Evolutionary Behavioral Sciences

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Despite the impact of social media use on women's self-perception, research has less frequently explored social media's impact on behavioral intentions. Further, most of the research in this area has taken into account social comparison as a mediating variable, despite the extent of our social comparison being closely related to sexual competition, which is infrequently considered. This study explored the relationships between women's Instagram use, Instagram image exposure, cosmetics behavior and attitudes, sexual strategies, and a hypothetical cosmetics purchasing decision task in order to determine the impact of sexual strategies and social media use on cosmetics-related consumer intentions. Two hundred twenty women (M_{age} = 25) completed a series of measures to assess these variables, were shown cosmetics-related Instagram images (idealistic facial images, budget cosmetics, luxury cosmetics, or travel images), and then completed a hypothetical cosmetics purchasing task. Women exposed to luxury cosmetics images spent relatively more than the other groups on the luxury items in the cosmetics purchasing task. Regression further revealed that the predictors of hypothetical cosmetics purchases were real-life cosmetics behavior and attitudes, Instagram use, and intrasexual competitiveness. Thus, considering intrasexual competition is important for a complete understanding of the mechanisms by which Instagram use impacts women's cosmetics purchasing behavior.

Public Significance Statement
This study examined women's Instagram use, attitudes to cosmetics, sexual strategies, and hypothetical cosmetics expenditure. Women who are more competitive toward other women or who had just viewed Instagram feeds of high-end cosmetics were more likely to purchase luxury cosmetics in a mock online store.

Keywords: cosmetics, intrasexual competition, purchasing task, mate-value, Instagram

Social media use is pervasive and is changing how we interact with each other (Hampton, 2015), consume information (Flaxman et al., 2016), and

purchase products (Kapoor et al., 2018). Instagram is an image-based social media platform, with approximately 1 billion monthly active users from January 2013 to June 2018 (Statista, 2021). Given concerns about its effects on well-being (Lup et al., 2015), Instagram has been subject to the scrutiny of researchers. For example, consumption of thin-ideal body images via Instagram negatively impacts women's body image (Brown & Tiggemann, 2016). This may be exacerbated by social comparison such that women who tend to compare themselves more with others also have more negative outcomes when viewing such images on Instagram (e.g., Sherlock & Wagstaff, 2019). Similarly, viewing others' selfies can have negative effects on self-esteem (Wang et al., 2017), an effect that, like

the one above, is also moderated by social comparison. Concerns around the use of social media, therefore, center on the negative effects the platforms have on psychological well-being due to the opportunities they afford for ready comparisons with idealistic others. The metrics of Instagram use vary widely, with evidence of time spent on the platform (Sherlock & Wagstaff, 2019) as well as emotional investment (Lowe-Calverley et al., 2019) impacting well-being. Given we increasingly live our lives online, however, time may not be the most informative measure of Instagram use (Coyne et al., 2020); rather, it is the ways one uses social media that can lead to negative outcomes.

While substantial research has focused on the impacts of Instagram use on women's self-perceptions (such as body image, self-esteem, and self-rated attractiveness), much less is known about the impact of Instagram use on behavioral intentions or outcomes. If women feel less about themselves from viewing idealized images on Instagram, what, if anything, do they seek to do about it? Viewing #fitspiration images (those purporting to motivate individuals toward a healthy lifestyle) leads women to feel they exerted themselves more during a bout of exercise (Prichard et al., 2020), while Instagram use, generally, is linked with higher symptoms of orthorexia (an unhealthy obsession with eating healthy food; Turner & Lefevre, 2017). These findings confirm Instagram's potential to impact health-related outcomes in the real world but likely manifest via different psychological mechanisms than those that impact self-image since orthorexia is strongly associated with obsessive–compulsive tendencies toward food and exercise but potentially unrelated to self-esteem (McComb & Mills, 2019).

Besides fitness content, another popular trend on Instagram is the posting of beauty or makeup looks, including selfies that demonstrate one's makeup skills or images of recent cosmetics "hauls" (purchases). Cosmetics on Instagram is a big business, with 83% of beauty brands in 2018 including Instagram influencers in their marketing strategy (Gartner, 2018). For women, exposure to beauty-related images on Instagram leads to lower self-ratings of attractiveness (Sherlock & Wagstaff, 2019). Appearance-enhancing luxuries are a means of self-promotion by women in intrasexual contexts (Hudders et al., 2014), with attitudes to cosmetics, cosmetics use, and cosmetic surgery all related to intrasexual competition (Wagstaff, 2018; although see Batres et al., 2018). The utility of makeup as a means of signaling in competitive contexts is

evident as Sulikowski et al. (2022) showed that high-mate-value women are perceived as more aggressive when made up. As such, women, particularly high-mate-value women, who view idealistic beauty-related images on Instagram may seek to improve their own appearance through utilizing cosmetics products. This would align with Atari et al. (2017), who found that women who set more strict standards for potential mates are interested in cosmetic surgery, while Arnocky and Piché (2014) demonstrated intrasexual competition is related to positive attitudes toward, and desired spending on, cosmetic surgery. The value of considering evolutionary approaches to understanding both our use of, and the effects of, social media use is therefore evident. While researchers frequently utilize evolutionary approaches to understand some facets of online behavior, such as online sexual behavior (e.g., March & Wagstaff, 2017), these perspectives are infrequently applied in other contexts, particularly in understanding social media use (with notable exceptions, such as cooperation; Ng, 2020).

