Research article

The study of female college students' consumer psychology mechanism toward male celebrity endorsed products: Tempted or coerced?

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A R T I C L E I N F O

A B S T R A C T

The trend of male celebrities endorsing female products is increasing. However, research is lacking on whether this influence is due to the positive emotions generated by the male celebrity's attractiveness or the peer pressure due to mass purchases by the celebrity's fans, and how these effects differ across products with different attributes. This study aims to fill the gap in the existing literature by investigating the influence of male endorsers on female consumers purchase intention, and to deepen the understanding of the mechanisms by which attractiveness and conformity jointly influence purchase decisions. This study used a mixed-design text experiment to investigate the impact of male endorsers' attractiveness and conformity on female college students' positive product attitude and purchase intention for gender-neutral product, female skincare product, and female intimate product, based on the Theory of Planned Behaviour (TPB). The data collected from 456 female college students were analyzed using bootstrap analysis. The study found that both male endorsers' attractiveness and conformity can enhance female college students' positive product attitude and promote their purchase intention for gender-neutral product. However, for female skincare product, male endorsers' attractiveness affects their positive product attitude and purchase intention. Nevertheless, when conformity was present, attractiveness no longer had an effect. Furthermore, for individuals with high levels of loneliness, attractiveness had a detrimental effect on their positive product attitude. On the other hand, conformity had a positive effect by promoting positive product attitude and increasing purchase intention. For female's intimate product, attractiveness did not affect positive product attitude and purchase intention, but the positive effect of conformity remained significant, and both relationships were not moderated by loneliness. It enhances our comprehension of the intricate dynamics underlying the influence of male celebrity endorsements on consumer purchasing decisions, and also offers theoretical justification for the selection of male endorsers for diverse female product.

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1. Introduction

The growing 'she economy' has led to a rise in diverse female aesthetics and increased gender-targeted consumption [1]. Brands are now selecting endorsers who challenge gender norms, with young male celebrities often endorsing traditionally female products, resulting in significant sales success. For instance, Kao's endorsement by Kimura Takuya and Shu Uemura's lipsticks endorsement by Wang Yibo have proven to be highly profitable.

Research indicates that celebrity endorsements can greatly influence consumers' attitudes and purchase intentions [2]. Consumers form perceptions of product quality, based on clues such as the endorser, which can significantly impact their purchase intentions [3]. When the attributes of the endorser, such as gender, are incongruent with the attributes of the product, such as gender-specific features, it can stimulate consumers' fine processing, resulting in positive consumer responses and promoting purchases [4]. For instance, a male celebrity endorser who challenges gender stereotypes can convey more information that is incongruent with the product's feminine attributes, significantly improving consumers' perceptions and evaluations of the product, compared to traditionally feminine ads [5]. However, for certain products that are more private in nature, male celebrity endorsement may not be effective. For example, Chinese stars Luo Zhixiang and Wang Dongcheng received harsh criticism from netizens for endorsing sanitary napkins. However, there is insufficient empirical evidence to determine if male celebrity endorsers who challenge gender stereotypes can consistently improve consumers' perceptions and evaluations of the product in various contexts. It hinders a more profound comprehension of the complex relationship between male celebrity endorsements and female consumer reactions [1,6,7].

The Theory of Planned Behaviour suggests that behavioural intention is influenced by attitude and subjective norms. Attitude reflects an individual's positive or negative evaluation of a specific behaviour, while subjective norms refer to the social pressure [8]. So one of the reasons why celebrity endorsements can influence consumption is the endorser's high attractiveness. This can lead consumers to increase their evaluations of the endorser [9] and the endorsed products [1]. Another possible explanation is the conformity effect. Consumers tend to conform to the behaviour of reference groups when shopping [10]. They often adopt positive attitudes toward products based on the behaviour of reference groups, which significantly increases their purchase intentions [11].

Female college students, a significant and growing consumer group, are influenced by new values and emotional consumption tendencies. While appearance and conformity influence their product attitudes and purchase intentions, research lacks clarity on which has a stronger impact, especially for male celebrity endorsements. This gap hinders understanding of the nuanced effects of celebrity endorsements on purchase decisions and can lead to inaccurate endorser selection.

This study, based on the Theory of Planned Behaviour, examines whether female college students' purchases of products endorsed by male celebrities are driven by the star's attractiveness-induced positive emotions or by the pressure to conform to trends. It aims to reveal how these factors influence purchase intentions and assesses the moderating role of loneliness.

