



Theory-Driven Assessment of Intrasexual Rivalry

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Published online: 4 January 2019
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Abstract

Assessment of intrasexual competition has largely relied on Intrasexual Competition Scale (ICS; Buunk & Fisher *Journal of Evolutionary Psychology*, 7:37–48, 2009). Based on recent developments in mating psychology and the notion that humans use multiple tactics to compete with same-sex individuals, we propose a new theory-driven assessment strategy for intrasexual rivalry in men and women. Here, we develop and initially validate the 16-item Intrasexual Rivalry Scale (IRS). Eight items represented self-promoting tactics in four mating areas and eight items represented rival-derogatory tactics in the same mating areas. We pre-registered our study design and statistical strategy and recruited a community sample in a non-Western culture, Iran. Consistent with our theoretical expectation, exploratory factor analysis ($N = 211$) clearly suggested extraction of two distinct factors (self-promotion and rival-derogation). Results suggested that scores on the ICS are strongly correlated with rival-derogation, but only weakly associated with self-promotion. Findings are explained in the light of evolutionary psychological perspective and future directions with the newly developed scale are outlined.

Keywords Intrasexual competition · Evolutionary psychology · Scale development · Factor analysis · Sex differences

Theory-Driven Assessment of Intrasexual Rivalry

Sexual selection is the process observed by Darwin to account for sex-differentiated traits that arise as a consequence of reproductive competition among members of one sex (see Clutton-Brock 2004). Same-sex individuals may compete, sometimes even lethally, to exclude rivals from mating, leading to intrasexual selection of traits which help them maximize their benefits from competitions. They can compete to attract or charm individuals of the opposite sex leading to intersexual selection of traits that increase the likelihood of being selected (a mechanism commonly known as mate choice; Darwin

1871). Since such resources and characteristics are possessed by opposite-sex individuals in varying degrees, competition to attract those desirable individuals, as potential mates, can be adaptive. Intrasexual competition is expected to be particularly fierce when possession of these resources varies greatly among members of the opposite sex, because reproductive differences often correlate with resource differences (e.g., Turke and Betzig 1985).

Human intrasexual competition is tightly knit within broader human mating psychology. According to Buss (1988), there are four related but distinguishable components of human intrasexual competition: (a) skill at locating potential mates (e.g., finding effective mate pools); (b) producing effective mate-attracting behaviors (e.g., signaling interest); (c) acquiring adaptive resources that are highly desired by the opposite sex (e.g., attractiveness or power); and (d) altering morphology or appearance (e.g., dieting) (see Thornhill and Alcock 1983). In the past few decades, psychologists have begun to examine how intrasexual competition was shaped in our evolutionary psychological history and how competitive behaviors dynamically shape our decision-making processes in different social contexts (Buss 1988).

Vaillancourt and Sharma (2011) examined derogatory behaviors of women who were randomly exposed to either a more sexualized female confederate (i.e., wearing

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provocatively), or a less sexualized one. The findings of this study showed that, almost all women behave more derogatorily toward an attractive confederate. Men, on the other hand, have been shown to compete more violently than women in the domains of status, resources, and dominance. In fact, intrasexual aggression in men can be understood within the context of achieving mating opportunity. Griskevicius et al. (2009) indicated that, status and mating motives lead to face-to-face confrontation in men. Intrasexual aggression relates to various characteristics associated with male sexual jealousy (Arnocky and Carré *in press*). Thus, men's aggression is increased by mating motives within the observation of same-sex peers (Daly and Wilson 1988). Higher intrasexual rivalry among men is argued within the context of epigamic displays (behaviors which tend to attract the opposite sex) and aggression in the realm of modern human physiology and mating psychology. In this regard, mating systems play a crucial role specifically when there is more women in the society than men (Arnocky and Carré *in press*).