Much of the research on cosmetic product purchase intentions has focused on determining the impacts of persuasion cues such as celebrity endorsement (Chekima et al., 2018) or credibility (Sokolova & Kefi, 2020). However, the extent to which we compare ourselves with others is also related to our mating strategies (Buunk & Fisher, 2009; Garcia et al., 2013). The comparison we engage with on social media and its outcomes are therefore also likely related to mating strategies. Women are more likely to compete via modification of appearance than men are (Buss, 1988), and Instagram is a largely visual platform on which people present an idealized version of themselves (Sherlock & Wagstaff, 2019). Thus, it is likely that women's use of Instagram, particularly their emotional investment in the platform, and the impacts of Instagram on their perceptions of themselves are correlated with their sexual strategies and intrasexual competitiveness. Indeed, intrasexual competitiveness in women positively predicts appearance-related comparisons on Instagram (Hendrickse et al., 2017). Hence, women who are more competitive are more likely to become emotionally invested in a platform in which they can evaluate other women's appearances and create an idealized, and therefore more intimidating, image of themselves. Higher-mate-value women tend to be more intrasexually competitive, generally (Polo et al., 2019), and may also be more likely to both utilize and perceive makeup as a signal of intrasexual competitive

intent (Sulikowski, 2022). These women are therefore more likely to be affected by the viewing of other women's made-up faces and may be prone to spend money on cosmetics in order to appear competitive.

In spite of all of this, little research has looked at the impact of Instagram use, or exposure to beauty-related Instagram images, on women's cosmetics purchasing intentions, nor has any research explored the impact of women's intrasexual competitiveness on cosmetics purchase intentions. Hence, in this exploratory study, we sought to determine the relationships between Instagram use, sexual strategies (specifically intrasexual competition, self-rated physical attractiveness, and mate value), Instagram image exposure, and hypothetical makeup purchasing intentions as determined through a purchasing decision task. While the study was largely exploratory, given known relationships between social comparison and intrasexual competitiveness, we expected that more intense Instagram use, and higher rates of intrasexual competitiveness, would be associated with intentions to spend more on cosmetics (vs. other beauty items). It was also predicted that exposure to idealized made-up face images (compared to other image types) would increase hypothetical spending on cosmetics. We also measured preexisting cosmetics brand awareness, attitudes about and behavior regarding makeup use, social and physical appearance comparison, and annual income and sought to understand how these variables predicted cosmetics purchasing intentions.

Method

Ethics approval was granted by Federation University Australia (Protocol A18-039).

Participants

Initially, participants were 42 people recruited via advertisements on social media (such as Facebook) who participated voluntarily, plus 198 recruited via Prolific Academic, who were reimbursed £3.10 for their time, for a total of 240 respondents. Participants were eligible for inclusion if they identified as female and were over the age of 18. After removing five who did not move past the information statement, three who quit after completing the demographics, one who quit after completing only one scale, seven who were not women, and four who constituted statistical outliers (see description of data screening), we were left with 220 women, aged 18 to 57 (M_{age} = 25.64 years,

SD = 6.62). Information about participant relationship status, country of residence, and ethnicity can be seen in Table 1.

Measures

Demographics

Participants were asked to provide information pertaining to their age, gender (for the purpose of

Table 1
Demographic Details

Attribute	n
Country of residence	
Australia	21
Canada	11
Chile	15
Estonia	2
Germany	1
Greece	3
Ireland	1
Israel	1
Japan	1
Korea	1
Malaysia	1
Mexico	38
New Zealand	4
Nigeria	1
Poland	10
Portugal	49
South Africa	5
Spain	3
Sweden	1
United Kingdom	19
United states	27
Ethnicity	
Black/African	2
White/Caucasian	111
Asian	18
Latino/Hispanic	47
Middle Eastern	2
Native American	1
Mixed ethnicity	9
Specified a country (e.g., Australian, American)	24
Did not specify	5
Relationship status	
Single	93
Casual relationship, living apart	30
Casual relationship, living together	3
Serious relationship, living apart	47
Serious relationship, living together	47
Sexual orientation	
Heterosexual	153
Homosexual	8
Bisexual (including pansexual)	51
Asexual	2
Did not specify	6
Country of residence	

exclusion), ethnicity and country of residence, relationship status, sexual orientation, and income.

Makeup Use and Attitudes

Makeup Brand Awareness. Participants were asked approximately how much they spent on cosmetics per month and then were provided with a list of 50 popular cosmetics brands (collated from ranker.com) and asked if they were aware of the brand (yes or no). Makeup brand awareness was then defined as the sum of "yes" responses to these items.

Makeup Endorsement Attitudes. Participants were asked four questions pertaining to their attitudes toward makeup, derived by the researchers. These questions were "I believe makeup is necessary to look attractive," "If I had endless money, I would wear makeup everyday," "Most people need makeup to look good," and "To look good in makeup, you have to buy the best brands." Questions were answered on a 7-point scale from *strongly disagree* to *strongly agree*. Scores on these items were averaged to produce a "makeup endorsement attitudes" score. The four items showed good intercorrelation ($\alpha = .741$).

Perception of Makeup's Impact on Own Attractiveness. Participants were asked "How do you believe people perceive you when you wear makeup versus no makeup?" and answered on a 7-point scale from *much more attractive* with *makeup* to *much more attractive* without *makeup*.

Makeup Use. Participants were asked to indicate how many days per week (prior to any COVID lockdowns) they would wear any makeup and how many days per week they would wear a "full face" (i.e., a completely made-up face) of makeup, from 0 to 7 days.

