggesting that men with higher self-perceived mate value have a more unrestricted sociosexual orientation.

Other measures of self-perceived mate value, including the Components of Mate Value Survey (CMVS; Fisher et al., 2008) and the Mate Value Inventory (MVI; Kirsner, Figueredo, & Jacobs, 2003), have also demonstrated links to men's SOI-R scores (Blake, Bastian, & Denson, 2016). This finding has also been replicated in some non-Western cultures (e.g., Brazil; Nascimento, Hanel, Monteiro, Gouveia, & Little, 2017). In a small sample of 65 Australian males, Wagstaff, Sulikowski, and Burke (2015) found a positive relationship between a short version of the MVI and SOI-R scores. However, it is important to note that this sample size was underpowered to detect even a medium effect ($r = .30$, power = 0.80, yield min. $N = 84$ cases). Gomula, Nowak-Szczepanska, and Danel (2014) found men whose mate value was relatively lower than their partners exhibited a more restricted sociosexual orientation compared to men who were relatively higher in mate value than their partners. Further, men's self-perceived mate value also appears to be related to facets of sexuality that are conceptually related to sociosexuality, such as intended infidelity, among heterosexual men in committed romantic relationships (Starratt, Weekes-Shackelford, & Shackelford, 2017).

Research has also shown that men with a more unrestricted sociosexuality may also be more accurate at assessing their own mate value, as indicated by real-time mate choice during a speed-dating paradigm (Back, Penke, Schmukle, & Asendorpf, 2011). Interestingly, in this study, unrestricted sociosexuality correlated with both men's self-perceived mate value (i.e., how often they expected to be chosen) and with their actual mate value (i.e., how often they were chosen), suggesting that both self-perceptions and women's perceptions of mate value may be important predictors of male sociosexuality.

In addition, indirect metrics of mate value (e.g., self-esteem) also correlate with men's sociosexual orientation in a manner consistent with the above findings. For example, some researchers have hypothesized that the function of self-esteem may be as a metric or gauge of one's own mate-value (Brase & Guy, 2004). Clark (2006) found a correlation between a single-item measure of self-esteem and SOI scores among men, but not women. Cross-cultural research has indicated that self-esteem correlates with a more unrestricted sociosexuality among men, but not women, in most world regions (Schmitt & 118 Members of the International Sexuality Description Project, 2003). Other smaller studies have failed to find links between self-esteem and SOI-R scores (e.g., Longman et al., 2018).

Nevertheless, some studies have failed to find a positive link between men's mate value and their unrestricted sociosexual orientation, and others have even found an opposite pattern of association. Jonason, Garcia, Webster, Li, and

Fisher (2015) found no relationship between the MVI and SOI scores in a combined sample of men and women. Follow-up analyses (P. Jonason, personal communication, November 14, 2018) revealed that this null finding held when examining only men ($r = .02$, $p = .87$, $N = 107$). Another study also comprised of both men and women found no link between mate value and short-term mating orientation but did find a positive link between mate-value and long-term mating orientation (Strouts, Brase, & Dillon, 2017). Subsequent examination of the data (G. Brase, personal communication, September 17, 2018) showed that this effect held when examining the sexes separately, such that men with higher mate value were higher in long-term, rather than short-term, mating orientation, independent of the women in the sample. Similarly, Fisher et al. (2008) found no links between men's short-term mating and either the CMVS total mean score, any of its subscales, or the MVI. Instead, as in Strouts et al. (2017), they found a link between the MVI and long-term mating among men.

Other studies have also failed to identify any links between men's mate value and sociosexual orientation in either direction. Lee, Dubbs, Von Hippel, Brooks, and Zietsch (2014) found a small ($r = .11$, $p = .052$, $N = 339$) correlation between men's self-reported mate value and unrestricted SOI-R scores that did not reach the conventional threshold for statistical significance but did trend in the expected direction (additional data provided by A. Lee). In a sample of 140 undergraduates, Raw (2008) found that self-reported mate-value was unrelated to sociosexual orientation in both men and women. Similarly, in a large sample of 651 Norwegian students, Botnen (2017) found no links between self-report mate value (using the MVI) and sociosexual orientation in either sex. This null finding was also replicated by Znaor (2014). Curiously, however, some of the above-mentioned examples were identified through archived unpublished research (i.e., student theses archived by their home institutions). This raises an important question as to whether there are indeed reliable links between various indices of mate-value and sociosexuality, or whether there is potentially a selection bias pertaining to this finding.