The sex differences in the frequency and ferocity of intrasexual rivalry can be understood in light of disparate obligatory parental investment between the sexes (Trivers 1972). Women produce a limited number of energy-rich eggs, whereas men produce many energetically cheaper sperm. Therefore, females are shown to be reproductively limited by the number of eggs and hence the number of offspring they can produce over their reproductive phases of life. Because females bear the heavier parental investment, they have the most to lose from making poor mating decisions and are therefore selective in their mate choice (Trivers 1972). In contrast, male reproductive potential is limited only by the number of fertilizable females they can possibly access. Yet because, on the whole, the number of offspring sired by males and females in the population is the same, successful males who reproduce with multiple females impose a significant cost upon other males in the society (e.g., through cuckoldry; see Shackelford et al. 2006), many of whom will thus be less successful or will be shut-out from the reproductive pool altogether. Thus, males more than females, have evolved phenotypes oriented toward competing for mating opportunities. This is consistent with the well-established finding that women are more “choosy” in their mate selection. In other words, men may compete more coarsely and in more areas to meet high standards of the opposite sex. Women have an inevitable role in providing required care through early life stage of offspring (Campbell 2013). Thus, presence of the mother seems more vital to a vulnerable child rather than the father (Sear et al. 2000).

Women engage less frequently in risky forms of physical aggression, such as warfare and extreme violence compared to men (e.g., Daly and Wilson 1988; Fisher 2015; Reynolds et al. 2018; Vaillancourt 2013). Ultimately, women willingness to avoid destructive forms of competition and direct aggression

has altered their intrasexual rivalry system from an evolutionary standpoint (see Arnocky and Vaillancourt 2014; Campbell 2013; Reynolds et al. 2018). In support of this, Eagly and Steffen (1986) conducted a meta-analytic review of sex differences in aggression and the results showed that risk assessment of women, influences their aggressive behaviors. Taking into account the effects of sex differences, Buss and Schmitt (1993) articulated hypotheses in the form of sexual strategies theory. These authors found considerable support for their theory and suggested two effective tactics of mate attraction which increase romantic attractiveness and thus increase one's chances at successfully engaging in a desired sexual relationship (Buss and Dedden 1990). The first approach is related to the characteristics which are preferred by the opposite sex. These characteristics which have been established via evolved psychological mechanisms are used by men and women to manipulate their own characteristics and promote them deliberately (self-promotion strategy). The second approach is to depreciate the perceived mate value of same-sex competitors. Moreover, humans show various types of intrasexual rivalry embodying direct combative tactics and no combative tactics. Through direct combative, men tend to physically threaten, dominate, injure, or kill a rival. However, in no combative tactics both men and women try to improve their positive qualities compared to same-sex peers by using verbal derogation of competitors and social manipulation. Nevertheless, the temporal context in which competitor derogation and self-promotion are used, would predict the effectiveness of these tactics (Buss and Dedden 1990).

Generally, intersexual and intrasexual selection are directly associated with the notion that mate selection preferences exerted by one sex should affect the resources over which intrasexual rivalry takes place in the other sex (for a review see Buss and Schmitt *in press*). Female choice's conditions dictate males to intrasexually compete most strongly to display the above-mentioned characteristics and to possess those resources that females prioritize in their mate selection (Buss 1988; Chaudhary et al. 2018). In the context of intrasexual competition, tactics used to attract and retain mates should be strongly influenced by the mate preferences expressed by members of the opposite sex (Buss 1988), and come in two forms of rival-derogation and self-promotion. These rivalry strategies can act to increase a woman's own access to her preferred mate (e.g., through self-promotion) or decrease a rival's access to desirable mating opportunities (e.g., through rival derogation).

Psychometric measurement of intrasexual competition plays an important role in subsequent empirical findings and refining the theoretical grounding of human intrasexually competitive behavior. Researchers have heavily relied on a widely cited self-report measure to capture one's intrasexual competition, i.e., Intrasexual Competition Scale (ICS; Buunk and Fisher 2009). This

12-item measure has stimulated a number of important and fruitful studies, however, has limitations with regard to theoretical grounding and rigorous psychometric validation. Specifically, there are at least three lingering problems with this scale. First, the items were not systematically developed. This can bias the total score of participants toward specific (but not necessarily universal or frequent) intrasexually competitive behaviors, while lacking items on some behaviors. Second, although the measure was developed in a cross-cultural study in the Netherlands and Canada, it has not been adequately subjected to rigorous psychometric validation in non-Western cultures. Excluding non-Western cultures in mating psychological studies can largely influence further advancement of the literature on human mating systems (e.g., Atari et al. 2017a; Pazhoohi et al. 2016). Third, it does not take into account recent theoretical developments in mating psychology. For example, recent factor-analytic evidence regarding the dimensions of mate preferences (e.g., Atari and Jamali 2016; Csajbók and Berkics 2017) can shed light on multidimensional assessment of intrasexual competition. It can be of incremental value for the literature to incorporate recent evidence to the ongoing line of research on human intrasexual competition.