Social Media

Intensity of Instagram Use. A modified version of the Facebook Intensity of Use Scale (Ellison et al., 2007) measured participants' emotional investment in the platform. The five questions included "Instagram is part of my everyday routine," "I am proud to tell people I'm on Instagram," "I feel out of touch if I haven't logged onto Instagram for a while," "I feel like I am part of the Instagram community," and "I would be sorry if Instagram shut down." These questions were answered on a 7-point Likert scale from *strongly disagree* to *strongly agree*. Scores were averaged, and the scale had high internal reliability ($\alpha = .844$).

Social Comparison. Participants were asked to complete the Iowa-Netherlands Comparison Orientation Scale (INCOM; Gibbons & Buunk, 1999). This scale contains 11 items measuring how frequently one compares themselves to others. Statements include "If I want to learn more about something, I try to find out what others think about it," answered on a 7-point Likert scale from *strongly disagree* to *strongly agree*. Scores are summed, and the scale had high internal reliability ($\alpha = .798$). Participants also completed the Physical Appearance Comparison Scale Revised (PACS-R; Schaefer & Thompson, 2014). This scale contains 11 items such as "When I'm out in public, I compare my body fat to the body fat of others," answered on a 5-point Likert scale from *never* to *always*. Items are averaged, and the scale had high internal reliability ($\alpha = .958$).

Mating Strategies

Intrasexual Competitiveness. Participants completed the Scale for Intrasexual Competition (SIC; Buunk & Fisher, 2009). This scale contains 12 items including "I tend to look for negative characteristics in attractive women," answered on a 7-point Likert scale from *strongly disagree* to *strongly agree*. Scores are averaged to produce a total score. The scale had high internal reliability ($\alpha = .890$).

Mate Value. The Mate Value Scale (MVS; Edlund & Sagarin, 2014) was also included. This contains four statements, including "Overall, how would you rate your level of desirability as a partner," answered on a 7-point Likert scale from *extremely undesirable/much lower than average* to *extremely desirable/much higher than average*. The items are averaged to produce a full-scale score. The scale had high internal reliability ($\alpha = .900$).

Physical Attractiveness. Participants also completed the Estimating Physical Attractiveness Scale (EPA; Swami et al., 2007), which includes 19 items such as "overall physical attractiveness," answered on a 7-point scale from *very unattractive* to *very attractive*. The items are averaged to produce a full-scale score. The scale had high internal reliability ($\alpha = .920$).

Procedure and Purchasing Task

Participants first read the plain language information statement and then completed the demographics questions and makeup use and awareness

questions. They then completed the Instagram use, social comparison, intrasexual competition, and mate value scales in random order.

Participants were then assigned to one of four conditions in which they were shown 10 Instagram images. These Instagram images were collected by searching on the Instagram database of public accounts for relevant images in each of four categories. These categories were beauty looks (idealized faces of women wearing cosmetics), luxury makeup (images of makeup products categorized as luxury brands; see paragraph below), budget makeup (images of makeup products categorized as budget brands; see below), and control (images of landmarks or travel images with no people present). Participants were asked to view each of the 10 images once and then were asked to view the images again and to "like" and comment on two pictures (to ensure attention was paid). After viewing these images, participants were asked to complete the makeup purchasing task.

For the makeup purchasing task, participants were told they had a hypothetical $150 to spend at a new online store.[1] They were shown a selection of items from the store, and they could choose to spend as much or as little of the $150 as they liked. They were then shown images of 56 beauty-related items, presented on the same page and in an online shop configuration that participants could scroll through. Item types were foundation, eyeshadow palette, face powder, mascara, face cream, face cleanser, and shampoo. Two of each item type were included in each of four price points: budget (valued $2.99–17.97), lower-middle range ($20–40), upper-middle range ($39–62), and luxury range ($68–146). The actual items were images of products found at each of the four price points from major cosmetics retailers in Australia (such as Mecca Cosmetica, Sephora, and Priceline), and their prices were determined by the listed retail price on the website. No currency indication was provided. Participants indicated which of the items they wished to purchase by marking the price next to each item. We calculated the total amount spent on makeup items, specifically, as well as the proportion of the total spent on each of the budget, lower-middle, upper-middle, and luxury range items. After the makeup purchasing task, participants were asked to indicate how much they intended to spend on cosmetics in the next month.

Results

Data Screening and Descriptive Statistics

All data analyses were completed using the statistical package SPSS for Windows v27. Prior to analysis, we checked for missing values and found 0.492% of values missing. One variable had 10.7% of values missing, which was the total spent for the purchasing decision task. These missing values were due to the participant either not completing the task ($n = 4$) or failing to complete the task correctly ($n = 20$). Further, a complete cases analysis would yield a loss of 31.70% of participants, and Little's (1988) test of missing completely at random was not significant, $\chi^2 = 1789.51$, $df = 1765$, $p = .337$. As such, we did not impute, and listwise deletion of data was used in analyses. After computing scale scores, data were also checked for outliers (> 3 standard deviations from mean). Four extreme cases were identified and deleted (one each from the INCOM and SIC and a further two from the purchasing decision task).

All values on the items related to amount of makeup spent per month, annual income, and planned spending on makeup in the next month were converted to the same currency (USD) from the participants' indicated currency such that comparisons could be made on a single scale. All conversions were determined via the conversion rates listed on xe.com on December 9, 2020.