The Present Study

The present study examined the hypothesized positive relationship between men's self-reported mate value and a less restricted sociosexual orientation through a meta-analysis. All self-report measures of mate value were combined in a meta-analysis to examine greater precision for estimation of the relationship between mate value and sociosexual orientation (Cumming, 2014). We also conducted moderation analysis to determine whether common measurement decisions might influence the relationship between mate value and sociosexual orientation, type of mate value measure, SOI subscales, sample type (community vs. students), and location of study (in lab vs. online) were examined as moderators. A secondary goal was to determine whether there may be a selection bias regarding the dissemination of positive versus null or negative relations between these variables (i.e., a file drawer problem). Accordingly, publication status was also examined as a moderator and funnel plots were explored.

Method

Literature Search Protocol

A literature search was conducted between January and September 2019 to identify published and unpublished (e.g., dissertation, master theses, and unpublished data) studies on the relationship between global self-perceived mate value and sociosexual orientation. First, searches on databases (Google Scholar, PsycINFO, PubMed, Scholar Portal Journals, Theses Canada Portal, EthOS, and EBSCO Open Dissertations) were implemented using keywords: mate value, sociosexuality, sociosexual orientation, and short-term mating. Second, a manual search was conducted by examining all papers that have cited any of the commonly used mate value measures, as well as work citing the identified articles, and work the identified articles cited. For articles missing some of the key data needed for analysis, researchers were contacted by email to access information. Third, we sent a call for studies to the Northeastern Evolutionary Psychology Society (NEEPS, July 2, 2019), Human Behavior and Evolution Society (HBES, July 11, 2019), the Society for Personality and Social Psychology (SPSP, June 17, 2019), the International Academy of Sex Research (IASR, July 18, 2019), and on Twitter (June 17, 2019). We included all data received before August 10, 2019.

Inclusion Criteria

We constrained our inclusion criteria to established self-perceived global mate value scales and sociosexual orientation among heterosexual men. We confined the present analyses to men for both theoretical and empirical reasons. Theoretically, women's mate value should account for less variation in short- versus longer-term mating strategies, because the benefits to short-term mating are relatively lower than for men; in other words, additional sexual partners were less likely to increase women's total reproductive output. Because of this theoretical prediction, empirical studies have tended to focus more often on men and have identified links between mate value and sociosexuality more often for men (e.g., Back et al., 2011).

There were several reasons why we chose to focus on global self-perceived mate value. Mainly, a multitude of different factors influence mate value assessments, including

physical attractiveness (self- and other-perceived), physical strength (perceived and objective measures), resources, and personality (e.g., humor). Although there is some conceptual overlap, these variables are not always easily comparable and may not all contribute to mate-value assessments in the same way. As such, comparing individual-specific traits to global scales is not ideal for meta-analyses (i.e., potential "apples to oranges" comparisons). Instead, separate meta-analyses would be needed for each theoretical construct, which was beyond the scope of the present study. Thus, we had no a priori justification to suggest that these are all the same construct and chose to focus on global mate-value assessments. This decision was also informed by the theoretical position that one's own assessment of mate value (i.e., self-report) would potentially be more important to one's sociosexual orientation than more targeted measured or other-rated traits (e.g., other-rated attractiveness), because there are often mismatches with individuals' own assessment of where they stand on these dimensions. For instance, on average, men's evaluation of their own attractiveness often does not correlate with women's ratings of their attractiveness (Rand & Hall, 1983).

However, many large-scale community samples did not often include mate value scales and instead used short self-perceived attractiveness items. Therefore, if researchers responded to our call with self-perceived attractiveness variables that were beyond the scope of our inclusion criteria, we included this data in a secondary exploratory analysis which can be found in Supplementary Material A. Similarly, we conducted exploratory analyses for women when researchers responded with relevant data, although the focus of this paper is on men (see Supplementary Material B). Note that we did not conduct literature searches for these analyses; only data from researchers who responded to our calls were included and are thus exploratory.

Included Mate-Value Scales

The different measures used to assess mate value were the CMVS (Fisher et al., 2008), the MVI (17 items; Kirsner et al., 2003), Self-Perceived Mating Success Scale (SPMSS; 8 items; Landolt, Lalumière & Quinsey, 1995), and the Mate Value Scale (MVS; 4 items; Edlund & Sagarin, 2014). The criteria for sociosexual orientation were any studies examining the original Sociosexual Orientation Inventory (SOI; Simpson & Gangestad, 1991), the revised Sociosexual Orientation Inventory (SOI-R; Penke & Asendorpf, 2008) or the Short-term Mating Orientation Scale (STMOS; Jackson & Kirkpatrick, 2007). A list of study characteristics can be seen in Table 1.