This study used a mixed design, text-based experiment to examine the effects of male celebrity endorser attractiveness and conformity on female college students' attitudes and purchase intentions for three product types: gender-neutral, feminine hygiene, and intimate hygiene products. Results indicate that attractiveness has a contextual effect on purchase intentions, while conformity has a consistent effect. Loneliness moderates the effect of attractiveness on attitudes toward gender-neutral and feminine products, but does not affect the stability of the conformity effect.

The study shows that the effect of attractiveness varies across product contexts, while conformity is consistently found to be effective. Furthermore, the effect of attractiveness is overshadowed by conformity when both factors are present. The study enhances our understanding of how attractiveness and conformity jointly influence purchase decisions and contributes to the development of a more accurate model of consumer behaviour. In addition, this study examines differences in the consumer psychology of female college students toward male celebrity endorsements of gender neutral and female products. It provides theoretical support for the selection of endorsers for different types of feminine products.

2. Conceptual framework and hypotheses

2.1. The direct effect of attractiveness and conformity on purchase intention

In contemporary society, physical attractiveness has become a widespread trend [12]. It is now considered as important as income, occupation, education level, and other indicators [13]. Attractiveness has a halo effect, generating positive emotions and increasing the likelihood of approach behaviour [14]. Dion et al. have described the phenomenon of beauty conferring advantages as the "what is beautiful is good" stereotype [15]. Generally, attractive individuals can elicit positive emotional responses from others and encourage approach behaviour. This effect of attractiveness is also pronounced in the field of consumer behaviour.

The Theory of Planned Behaviour proposes that an individual's attitude influences their purchase intention. Attitude comprises three components: affective, cognitive, and behavioural [9]. Therefore, consumers' emotional experiences, as a significant component of attitude, have a positive relationship with their purchase intention. In the field of personnel selection, individuals with high attractiveness can elicit positive emotional responses [14]. In the consumer domain, it is believed that attractive service personnel can lead to higher customer satisfaction with products [16]. This indicates a more positive emotional state may significantly influences consumers' purchase intention.

Research on consumer behaviour has shown that the physical attractiveness of service personnel has a positive impact on customer response. When faced with attractive service personnel, customers tend to be more satisfied with the products and are more likely to make a purchase [16]. Furthermore, research has shown that the perceived attractiveness of a spokesperson can influence customer

engagement in customer citizenship behaviors [17]. Consumers tend to associate highly attractive spokespersons with the product, which can increase the likelihood of purchase [18].

Additionally, due to the fact that women are generally more emotional [19], celebrity endorsements tend to have a greater impact on female consumers, particularly young women [20]. Studies have found that female college students are more prone to impulsive consumption [21]. Therefore, when the spokesperson is highly attractive, female college students are more likely to have a stronger purchase intention due to the attractiveness of male celebrities.

Therefore, we propose *Hypothesis 1a: Endorser attractiveness has a significant positive effect on purchase intention among female college student consumers.*

The Theory of Planned Behaviour suggests that behavioural intention is influenced by attitude and subjective norms [9]. Subjective norms refer to the social pressures that an individual experiences. Does the purchase intention arise from the attractiveness of celebrity endorsements, or from the impact of conformity? [22] Consumer conformity refers to the phenomenon where individuals modify their product evaluations, purchase intentions, or purchase behaviour to align with others [23]. Scholars have noted that consumers engage in conformist consumption by referencing the behaviours of their peers while shopping [24]. For example, researchers have observed a significant trend of conformity in online book purchases [25]. Both informational and normative social influence have a significant impact on consumers' impulsive buying behaviour [26]. Individual can be influenced by those who are important to them, such as friends, partners and family members [27]. The attitude, intentions and behaviour of online shoppers are significantly influenced by these individuals [24].

Companies often choose celebrities with significant market influence for endorsements, which can result in consumer conformity within fan communities. Consumers often form communities around their favorite celebrities, leading to collective purchasing behaviour for endorsed products [28]. Celebrity endorsements have a greater impact on young women [21]. Female college students may feel pressured to buy products endorsed by celebrities due to the desire for social identification and comparison with their peers.