Descriptive statistics were calculated for all predictor variables, and correlations between each were calculated, as shown in Tables 2 and 3. As shown, the more people believed they were attractive without makeup, the less they spent on cosmetics and the fewer days per week they wore makeup. People who earned more had more awareness about makeup brands and stronger attitudes in favor of makeup. The more strongly participants' attitudes endorsed makeup, and the more awareness about brands, the more participants typically spent on makeup. Higher Instagram intensity of use was correlated with more days of makeup use, higher brand awareness, and stronger attitudes about makeup. People who were higher in mate value also spent more per month on makeup and wore makeup more frequently. Those higher in competition and higher on appearance comparison believed they looked

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[1] This value was chosen as the average monthly spend on makeup/beauty products (excluding hair and fitness) in 2017 was $115 (nypost.com), allowing for inflation.

Table 2
Descriptive Statistics for Predictor Variables

Variable name	N	Min	Max	M	SD
Personal income (USD)	208	0	92,000	15,935	18,824
Couple income (USD)	46	0	183,633	68,856	51,485
Makeup spend per month (USD)	212	0	781	35.35	77.70
Perception of makeup's impact on own attractiveness	218	1	7	2.61	1.20
Days per week any makeup is worn	190	0	7	4.52	2.23
Days per week full face makeup is worn	190	0	7	2.62	1.81
Makeup brand awareness	220	0	50	31.20	12.03
Makeup endorsement attitudes	217	1	6.5	2.92	1.31
Intensity of Instagram use	219	1	6.8	4.02	1.49
INCOM	219	22	74	50.73	9.26
PACS	220	1	5	2.91	1.07
SIC	219	1	4	1.88	0.70
MVS	220	1	7	4.49	1.17
EPA	220	1.74	7	4.28	0.92

Note. Min = minimum; max = maximum; INCOM = Iowa-Netherlands Comparison Orientation Scale; PACS = Physical Appearance Comparison Scale; SIC = Scale for Intrasexual Competition; MVS = Mate Value Scale; EPA = Estimating Physical Attractiveness Scale.

better with makeup and exhibited attitudes that more strongly endorsed makeup, while those higher on appearance comparison also wore makeup more often. Finally, age correlated positively with days of makeup frequency of wear and attitudes to makeup and negatively with Instagram use and social comparison.

Hypothetical and Intended Makeup Purchasing Behavior

On average, participants spent $74.98 ($SD$ = 43.13) of the hypothetical money on cosmetics items and $46.87 ($SD$ = 41.44) on noncosmetic beauty items. Of this, an average of 24.40% of their cosmetics purchases were on budget items (average 1.36 items), 27.42% on lower-middle range (average 0.70 items), 40.14% on upper-middle range (average 0.74 items), and 8.04% on luxury range items (average 0.11 items). To determine whether low and high total spenders divided their money differently, we split the total spend along the median ($136.10) and conducted a multivariate analysis of variance (ANOVA) to determine any difference in the proportion spent in the budget, lower midrange, upper midrange, and luxury between high and low total spend groups. There was an effect of total spend on the proportion spent in each category, $F(3, 177) = 3.486$, Wilks' $\lambda = .944$, $p = .017$, $\eta_p^2 = .056$. Simple effects contrasts revealed that this was due to those in the low-spending group allocating a smaller proportion of their spending to the luxury items ($p = .044$) and a higher

proportion of their spending to the budget items ($p = .011$) than the high-spend group.

We investigated whether exposure to the Instagram images had any impact on the purchasing decision task. A multivariate mixed-effects ANOVA with experimental Instagram images group (four levels: idealized faces, budget makeup, luxury makeup, and travel) as a between-subjects factor and cosmetics value purchased (four levels: budget, lower midrange, upper midrange, and luxury) as the within-subjects factor was applied to the proportion of total expenditure participants allocated across the items purchased. Given Sulikowski and colleagues' (2022) finding that only high-mate-value women were impacted by exposure to made-up attractive women's faces, we included MVS scores (centered) as a covariate. Since total overall spend was defined as 1 for all participants (by expressing spend on each category as a proportion), the main effects of experimental group and mate value remained undefined in the model. The interaction between mate value and cosmetics value was not significant, $F(3, 181) = .507$, Wilks' $\lambda = .992$, $p = .678$, $\eta_p^2 = .008$, nor was the three-way mate value, cosmetics value, and experimental group interaction, $F(9, 440.7) = .919$, Wilks' $\lambda = .956$, $p = .508$, $\eta_p^2 = .015$, suggesting that mate value did not moderate how participants apportioned the money they spent. A significant main effect of cosmetics value was observed, $F(3, 181) = 37.088$, Wilks' $\lambda = .619$, $p < .001$, $\eta_p^2 = .381$, as participants collectively spent the least on the luxury items compared to all other groups (all $p <$