Statistical Analysis

To assess the relationship between global self-perceived mate value and sociosexual orientation, we conducted multi-level random-effects meta-analyses, controlling for random intercepts within lab-groups and within-paper, based on standardized correlation coefficients (i.e., Fisher's *r*-to-*z* transformed correlation coefficient).[1] Analyses were conducted using the *metafor* package (Viechtbauer, 2010) in R 3.6.3 (R Development Core Team, 2019). To test the effects of the moderator variables, we also computed multi-level random-effects meta-regression models, again controlling for random-intercepts within lab-group and within-study.

The funnel plot was not asymmetrical, suggesting that selection bias or small study bias is not a problem in this analysis, $z = 1.54$, $p = .123$ (see Fig. 1); therefore, we did not apply bias corrections.

Results

Our final sample consisted of 33 studies from 25 lab-groups with 5928 participants (see Table 1). All our data and analysis code are available at https://osf.io/ypkbf/.

Overall Analysis

Men who reported greater self-perceived global mate value also pursued more unrestricted sociosexual orientations, $z_r = 0.24$, $SE = 0.03$, 95% CI [0.18, 0.30], $t = 8.00$, $p < .001$. The total amount of heterogeneity not attributable to sampling error was ${I_{\text{total}}}^2 = 74.38$, the amount of within-cluster heterogeneity (i.e., heterogeneity within lab-groups) was ${I_{\text{Level2}}}^2 = 74.38$, and the amount between-cluster heterogeneity was ${I_{\text{Level3}}}^2 = 0$. These heterogeneity results suggest that moderator variables are influencing the magnitude of the effect. A forest plot of this analysis is presented in Fig. 2.

Model fit analyses indicated that including the lab-group clustering variable improved model fit ($p < .001$) but including a clustering variable based on paper (i.e., for multiple effect sizes within a paper) did not ($p = 1.00$).

Moderator Analyses

We conducted the following exploratory moderator analyses: mate-value scale (CMVS, SPMSS, MVI, and MVS), SOI-R subscales (attitude, behavior, and desire), publication status

[1] The analysis using SOI subscales controlled for random intercepts within lab-groups and within-study (not within paper), because multiple effect sizes were included from the same studies (and there were no duplicate papers).

Table 1 Characteristics of studies

Study	Country	*N*	Sample	Published	Location	Mate value	Sociosexuality
Albert (2019)	US	301	MTurk	No	Online	CMVS	SOI-R
Arnocky et al. (2014a, b)	CA	105	Students	No	In lab	CMVS	SOI-R
Arnocky and Kelly (2018)	CA	330	Students	No	In lab	MVI	SOI-R
Arnocky (2017)	CA	139	Students	No	In lab	CMVS	SOI-R
Arnocky (2018)	CA	162	Students	Yes	In lab	MVS	SOI-R
Back et al. (2011)	DE	189	Community sample	Yes	In lab	SPMSS	SOI-R
Blake et al. 1 (2016; Study 2)	AU	215	Community sample	Yes	Online	CMVS + MVI	SOI-R
Blake et al. 2 (2016; Study 3)	AU	177	Community sample	Yes	Online	CMVS + MVI	SOI-R
Blake et al. 3 (2016; Study 4)	AU	185	Community sample	Yes	Online	CMVS	SOI-R
Botnen (2017)	NO	290	Students	No	In lab	MVI	SOI-R
Brandner (2019)	US	34	Students	No	Online	MVS	STMOS
Brandner (2019, Study 1)	US	14	Students	No	Online	CMVS	STMOS
Brandner (2019, Study 2)	US	26	Students	No	Online	CMVS	STMOS
Clark (2006)	CA	87	Students	Yes	In lab	SPMSS	SOI
Jackson and Kirkpatrick (2007)	US	94	Students	Yes	In lab	SPMSS	SOI
Jonason et al. (2015)	US	115	Students	Yes	Online	MVI	SOI
Kolze et al. (2019)	US	34	Students	No	In lab	CMVS	STMOS
Kolze et al. (2019)	US	56	Students	No	In lab	CMVS	STMOS
Lee et al. (2014)	AU	339	Community sample	Yes	Online	CMVS + items	SOI-R
Longman et al. (2018)	UK	38	Student rowers	Yes	Off-campus	SPMSS	SOI-R
Mak (2019)	CN	45	Students and community	No	Online	MVS	SOI
Moon (2019)	US	274	MTurk	No	Online	SPMSS	STMOS
Moon et al. (2018, Study 1)	US	176	MTurk	Yes	Online	SPMSS	SOI-R
Penke and Asendorpf (2008)	DE	1,026	Community sample	Yes	Online	SPMSS	SOI-R
Perrilloux and Buss (2010)	US	64	Students	No	In lab	SPMVS*	SOI-R
Prokosch (2019)	US	51	Students	No	In lab	SPMSS	SOI-R
Rotella (2020)	CA	446	Students	No	Online	SPMSS	SOI-R
Rotella and Barclay (2019)	CA	372	Students	No	Online	SPMSS	SOI-R
Seda and Edlund (2019)	US	54	Students and community	No	Online	MVS	SOI
Strouts et al. (2017)	US	86	Students	Yes	Online	MVI	STMOS
Wagstaff et al. (2015)	AU	65	Students	Yes	In lab	MVI	SOI-R
Williams (2019)	US	179	MTurk	No	Online	SPMSS	SOI-R
Yilmaz et al. (2016)	TU	160	Students	Yes	In lab	SPMSS	SOI-R