Taking Buss (1988) bi-tactic framework in intrasexual competition (i.e., self-promotion and rival-derogation) and Atari's (2017) five-factor model of mate preferences (i.e., Kindness/dependability, Attractiveness/sexuality, Status/resources, Education/intelligence, Religiosity/chastity [KASER]); we develop and initially validate Intrasexual Rivalry¹ Scale (IRS) in Iran. The five-factor model of mate preferences (Atari 2017; Atari and Jamali 2016) provides an important basis for assessment of long-term mate preferences by categorizing mate preferences into five parsimonious factors: Kindness/dependability, Attractiveness/sexuality, Status/resources, Education/intelligence, and Religiosity/chastity. This model suggests that men and women are significantly different in their preferences for the first four factors (also see Conroy-Beam and Buss 2016). Therefore, two well-established tactics of intrasexual rivalry can be applied in four sex-differentiated mating areas, producing 8 possible aspects of behaviors in intrasexual rivalry. Such theory-driven top-down development of the IRS provides a systematic approach in reliable and valid assessment of intrasexual rivalry.

¹ Rivalry and competition have been used in the literature interchangeably, but we chose to use "rivalry" specifically for two reasons. First, it can differentiate our measurement strategy from the widely used scale by Buunk and Fisher (2009). Second, the definitions of rivalry and rival (i.e., "the word *rival* most commonly refers to a person or group that *tries to defeat or be more successful than another person or group*"; <https://www.merriam-webster.com/dictionary/rivalry>) are conceptually closer to our theoretical perspective indicating that there are both promotive and derogatory tactics among same-sex individuals.

Methods

Participants

Our sample comprised 211 individuals (110 men, 101 women). Participants were recruited from public places in Tehran, Iran. The mean age of the participants was 31.4 years (min = 18, max = 65, $SD = 9.14$). All participants identified as heterosexual. In terms of marital status, 130 participants (61.6%) reported being married. All participants identified as Iranian and spoke Persian. Participation was voluntary, anonymous, and not compensated.

Measures

Intrasexual Rivalry Scale Based on the theoretically provided tactics and areas of intrasexual competition (2 tactics \times 4 areas = 8 aspects; delineated in Introduction), we wrote two items to assess each intrasexually competitive aspect resulting in 16 items. We began with a pool of items designed to circumscribe the classic conceptions of intrasexual competition. All items' wordings were developed by high consensus between the authors and the developer of the KASER model (see Table 1).

Intrasexual Competition Scale (ICS) All participants completed the Intrasexual Competition Scale (ICS; Buunk and Fisher 2009) which was originally designed to assess the degree to which an individual is motivated to compete with members of the same sex. Previous research has also used the ICS for measuring attitude toward intrasexual competition. This scale consists of 12 items rated on a seven-point Likert-type scale ranging from 1 (Not at all applicable) to 7 (Completely applicable). An example item include is "I can't stand it when I meet another woman who is more attractive than I am." Since the ICS had not been used in Iran, we provided a translation of the scale using the standard back-translation technique. Particularly, the ICS was first translated from English into Persian using the parallel back-translation technique (Brislin 1986). A bilingual psychologist translated the scale from English to Persian, while a second individual translated this back into English. Next, the Persian scale was assessed by a committee consisting of the individuals who participated in the translation process and two other psychologists who settled minor discrepancies in the translation. All members of the committee approved the final translation. In the current study, the ICS showed good internal consistency (Cronbach's $\alpha = .91$).