Table 3
Correlations Between Predictor Variables

Variable name		1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Personal income (USD)	r	—													
2. Couple income (USD)	r	.742**	—												
	p	.000													
	n	45													
3. Makeup spend per month	r	.196**	.161	—											
	p	.005	.291												
	n	201	45												
4. Perception of makeup's impact on own attractiveness	r	−.063	−.227	−.108	—										
	p	.372	.133	.117											
	n	206	45	211											
5. Days per (typical) week any makeup is worn	r	.074	−.059	.245**	−.279**	—									
	p	.327	.727	.001	<.001										
	n	180	38	183	189										
6. Days per (typical) week a full face of makeup is worn	r	0.088	−.029	.116	−.234**	.579**	—								
	p	.238	.863	.117	.001	<.001									
	n	180	38	183	189	193									
7. Makeup brand awareness	r	.148*	−.041	.146*	−.144*	.328**	.165*	—							
	p	.033	.789	.034	.034	<.001	.023								
	n	208	46	212	218	190	193								
8. Makeup endorsement attitudes	r	.182**	−.064	.232**	−.336**	.379**	.468**	.018	—						
	p	.009	.678	<.001	<.001	<.001	<.001	.792							
	n	205	44	210	217	188	188	217							
9. Intensity of Instagram use	r	.049	−.037	.088	−.109	.154*	.059	.176**	.253**	—					
	p	.479	.805	.204	.109	.034	.420	.009	<.001						
	n	205	44	210	217	188	188	217	216						
10. INCOM	r	−.008	−.326*	.002	−.013	.085	−.031	.070	.028	.210**	—				
	p	.914	.029	.978	.855	.245	.676	.301	.680	.002					
	n	207	46	211	217	190	190	219	216	218					
11. PACS	r	.079	−.012	.074	−.185**	.147*	.090	.116	.217**	.219**	.485**	—			
	p	.260	.936	.285	.006	.043	.218	.087	.001	.001	<.001				
	n	208	46	212	218	190	190	220	217	219	219				
12. SIC	r	.077	−.218	.107	−.138*	.109	.117	−.007	.412**	.232**	.264**	.348**	—		
	p	.269	.146	.121	.042	.135	.108	.922	<.001	<.001	<.001	<.001			
	n	207	46	211	217	189	189	219	216	218	218	219			
13. MVS	r	.172*	.137	.139*	.028	.243**	.093	−.015	.081	.112	−.095	−.168**	.016	—	
	p	.013	.363	.043	.682	<.001	.201	.820	.236	.099	.138	.012	.816		
	n	208	46	212	218	190	190	220	217	219	219	220	219		
14. EPA	r	.093	.048	.113	.078	.131	.027	−.035	.079	.113	−.130	−.337**	.019	.734**	—

(table continues)

Table 3 (*continued*)

Variable name		1	2	3	4	5	6	7	8	9	10	11	12	13	14
	p	.179	.752	.099	.250	.071	.716	.603	.245	.095	.055	<.001	.774	<.001	—
	n	208	46	212	218	190	190	220	217	219	219	220	219	220	—
15. Age	r	.347**	.365*	.050	−.075	.017	.175*	−.077	.177**	−.159*	−.148*	−.131	−.069	.004	−.004
	p	<.001	.013	.473	.272	.816	.015	.254	.009	.019	.028	.052	.309	.959	.950
	n	208	46	212	218	190	190	220	217	219	219	220	219	220	220

Note. INCOM = Iowa-Netherlands Comparison Orientation Scale; PACS = Physical Appearance Comparison Scale; SIC = Scale for Intrasexual Competition; MVS = Mate Value Scale; EPA = Estimating Physical Attractiveness Scale.
* Correlation is significant at the .05 level (two-tailed). **Correlation is significant at the .01 level (two-tailed).

.001), the most on upper midrange items compared to all other groups (all $p < .004$), and similar amounts on the budget and lower midrange items ($p = .386$). This main effect was qualified by a significant experimental group by cosmetics value interaction, $F(9, 440.7) = 2.066$, Wilks' $\lambda = .904$, $p = .031$, $\eta_p^2 = .033$. The interaction arose as all groups followed a similar spending pattern except for the luxury makeup group, who spent relatively more than all other groups on the luxury items (all ps $< .021$) while tending to spend less on upper midrange products ($.013 <$ all ps $< .127$) and more on lower midrange products ($.049 <$ all ps $< .193$); see Figure 1.

We had also anticipated that participants exposed to the idealized face images would spend more on cosmetics (as opposed to the noncosmetic beauty items) overall, compared to the other groups. To investigate this, we applied a one-way ANOVA comparing total spending on cosmetics items across the four experimental groups. Contrary to expectations, no main effect of group was observed, $F(3, 193) = .220$, $p = .882$, $\eta_p^2 = .003$, nor were any pairwise comparisons between the idealized face images and the other groups significant (all ps $> .468$). A similar model also revealed no effect of the experimental Instagram images on intended cosmetics spend over the coming month, $F(3, 212) = .115$, $p = .951$, $\eta_p^2 = .002$.

Since the experimental manipulation did not impact either the total amount spent hypothetically on cosmetics or the amount participants indicated they would spend on cosmetics in the following month, we used linear regression models to explore the extent to which age, income, intensity of Instagram use, makeup attitudes, brand awareness and use, social comparison, intrasexual competitiveness, mate value, and physical attractiveness predicted both cosmetics spending measures. Cross-correlations between all predictor variables and these two outcome variables are shown in Table 4 (for interest, we have also shown these correlations for the different categories of cosmetics purchased in the hypothetical purchasing decision task but did not analyze these further).