CMVS = Components of Mate Value Scale (Fisher et al, 2008), SPMSS = Self-Perceived Mating Success (Landolt et al., 1995), MVI = Mate Value Inventory (Kirsner et al., 2003), Mate Value Scale (Edlund & Sagarin, 2014), SPMVS* = an unidentified Self-Perceived Mate Value Scale used by Perriloux & Buss (2010), SOI = Sociosexuality Orientation Inventory (Simpson & Gangestad, 1991), SOI-R = Sociosexual Orientation Inventory-Revised (Penke & Asendorpf, 2008), STMOS (Jackson & Kirkpatrick, 2007)

(published vs. unpublished data), sample (community vs. students), and location of study (in lab vs. online).

To determine whether the mate value subscales influenced the size of the relationship with the total SOI scale, we conducted a moderator analysis. Scale moderated the relationship between MV and SOI, $F(3, 25) = 8.66$, $p < .001$. There was a larger correlation between SOI and the CMVS (Fisher et al., 2008; $z_r = 0.38$, 95% CI [0.25, 0.51]) than with the MVI (Kirsner et al., 2003; $z_r = 0.14$, 95% CI [0.03, 0.26], $t_{diff} = 3.38$, $p = .002$), and the MVS (Edlund & Sagarin, 2014; $z_r = 0.03$, 95% CI [−0.10, 0.16], $t_{diff} = 4.98$, $p < .001$). There were no differences between the CMVS and the SPMSS (Landolt et al., 1995; $z_r = 0.29$, 95% CI [0.21, 0.38], $t_{diff} = 1.18$, $p = .249$). The SPMSS was also larger than the MVS ($t = 3.24$, $p = .002$) and the MVI ($t_{diff} = 2.21$, $p = .036$). There were no differences between the MVS and MVI, $t_{diff} = 1.65$, $p = .111$; see Table 2.

The revised SOI has three facets: behavior, attitude, and desire. To determine whether the relationship between MV and SOI in men was consistent across these three facets, we conducted a moderator analysis for the studies which used the SOI-R. Facet type moderated the relationship between MV and SOI, $F(2, 34) = 51.16$, $p < .001$. There was a larger correlation between MV and the SOI-R behavior facet

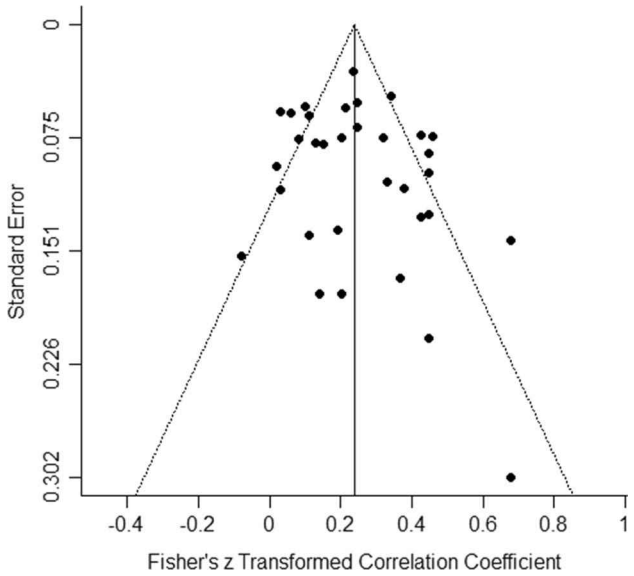

Fig. 1 Funnel plot of effect sizes (z_r) and their standard error for each study. Each dot represents one study. The funnel plot did not show asymmetry, which is confirmed by a regression test for asymmetry ($z = 1.54$, $p = .123$). This suggests that publication is not a problem