Procedure

The ethics approval was obtained from the relevant university. Potential participants were approached in public places and

Table 1 Intrasexual Rivalry Scale's items

Item	Tactic	Area	Range	Mean	SD
1. I'd like to be kinder and more dependable than other (wo)men.	SP	K	1–4	3.19	0.88
2. I cannot stand very kind and compassionate wo(men).	RD	K	1–4	1.80	0.97
3. I do my best to become a more forgiving and kind (wo)man.	SP	K	1–4	3.19	0.84
4. I look for negative points in kind and nice (wo)men.	RD	K	1–4	1.63	0.89
5. I'd like to be more attractive than other (wo)men.	SP	A	1–4	2.88	1.01
6. I cannot stand very attractive (wo)men.	RD	A	1–4	1.61	0.87
7. I do my best to become a sexier and more attractive (wo)man.	SP	A	1–4	3.05	0.91
8. I look for negative points in attractive (wo)men.	RD	A	1–4	1.61	0.84
9. I'd like to be more successful than other (wo)men.	SP	S	1–4	2.80	1.09
10. I cannot stand very successful and wealthy (wo)men.	RD	S	1–4	1.57	0.83
11. I do my best to become a more successful (wo)man.	SP	S	1–4	3.09	0.93
12. I look for negative points in successful (wo)men.	RD	S	1–4	1.54	0.81
13. I'd like to be smarter than other (wo)men.	SP	E	1–4	3.04	0.92
14. I cannot stand very intelligent and witty (wo)men.	RD	E	1–4	1.53	0.86
15. I do my best to become a more educated and smart (wo)man.	SP	E	1–4	2.95	1.05
16. I look for negative points in smart and witty (wo)men.	RD	E	1–4	1.45	0.79

SP self-promotion, *RD* rival-derogation, *K* kindness/dependability, *A* attractiveness/sexuality, *S* status/resources, *E* education/intelligence. Please note that these wordings are translated versions of the Persian items used in the study

invited to participate in a psychological study. Upon agreement to take part, participants were given the paper-and-pencil version of a survey including these measures along with other measures that are reported elsewhere. Participants individually and anonymously completed the questionnaires. The measures were counterbalanced. Participation was on a voluntary basis and participants were not compensated. This study was pre-registered as an exploratory study on the Open Science Framework (OSF; https://osf.io/9ywqx/?view_only=4b0f50f3b29e429d95109f20e4a290d6).

Statistical Analysis

Since we did not have a priori predictions about the structural validity of the IRS, the factor structure of the newly developed IRS was examined using a principal-axis exploratory factor analysis (EFA) with promax rotation in R programming language (R Core Team, 2018) using the psych package, version 1.8 (Revelle 2017). Examination of the scree plot and parallel analysis were used as our factor retention strategies in the EFA. Items with factor loadings greater than 0.3 aimed to be retained (Tabachnick and Fidell 2001). We calculated Cronbach's alpha and McDonald's omega to determine whether the items measure a latent variable in common and the extent to which this latent variable accounts for the variance in the scale (see Revelle and Zinbarg 2009). Omega total (ω_T) estimates the reliable variance in a test and Cronbach's α measures the internal reliability of the test (Revelle and Zinbarg 2009). Finally, independent samples *t* tests (with Welch correction) were used to compare

scores on the target variables to examine sex differences and marital status differences. Pearson correlation coefficients were used to investigate associations between the IRS scores, the ICS scores, and age.

Results

Exploratory Factor Analysis

Means and standard deviations of all 16 items are provided in Table 1. Examining the scree plot and the parallel analysis, suggested that two factors should be retained. Thus, two factors were derived. The Kaiser-Meyer-Olkin (KMO) factor adequacy index (KMO = 0.86) and Bartlett's sphericity tests ($\chi^2 [120] = 1332.18, p < .001$) supported the suitability of the data for EFA. The former indicates the total variance accounted for by a common construct, with 0.50–0.60 commonly suggested as the minimum acceptable values (Kaiser 1970), whereas the latter indicates the existence of correlations in the dataset by testing the null hypothesis that all items are uncorrelated. The two factors cumulatively explained 44% of the variance. Item loadings and communalities (h^2) from the promax-rotated EFA are presented in Table 2. As shown in Table 2, all communalities are adequate and all loadings are greater than the widely cited thresholds in the literature (Tabachnick and Fidell 2001) for item removal. Therefore, we did not discard any items for further analysis, as all items showed adequate psychometric adequacy. These two factors were not significantly correlated ($r = .05, p = .48$), indicating that self-