Into the first step of each model, we entered the following variables, all converted to z scores: age, personal income, days per week any makeup is worn, days per week a full face of make is worn, perception of makeup's impact on own attractiveness, makeup attitudes score, makeup brand awareness, intensity of Instagram use, social

Figure 1

Proportion of Spending on Cosmetics of Varying Value (From Budget to Luxury) Between Instagram Image Conditions
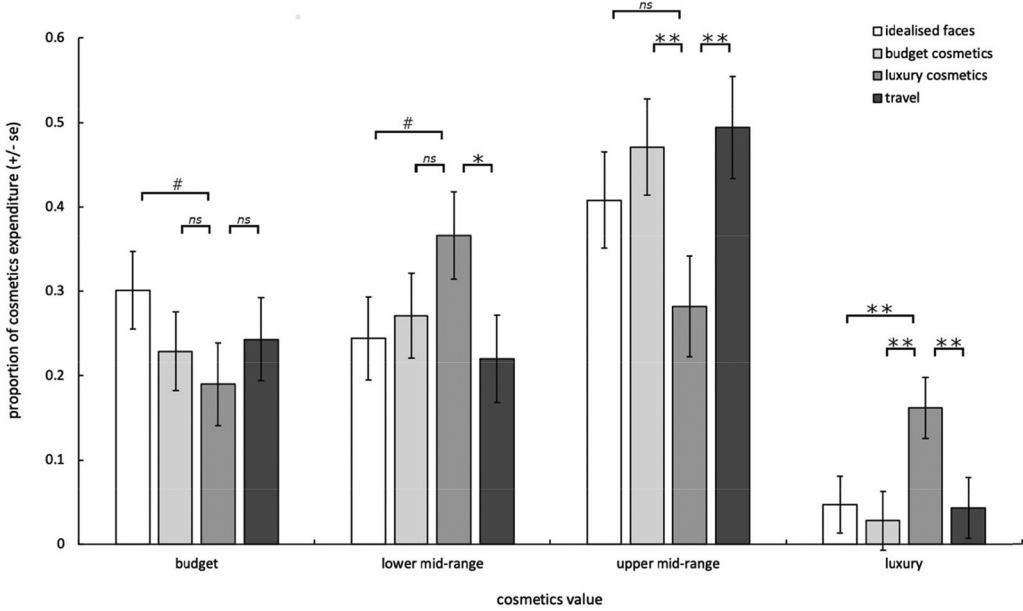
Note. Participants in the luxury condition spent more on luxury cosmetics while tending to spend less on upper midrange products and more on lower midrange products. *ns* = nonsignificant. # $p < .1$. * $p < .05$. ** $p < .025$.

comparison measures (INCOM and PACS), intrasexual competitiveness (SIC), mate value (MVS), and physical attractiveness (EPA). Only into the model predicting total hypothetical spend on cosmetics did we also enter typical monthly spend on makeup. We did not enter this variable into the model predicting the upcoming month's intended spend on makeup as we felt the conceptual similarity between the variables was too high. After the first step, we allowed both models to progress stepwise (removing variables at a threshold of $p > .1$ and entering them at a threshold of $p < .05$).

The final model predicting total spend on cosmetics in the purchase decision task was significant, $F(6, 161) = 10.746$, $p < .001$, $R^2_{adj} = .259$, and retained the predictors age, intensity of Instagram use, number of days per week on which any makeup is worn, perceptions of makeup's impact on own attractiveness, intrasexual competitiveness (SIC), and social comparison (INCOM). The full statistics are reported in Table 5.

The final model predicting intended spend on makeup in the coming month was also significant, $F(4, 170) = 9.514$, $p < .001$, $R^2_{adj} = .164$, and

retained the predictors makeup endorsement attitudes, physical attractiveness (EPA), personal income, and intrasexual competitiveness (SIC). The full statistics are reported in Table 5.

Discussion

The aim of this exploratory study was to describe the relationships between makeup use, awareness and attitudes, Instagram use, social comparison tendencies, sexual strategies variables (including intrasexual competitiveness, physical attractiveness, and mate value), and hypothetical and intended makeup purchasing decisions. We observed a number of first-order correlational relationships whereby makeup use, makeup brand awareness, and positive attitudes toward makeup all tended to positively correlate and also tended to positively predict intensity of Instagram use. Similarly, social comparison and intrasexual competition measures positively correlated, and these positively predicted intensity of Instagram use. Intrasexual competition also predicted positive attitudes toward makeup.

Table 4
Predictors of Makeup Spending Intentions

			Purchasing task			
			Proportion of spend at each product value level			
Variable name		Intended spending on cosmetics in the next month	Total spent on cosmetics	Budget	Lower-middle range	Upper-middle range	Luxury
1. Personal income (USD)	r	.182**	.106	−.128	.093	.006	.024
	p	.009	.135	.085	.212	.931	.742
	n	205	202	183	183	183	183
2. Makeup spend per month	r	.452**	.151*	−.061	.064	.001	−.011
	p	< .001	.030	.406	.384	.990	0.879
	n	209	206	186	186	186	186
3. Perception of makeup's impact on own attractiveness	r	−.204**	−.285**	.085	.033	−.155*	.092
	p	.003	< .001	.244	.648	.033	.206
	n	215	212	190	190	190	190
4. Days per (typical) week any makeup is worn	r	.202**	.372**	−.132	.085	.051	−.019
	p	.005	< .001	.087	.272	.514	.810
	n	189	187	168	168	168	168
5. Days per (typical) week a full face of makeup is worn	r	.222**	.305**	−.174*	.042	.148	−0.057
	p	.002	< .001	.024	.587	.055	.462
	n	189	187	168	168	168	168
6. Makeup brand awareness	r	.107	.166*	−.187**	.240**	.065	−.198**
	p	.115	.015	.010	< .001	.371	.006
	n	217	214	192	192	192	192
7. Makeup endorsements attitudes	r	.342**	.268**	−.097	−.070	.181*	−.066
	p	.000	< .001	.184	.336	.013	.364
	n	214	211	189	189	189	189
8. Intensity of Instagram use	r	.121	.233**	−.011	.022	.047	−.091
	p	.074	< .001	.881	.766	.522	.208
	n	217	214	192	192	192	192
9. INCOM	r	−.112	.003	−.046	.061	−.001	−.024
	p	.102	.965	.530	.398	0.984	.742
	n	216	213	191	191	191	191
10. PACS	r	.026	0.061	−.072	.009	.041	.015
	p	.707	.372	.322	.905	.573	.832
	n	217	214	192	192	192	192
11. SIC	r	.021	.159	−.149*	−.010	.111	.029
	p	.760	.020	.040	.894	.126	.691
	n	216	213	191	191	191	191
12. MVS	r	.158*	.015	−.013	.052	.017	−.084
	p	.020	.824	.860	.473	.815	.249
	n	217	214	192	192	192	192
13. EPA	r	.149*	−.064	.022	.174*	−.100	−.111
	p	.028	.349	.759	.016	.167	.125
	n	217	214	192	192	192	192
14. Age	r	.049	.093	−.055	−.097	.101	.044
	p	.472	.175	.448	.181	.164	.540
	n	217	214	192	192	192	192