($z_r = 0.29$, 95% CI [0.23, 0.36], $t_{diff} = 8.95$, $p < .001$) than for the SOI-R attitude facet ($z_r = 0.18$, 95% CI [0.11, 0.24], $t_{diff} = 6.47$, $p < .001$) and the SOI-R desire facet ($z_r = 0.11$, 95% CI [0.04, 0.18], $t_{diff} = 9.97$, $p < .001$). There was a larger effect for the attitude facet than the desire facet, $t_{diff} = 3.54$, $p = .001$. The effect size confidence intervals did not include zero (see Table 2).

Location moderated the effect size between MV and SOI, $F(1, 30) = 5.33$, $p = .028$. There was a stronger relationship between self-perceived mate value and SOI when participants were assessed in lab, $k = 14$, $z_r = 0.31$, 95% CI [0.22, 0.40], compared to online, $k = 18$, $z_r = 0.17$, 95% CI [0.10, 0.25]. Sample type, which compared student and community (i.e., non-student, including Amazon Mechanical Turk) samples, did not moderate the effect size between MV and SOI, $F(1, 29) = 1.47$, $p = .236$. Similarly, publication status did not moderate the relationship, $F(1, 31) = 0.27$, $p = .607$. Sample estimates are presented in Table 2.

Discussion

Due to their lower minimal obligatory parental investment (Trivers, 1972), men can derive greater reproductive benefit than women from seeking out and competing for varied mating opportunities. Indeed, men, relative to women, exhibit a less restricted sociosexual orientation on average, prefer a larger number of lifetime sex partners, are faster to consent to sexual activity, desire more short-term sexual relationships, and more frequently fantasize about having sex with a larger variety of partners (Buss & Schmitt, 1993; Ellis & Symons, 1990; Schmitt & 118 Members of the International Sexuality Description Project, 2003; Schmitt & Buss, 2001; Symons, 1979). However, not all men are able to enact their optimal sex typical mating strategy (Schmitt & Buss, 1993), making the study of the relationships between individual differences and reproductive strategies essential for increasing our understanding of the factors that govern human mating.

Previous research found mixed findings regarding the relationship between men's mate value and short-term mating. The purpose of the current investigation was to assess whether men's mate value, determined through self-reported mate value, was a significant predictor of their orientation toward short-term mating. The meta-analysis, which included 33 studies identified through a comprehensive literature search and a call for studies, confirmed a relationship between men's self-perceived mate value and unrestricted sociosexual orientation. The predictions of the meta-analysis were supported; from these 33 studies, the majority identified a significant positive relationship between male's mate value and sociosexual orientation, where males with higher self-reported mate value reported a short-term mating strategy. Only two studies identified negative relationships.

Overall, the findings demonstrate that men's mate-value is an important predictor of the type of mating strategy they adopt, where high mate-value men are more likely to adhere to a short-term pluralistic mating strategy, as demonstrated by their higher SOI-R scores. However, the effect size of the correlation was moderate ($r = .24$), indicating that although mate value accounts for some variance in mating strategy (about 6%), many other factors influence sociosexuality. For example, previous research has shown that in a higher operational sex ratio environment (more reproductively available men than women), sociosexuality was lower, indicating a more long-term mating strategy was more favorable (Schmitt, 2005). Furthermore, men may become less restricted in their sociosexual orientation when they perceive mates to be readily available to them (Arnocky et al., 2016; Marlowe, 1999).

It is also important to note that mate value correlated much more strongly with unrestricted sociosexual behavior relative to the attitude or desire facets. It is well established that men are broadly less restricted in their sociosexual orientations relative to women (see Arnocky et al., 2016 for review). Perhaps, then, irrespective of mate value, men are generally high in their less restricted attitude and desire, but that only those men who are high mate value are best able to translate these attitudes and desires into behavior (i.e., more pluralistic sexual interactions with women). In general, individuals' scores on the SOI-R tend to be lowest for the behavior subscale (e.g., Penke & Asendorpf, 2008), suggesting that there may be barriers in the mating environment, such as mate value and access to desired mates, that might regulate