Table 2 The factor structure of the Intrasexual Rivalry Scale (IRS)

Item	Factor I	Factor II	h^2
12	.83	.03	.70
16	.77	.00	.60
6	.73	.04	.53
14	.72	.00	.52
4	.68	-.03	.46
10	.67	-.09	.46
8	.67	.03	.45
2	.45	.01	.20
13	.08	.74	.56
11	.01	.71	.51
9	.23	.69	.52
7	.00	.63	.40
5	.23	.61	.43
1	-.15	.51	.28
3	-.17	.46	.24
15	-.06	.46	.21

Corresponding loadings ($\lambda > .45$) are in bold; Factor I = rival-derogation; Factor II = self-promotion

promotion and rival-derogation are two distinct tactics of rivalry with competitors.

Internal Consistency

The Cronbach's alpha of the self-promotion factor was .82 (95% CI = [.78, .85]). Total omega was .86 (Explained Common Variance = 0.60). The Cronbach's alpha for rival-derogation factor was .88 (95% CI = [.85, .90]). Total omega was .90 (explained common variance [ECV] = 0.79). Both factors showed high internal consistency relative to conservative thresholds in the literature.

Convergent Validity

In order to provide initial evidence for convergent validity of the IRS, we examined the correlation coefficients between IRS's factors and ICS scores. In addition, we ran a linear regression model with IRS factors as independent variables and ICS as dependent variable. The correlation coefficient between self-promotion and ICS, $r = .22$, $p = .001$, was significant. The ICS scores were also positively correlated with rival-derogation ($r = .62$, $p < .001$). The regression model indicated that self-promotion ($B = 0.39$, $SE = .11$, $p < .001$) and rival-derogation ($B = 1.26$, $SE = .11$, $p < .001$) significantly predicted ICS scores (Adjusted $R^2 = .41$, $F [2, 208] = 74.68$, $p < .001$). Therefore, the convergent validity of the IRS is evidenced. In addition to evidence for convergent validity, these results suggest that the ICS scores typically reflect rival-derogation, but not self-promotion behaviors.

Between-Group Differences

Women and men did not differ in their self-promoting ($t = 0.09$, $p = .93$, Cohen's $d = 0.01$) or rival-derogatory ($t = 0.21$, $p = .84$, Cohen's $d = 0.03$) behaviors. Self-promoting rivalry was negatively associated with age ($r = -.17$, $p = .02$). Rival-derogation was also negatively associated with age ($r = -.23$, $p < .01$). We also examined the relationship between marital status and intrasexual rivalry. Non-married individuals scored significantly higher on self-promotion ($t = 3.04$, $p < .01$, Cohen's $d = 0.42$) and rival-derogation ($t = 3.91$, $p < .01$, Cohen's $d = 0.60$).

Discussion

The present study is the first to develop and initially validate a theory-driven tool for assessment of intrasexual rivalry. We used previously identified tactics of intrasexual rivalry (i.e., self-promotion and rival-derogation; see Buss 1988) and applied them to sex-differentiated mating preferences (i.e., Kindness/dependability, Attractiveness/sexuality, Status/resources, and Education/intelligence; see Atari 2017). The present tool addresses several psychometric and theoretical shortcomings of the Intrasexual Competition Scale (ICS; Buunk and Fisher 2009) and takes into account recent developments in mating psychology, especially in non-Western cultures (e.g., Arnocky et al. 2018; Atari et al. 2017b; Chaudhary et al. 2018; Goetz and Meyer 2018). Psychologists have only recently begun to examine psychological implications of intrasexual rivalry in men and women in modern societies and in everyday interpersonal relationships (e.g., Arnocky and Piché 2014). The present study provides researchers with a psychometrically robust, multidimensional measure of human intrasexual rivalry for use in psychological research.