Note.   INCOM = Iowa-Netherlands Comparison Orientation Scale; PACS = Physical Appearance Comparison Scale; SIC = Scale for Intrasexual Competition; MVS = Mate Value Scale; EPA = Estimating Physical Attractiveness Scale.
* Correlation is significant at the .05 level (two-tailed). **Correlation is significant at the .01 level (two-tailed).

These first-order relationships generally align with the proposition that intrasexual competitiveness plays a central role in the interrelationships between social comparison, social media use, and cosmetics use. Women who are more competitive are more likely to use social media to determine their social standing (hence higher investment in platforms such as Instagram), will compare

Table 5

Multiple Linear Regression Models Predicting Hypothetical and Intended Spending on Cosmetics

| Spend type | | | | 95% CI for *B* | |
Predictor variable	β	*t*	*p*	LL	UL
Hypothetical spending					
(Constant)		25.452	<.001	69.06	80.68
Intensity of Instagram use	**0.230**	**3.295**	**.001**	4.01	16.00
Intrasexual competitiveness (SIC)	**0.154**	**2.186**	**.030**	0.655	12.925
Perceptions of makeup's impact	**−0.194**	**−2.740**	**.007**	−14.591	−2.369
Days per week any makeup is worn	**0.267**	**3.749**	**<.001**	5.68	18.33
Social comparison (INCOM)	−0.117	−1.660	.099	−11.22	0.972
Age	0.114	1.670	.097	−0.903	10.792
Intended spending					
(Constant)		11.341	<.001	27.70	39.27
Makeup endorsement attitudes	**0.330**	**4.239**	**<.001**	7.56	20.55
Physical attractiveness (EPA)	**0.206**	**2.927**	**.004**	2.83	14.27
Personal income (USD)	**0.142**	**2.008**	**.046**	0.156	12.95
Intrasexual competitiveness (SIC)	−0.132	−1.722	.087	−11.74	0.76

Note. CI = confidence interval; LL = lower limit; UL = upper limit; INCOM = Iowa-Netherlands Comparison Orientation Scale; SIC = Scale for Intrasexual Competition; EPA = Estimating Physical Attractiveness Scale. Bold indicates a significant predictor in the model.

themselves more with others (hence higher social comparison scores), and will subsequently use cosmetics (hence stronger attitudes toward, and perception of oneself as attractive in, makeup) to make themselves more attractive to others. Importantly, women's use of cosmetics is not just related to increasing attraction to the opposite sex but also to changing perceptions in a variety of contexts, an issue that has received increased attention (see Blake, 2021) and aligns with recent findings that cosmetics act as a signal of competitiveness in intrasexual contexts (Mafra et al., 2020; Sulikowski et al., 2022; Wagstaff, 2018). We do not argue that intrasexual competitiveness and its relationship with strategies such as cosmetics use should be considered only when considering mating-relevant scenarios, but rather that intrasexual competition affords a key viewpoint from which to consider women's social media use and social comparison more broadly.

In the experimental component of this study, we exposed participants to one of four categories of Instagram images (idealized faces, budget makeup, luxury makeup, or travel [control] images) and subsequently asked participants to spend a budget in a hypothetical online store and to indicate their intended makeup expenditure for the next month. Participants exposed to luxury makeup brands subsequently spent more on such brands in the hypothetical store. We had initially predicted, in line with previous research that has shown that exposure to idealized images leads to poorer self-

perception (Sherlock & Wagstaff, 2019), that exposure to idealized faces would have resulted in greater spending on cosmetics in the hypothetical purchasing task, but this was not observed. However, our finding confirms Instagram's potential to influence subsequent purchasing decisions and suggests these may be more strongly related to demonstrating social status (via the owning of luxury goods; Ajitha & Sivakumar, 2017) than to negative self-perception. That this was the case even in the context of (hypothetically) purchasing items directly related to appearance makes for especially compelling evidence. It is also possible, however, that the exposure threshold to impact self-perception is higher than that to impact motivations related to social status. Our brief exposure may have been sufficient for the latter but not for the former.