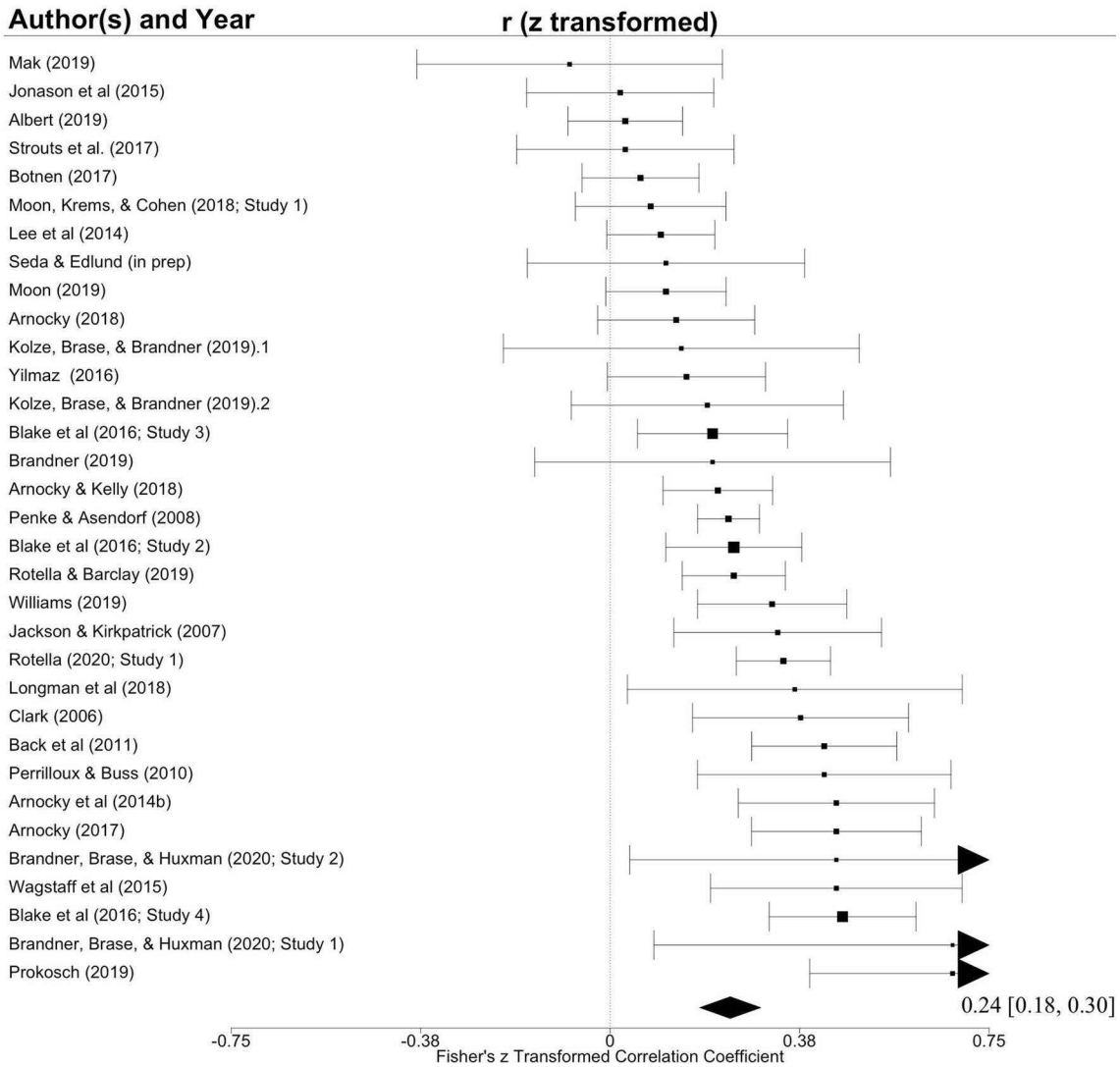

Fig. 2 Forest plot of the uncorrected effect size estimates included in this analysis. The square represents the effect size for the study, where the size of the square represents the amount of weight used in the meta-analysis. The branches represent the confidence interval of the effect size. At the bottom of each forest plot, a polygon indicates the estimated weighted mean effect size of the model. The size of the polygon represents the overall confidence interval. Examining the forest plot indicates only one study found negative relationships

behavioral expression of sociosexual attitudes and desires. Future research might consider asking men the extent to which they wish they could have more varied sexual partners and experiences than they are able to attract, and whether mate value maps on to this discrepancy.

In terms of moderator analyses, neither sample type (community versus student samples) nor publication status (published versus unpublished data) moderated the relationship between mate value and sociosexuality in men. However, facet type of the SOI (behavior, attitude, and desire) did moderate the relationship between mate value and sociosexuality. The moderation effect of facet type may demonstrate that women's choice in mates matters for the behavior facet of sociosexuality (i.e., high mate value men are more capable of enacting this strategy because of female choice), where a man's mate value should impact a woman's choice in partners for actual acts of short-term mating. Conceivably, female choice bears less heavily on men's attitudes and desires, which may or may not result in overt behavior depending in part upon female choice.