Unlike the widely used ICS (Buunk and Fisher 2009) which gives a single overall score (e.g., Arnocky and Piché 2014; Torrance et al. 2018), we found two factors of intrasexual rivalry (self-promotion and rival-derogation). The ICS was found to be very strongly correlated with rival-derogation, but only weakly associated with self-promotion, indicating that all the studies that relied on the ICS were tapping into derogatory intrasexual rivalry, while neglecting the theoretically important notion that promoting self can be as important in human mating psychology. Indeed, competitor derogation is a common tactic in intrasexual rivalry (Buss and Dedden 1990), but is not the only one. Mate preferences of one sex drive the domains of competition of the other sex (Buss 1988), both in derogatory behaviors (e.g., spreading rumors about a same-sex individual's character, status, beauty, or intelligence) or seeking self-promoting strategies (e.g., improving one's own character, resources, attractiveness, or education). For example, cosmetic surgery or make-up

consumption have been found as a female intrasexual competition strategy (Arnocky and Piché 2014), but they can be regarded as a self-promoting strategy (i.e., appearance enhancement, beautification) rather than mere rival derogation (see Atari et al. 2017c, 2017a). Although previous research has usually used “self-promotion” in the context of attractiveness, here we propose that self-promotion can occur in other areas such as status and education. If one outcompetes others using these promotion strategies, they are essentially preventing others from obtaining desirable mates. It is important to re-consider previous findings and inquire if they produce the same results using the newly developed IRS. Notably, the IRS is only slightly longer than the ICS, but provides a theoretically informed, reliable, and multi-dimensional measurement of intrasexual rivalry. It is worth noting that IRS items might tap more strongly into competitive attitudes rather than actual competitive behaviors (e.g., not hiring an attractive person) as in the ICS.

We did not find significant sex differences in factors of intrasexual rivalry in this study. Some previous studies have found significant differences in rival derogation (e.g., Chaudhary et al. 2018). Some other studies have found null findings (e.g., Arnocky and Piché 2014; Arnocky et al. 2014; Davis et al. 2018). Yet, two robust findings are that men usually score higher than women on direct aggressive behaviors (Barbaro and Shackelford *in press*), whereas women’s intrasexual strategies are more indirect (e.g., gossip, jealousy-evoking) (Buunk et al. 1996). Although sexual selection theory offers a powerful explanation for sex differences in competitive strategies, instances of intense female competition and aggression are not uncommon across a wide range of species with conventional sex roles (Rosvall 2011). More generally, females can occasionally be as aggressive as males (or more so) in competitive interactions (Campbell 2004). Two additional findings were found in this study. First, both tactics of intrasexual competition decreases with age. This is attributable to the fact that women and men are less actively searching for mates as they age (Buss and Schmitt *in press*). Second, non-married individuals were more competitive (in both factors: self-promoting and rival-derogating) than married individuals. This can be explained by the fact that mated individuals allocate less resource to derogate rivals or promote self.

Future research can aim to determine how and why the competitive behaviors of the sexes are similar or different in different contexts, and in different mating areas. Indeed, future research is highly recommended to examine and replicate sex differences in intrasexual rivalry using different psychometric measures and implicit assessments. Future research can also benefit from examining how the scores on IRS are linked to related constructs (e.g., mate retention behaviors, mate preferences, sociosexuality). In

addition, personality and morality correlates of intrasexual rivalry, as measured by the IRS, can be good next steps. In addition, it is recommended for future research to use confirmatory factor analytic techniques to examine the factorial structure of different translations of the IRS across cultures. One of the strengths of the current work is using a non-Western community sample, but of course further validations in Western cultures are encouraged (Rad et al. 2018).

Conclusion

Overall, the present study provides a theory-driven, valid, and reliable scale for assessment of human intrasexual rivalry. Our results showed that intrasexual rivalry, in four sexually differentiated mating areas, has two factors, namely self-promotion and rival-derogation. The newly developed scale, the IRS, has adequate convergent validity, indexed by significant correlations with scores on the ICS (Buunk and Fisher 2009). Results revealed that the correlation between IRS’s rival-derogation factor and ICS’s scores is strong, while for self-promotion is weak. This newly developed scale was introduced within the broader context of evolutionary psychological perspective and can be used as a valid and reliable measure in future research in various fields.

Acknowledgments The authors would like to thank Mohammad Atari for valuable feedback on earlier versions of this paper.

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