Additionally, our exposure occurred as part of an artificial online survey and not as a naturalistic Instagram feed. Further research could consider other methods of exposure, including using a more realistic method of exposure, to directly compare Instagram's impacts on purchasing intentions via the social status motivations versus self-perception manipulation routes. It would also be worthwhile to explore whether exposure to other idealistic face images can lead to a change in women's cosmetics use and purchasing desire. Given Sulikowski et al. (2022) demonstrated that high-mate-value women, specifically, benefit from makeup as a signal of competitive intent, it is possible that exposure to

women of high or low attractiveness levels wearing different amounts of makeup will elicit different effects.

Measuring actual cosmetics behavior, such as how women choose to apply makeup in preparation for competitive interactions with other women of varying attractiveness levels, across a variety of contexts, would be especially illuminating. Given that women underestimate how important their facial appearance (relative to the importance of their body's appearance) is to men (Wagstaff et al., 2015), women's cosmetics behavior may be less affected by the expected presence or absence of a male audience and more affected by the characteristics of an expected female adversary. Such an observation would firmly cement cosmetics use as a vector of intrasexual competition more so than of mate attraction.

Since neither the total amount spent on cosmetics in the online store nor the intended cosmetics expenditure in the upcoming month were affected by our manipulation, we applied multiple regression models to these outcome variables (ignoring experimental groups) to see how well they could be predicted from our measures of intensity of Instagram use, makeup attitudes and behavior, social comparison, and sexual strategies. These models revealed the strongest independent predictors of hypothetical cosmetics purchases to be the frequency with which makeup is worn (in real life) and the intensity of Instagram use, followed by perceptions of makeup's impact on the participants' own attractiveness and intrasexual competitiveness. These relationships were such that those participants who wear makeup more frequently, use Instagram more intensely, and are of higher intrasexual competitiveness spent more on cosmetics. These models provided further evidence that considering how intrasexual competition plays out on social media platforms is important for a complete understanding of the mechanisms by which Instagram use impacts women's purchasing behavior, at least with respect to cosmetics.

The strongest predictors of intended expenditure on makeup in the upcoming month were makeup endorsement attitudes and participants' own physical attractiveness, followed by income. These relationships were such that those who most positively endorsed makeup's use, who find themselves more attractive, and who earn more all indicated planning to spend more on makeup. None of these relationships are especially surprising, but it is interesting to observe, in the same sample of women, that

intensity of Instagram use predicted (hypothetical) cosmetics purchasing in the context of an online store but not real-world intentions to purchase cosmetics. It could be that those who use Instagram more intensely also spend more time online generally, including online shopping. The hypothetical purchasing task may have had more intrinsic ecological validity for these participants, making it a more apt vehicle through which to express their social and competitive motives. Alternatively, there could be more fundamental differences between the mechanisms that determine hypothetical/idealistic versus actual/realistic spending behavior. Whatever the potential explanations for these differences, further experimental and/or longitudinal designs are required to elucidate the direction of causality for all these relationships. Further speculations about possible mechanisms and causality are not warranted until they can be based on such findings.

Interestingly, we did not observe that mate value moderated hypothetical cosmetics purchasing decisions, nor did it survive as an independent predictor of cosmetics purchases in our subsequent regression models. Sulikowski et al. (2022) reported that makeup increased perceptions of aggressive intent when applied to highly attractive faces but increased perceptions of leadership potential when applied to less attractive faces. This points to the multiplicity of makeup's social functions and suggests that simultaneous investigations of other social motives, alongside intrasexual competition, are called for. Even though we did not observe that mate value moderated hypothetical purchasing decisions, it remains possible that mate value influenced our participants' (unmeasured) motivations for their purchasing choices, and subsequent investigations should interrogate this possibility.

Several limitations exist. First, some participants failed to follow the purchasing task instructions, spending more than provided. The purchasing task was also highly constrained, with limited money and limited items. Less constrained spending conditions, and a larger variety of options to purchase, may have led to more variance in purchase decisions. Further, we were unable to determine the order in which participants chose items. As such, we are unable to comment on participants' relative prioritization of the products they chose. Some may have been chosen out of immediate desire, others just to spend the totality of the provided money. Future designs based on mate-budget allocation tasks (such as those employed by Li et al., 2002,

and Thomas et al., 2020) would provide for more nuanced conclusions as to which items participants saw as necessities and which they merely purchased because they had leftover funds. Finally, the data were collected for this study during the COVID-19 global pandemic. As such, women's normal routines, and therefore their use of cosmetics, were potentially impacted. While we asked people to indicate their average makeup spending prior to lockdown, their intended spend over the next month would necessarily have been affected by whether they were engaged in their normal routine. This study should be extended when lockdowns ease or at least control for whether someone's cosmetics use routine has changed.

The present study reports a partially exploratory and partially experimental investigation of the relationships between Instagram use, social and sexual strategies variables (including social comparison, intrasexual competitiveness, mate value, and attractiveness), and makeup-related attitudes and behaviors and how these aforementioned factors predict hypothetical and (real-world) intended makeup purchase decisions. Collectively, the data confirm Instagram's role in (hypothetical) purchase decisions and support models of social and intrasexual competitiveness that view women's use of Instagram and cosmetics as vehicles for social comparison and competition. Future studies should investigate the thresholds for exposure to various categories of images to impact self-perception of attractiveness and social status, respectively. Further, more experimental and/or longitudinal data are required to support theory development regarding female social and intrasexual competition, Instagram use and exposure, and makeup use and purchase decisions.

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