In addition, there was a moderation effect of the location of sampling (laboratory or online), which may be impacting the mate value and sociosexuality link through two avenues. First, in-lab research is better controlled and eliminates extraneous noise in data by standardizing the environment. Second, the laboratory setting may be capturing a younger undergraduate sample, while the online sampling could be capturing older community members, who are more likely

Table 2 Uncorrected random-effects models (both overall and moderator analyses)

B	z_r [95% CI]	Test statistics	p	I_{Level1}^2	I_{Level2}^2	I_{Level3}^2	k	n
Overall model	**.24 [.18, .309]**	***t = 8.00***	**< .001**	**25.62**	**73.48**	**0**	**33**	**5928**
MV Scale***		*F(3, 25) = 9.57*	*< .001*	*37.52*	*4.48*	*57.99*	*29*	*5133*
CMVS	.38 [.25, .52]	$t = 5.97$	< .001				7	559
MVI	.14 [.03, .26]	$t = 2.64$	.014				5	886
MVS	.03 [-.10, .16]	$t = 0.54$	.596				5	596
SPMSS	.29 [.21, .38]	$t = 7.23$	< .001				12	3092
SOI Facets***†		*F(2, 34) = 51.16*	*< .001*	*25.22*	*30.21*	*44.57*	*36*	*17,123*
Attitude	.18 [.11, .24]	$t = 5.55$	< .001				12	5121
Behavior	.30 [.23, .36]	$t = 9.18$	< .001				12	6002
Desire	.11 [.05, .18]	$t = 3.50$	.001				12	6007
Publication status		*F(1, 31) = 0.27*	*.607*	*24.60*	*75.40*	*0*	*33*	*5928*
Published	.22 [.13, .31]	$t = 5.05$	< .001					3114
Unpublished	.25 [.17, .34]	$t = 6.10$	< .001					2814
Sample type		*F(1, 29) = 1.47*	*.236*	*25.04*	*74.96*	*0*	*31*	*5829*
Community	.20 [.10, .30]	$t = 3.95$	< .001				10	3061
Students	.27 [.20, .35]	$t = 7.27$	< .001				21	2768
Location*		*F(1, 30) = 5.33*	*.028*	*27.50*	*72.50*	*0*	*32*	*5890*
In lab	.31 [.22, .40]	$t = 7.17$	< .001				14	1826
Online	.17 [.10, .25]	$t = 4.54$	< .001				18	4064

For each moderator category, a z-test is presented which assesses if the effect size is different from zero. Bolded effect sizes indicate that the confidence intervals did not include zero. Italic rows contain the results of the moderator analyses; all others are group or subgroup analyses. Analyses use the total scale values, unless otherwise specified

*Significance at $p < .05$, ** at $p < .01$, and *** at $p < .001$; I_{Level1}^2 is the proportion of sampling error variance, I_{Level2}^2 is the within-cluster heterogeneity, and I_{Level3}^2 represents the between-cluster heterogeneity (0 indicates that there was only one effect size per study included in the analysis)

†This analysis did not include the total scales, rather it includes the specified subscales of the SOI-R only; additionally, random intercepts were controlled for within lab-groups and within-study (not within paper), because multiple effect sizes were included from the same studies

to be married and have different mating strategies (Meskó, Láng, & Kocsor, 2014). However, the second explanation was not supported by our data; sampling types (student versus community samples) did not moderate the correlation. The link between mate value and sociosexuality could, therefore, be confounded by other factors. Alternatively, given that the location moderator was not replicated in women (see Supplementary B), it is possible that this is a spurious effect.

Limitations

Although the present study represents the first comprehensive meta-analytic review of the relationship between men's mate-value and SOI, there are several limitations worth noting. First, the current meta-analysis relied solely on self-reported measures of mate value and sociosexuality. This was important to deciphering whether self-perception can drive mating attitudes and behavior. Yet, as a result, error can be introduced during the retrieval processes involved with respondents' memory and with self-presentation bias. For example, high scores on both perceived mate value and unrestricted sociosexuality could merely reflect narcissism or self-aggrandizement. Future studies could extend the examination of men's mate value and sociosexual orientation beyond the context of self-reported variables by including more objective, or at least externally assessed, measures of mate value. This work would likely rely less on global mate value assessment and more on assessing specific mate value components, such as social status and physical attractiveness. However, because many more specific mate-value traits could break down further into constituent components, their comprehensive assessment via meta-analysis would be problematic. For instance, physical attractiveness is comprised, in part, of factors like facial asymmetry (Scheib, Gangestad, & Thornhill, 1999; Thornhill & Gangestad, 2006), facial structural masculinity (Carré, McCormick, & Mondloch, 2009; Valentine, Li, Penke, & Perrett, 2014), height, weight, muscle mass, clear skin, and hair quality (see Arnocky, Bird, & Perilloux, 2014a for review). This is further complicated by the fact that many male mate value traits (both physiological and behavioral) have been linked to the androgen testosterone, which has been implicated in men's sociosexual

orientation, sex drive, and other related sexual behaviors (see Arnocky et al., 2018).

Second, the current investigation relied largely on young WEIRD (Western, educated, industrialized, rich and democratic) samples (Henrich, Heine, & Norenzayan, 2010). The mating strategies of undergraduate men may not reflect the mating strategies of men at large, irrespective of these men's perceptions of their mate value. Undergraduate students are younger than the average adult and therefore have had fewer romantic partners than adults from the broader population (Harris, 2000; Sabini & Green, 2004). Third, because many undergraduates are still in the process of finding and securing a long-term partner, they may be less committed to their current partner and thus are more likely to exhibit a less restricted sociosexual orientation than older adults who are more invested in their relationships (Sabini & Green, 2004).

Fourth, even with the extensive literature search and the calls for studies, there could be other studies which have either null findings or negative relationships that were not identified. The exclusion of such findings would likely over-emphasize the strength of the true effect to a degree, although it is unlikely that their inclusion would have rendered the small yet reliable relation between men's self-perceived mate value and unrestricted sociosexual orientation nonsignificant. With a sample of 5928 participants from 33 studies, the inclusion of new studies would improbably change the identified effect. Still, future efforts should attempt to obtain more unpublished data for inclusion in updating this meta-analysis in the future.

Fifth, future studies should expand research on factors affecting variation in sociosexuality among women, nonbinary, and non-heterosexual pairings. Because the inclusion criteria in this study were informed by an evolutionary history of sexual reproduction (approximately 1.2 billion years; Butterfield, 2000), we focused on heterosexual men; however, evolutionary theory may nevertheless provide useful explanatory frameworks for understanding sexual behavior across the wide breadth of varied human experience (e.g., Kenrick, Keefe, Bryan, Barr, & Brown, 1995).

Finally, it is important to note that the data analyzed herein were drawn from correlational studies. Although important mid-level evolutionary theories postulate that high mate value may compel or provide more opportunity for short-term mating, it is also possible that short-term mating success would lead to an increase in men's self-perceived mate value. Indeed, the finding that the correlation between mate value and sociosexual behavior was stronger than for either sociosexual attitude or desire might circumstantially support this hypothesis. Two future lines of enquiry could address this issue. First, comprehensive review of more objective mate value indices, such as social status or female-rated attractiveness, could be examined in relation to men's sociosexual attitudes. Second, experimental priming of high versus low mate value (Bird, Carré, Knack, & Arnocky, 2016) could be implemented to explore whether exposure to such conditions lead to changes in sociosexual attitude and desire, to better address the causal role of mate value on men's sexual strategies.

Conclusions

The current investigation assessed the relationship between mate value and sociosexual orientation of men through meta-analytic analysis. Overall, our findings suggest that mate value is an important predictor of men's tendency to adopt a short-term mating strategy. Across studies, the overarching effect found was men who perceived themselves to have relatively higher mate value demonstrated greater adherence to a short-term pluralistic mating strategy. Our findings provide compelling support for SST and SPT in that they emphasize the context specificity of human mating behavior. Because men have greater reproductive variance, they can benefit more from short-term pluralistic mating than can women. Therefore, men may allocate more energy toward short-term mating overall. However, not all men will benefit from enacting a short-term strategy. They are limited by the number of women who consider them to be desirable mates. Men's mate value is one contextual factor that influences their adherence to a short-term pluralistic mating strategy. Men who are most likely to enact their optimal sex typical mating strategy are those who perceive themselves to be of high mate value and are perceived by women as also being of high mate value (Buss & Schmitt, 1993).

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Declarations

Conflict of interest The authors declare no conflicts of interest.

Ethical Approval/Informed Consent Following articles 2.2 to 2.4 of the Canadian Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans, ethics approval is not required for reanalysis of publicly available data or secondary use of data (article 5.5) which is provided without any identifier or group of identifiers which would allow attribution of private information to an individual.

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