Therefore, we propose *Hypothesis 1b: Conformity to male celebrity-endorsed products purchasing has a significant positive affect on purchase intention among female college student consumers.*

2.2. The mediating effect of positive attitude toward the product

The theory of planned behaviour posits that attitude is a crucial factor that influences behavioural intention and behaviour [9]. In the consumer decision-making process, product attitude has a significant predictive power for purchase intention and behaviour. Empirical research also demonstrates a positive correlation between positive attitude and consumer purchase intention [29].

Attitude is composed of affective, cognitive, and conative. These components can directly control and predict human behaviour [30]. For example environmental stimuli in shopping malls can affect consumers' emotional states and thereby influence their purchasing behaviour [31]. The study found that others' economic evaluations and perceptions of a product can influence an individual's risk attitude toward the product, which in turn affects their willingness to purchase [32]. From a cognitive perspective, the higher a consumer's brand identification, the higher their purchase intention [33].

Therefore, we propose *Hypothesis 2: Positive attitude has a significant positive influence on purchase intention among female college student consumers.*

Previous research has shown a significant correlation between endorser attractiveness and consumer attitudes toward products [34]. People may choose similar individuals as comparison targets during social comparison [35]. Therefore, this study hypothesises that female college students are generally less affected by this psychological mechanism due to gender differences. In other words, the high attractiveness of male endorsers is less likely to create a sense of distance among female college student consumers, thereby reducing their positive attitude toward the product.

However, persuasion and influence can be significantly impacted by the familiarity, liking, and similarity between the audience and the source. When consumers perceive an endorser as highly attractive, they tend to develop positive feelings toward them, which increases the likeability of the source. As a result, consumers are more likely to be "persuaded" and develop a positive attitude toward the product [36]. A positive attitude toward the product significantly impacts on purchase intention. Consequently, consumers evaluate the attractiveness and credibility of the product based on the endorser's appearance, which then shapes their attitude toward the product and influences their purchase intention. The endorser's attractiveness may influence consumers' perceptions of the product's quality and value, thereby influencing their purchase intention [34]. Furthermore, brand logo design influences positive consumer responses through its aesthetic appeal [37]. This suggests that high attractiveness can have a positive impact on consumer attitudes and, subsequently, their purchase intentions.

According to the Theory of Planned Behaviour, it can be inferred that female college students' perception of a product's quality and value, influenced by the endorser's attractiveness, can lead to a positive attitude towards the product and subsequently increase their purchase intention.

Therefore, we propose *Hypothesis 3a: Positive product attitude mediates the relationship between the attractiveness of the endorser and the purchase intention of female college student consumers.*

The Theory of Planned Behaviour proposes that an individual's behavioural intentions are influenced by subjective norms, which are the perceived social pressures [9]. Users' attitudes, purchase intentions, and their usage behaviours are significantly influenced by those who are important to them [24]. Upon receiving information about others' product evaluations, purchase intentions, or purchase behaviours, consumers tend to adjust their own product evaluations to align with those of others [23]. Previous research has shown that heuristic social cues from others can, to some extent, reduce customers' perceived uncertainty and risk when visiting online stores, thereby promoting the development of trust [38]. These social cues from others can be based on online interpersonal communication

or simple co-presence without communication. External group consumer behaviour can positively influence consumers' attitudes toward the product [39].

However, consumers' positive attitude have a significant impact on their purchase intention [40]. Therefore, consumers' conformity may influence their purchase intention through the mediation of product attitude.

Research has investigated the influence of celebrity endorsement on the purchase behaviour of consumer groups in China [41]. In this context, college students frequently make purchases without considering whether the products meet their actual needs. This is often due to conformity or being attracted by internet celebrities [42]. Celebrity endorsement of products leads to mass purchases within fan communities, which can trigger a conformity effect among general consumers. As a result of the conformity effect, consumers tend to evaluate products more positively and have a stronger intention to purchase. Therefore, when male celebrities endorse products, female college students may perceive the quality and value of the products more positively due to conformity, resulting in a positive product attitude and purchase intention.

Therefore, we propose *Hypothesis 3b: Positive product attitude mediates the relationship between conformity and the purchase intention of female college students.*

2.3. The moderating role of loneliness

Loneliness has a moderating effect on compensatory consumption psychology exists in consumer behaviour. This occurs when individuals may intentionally or unintentionally use consumption behaviour to compensate for threatened needs and achieve an ideal psychological state [43]. When their interpersonal relationships are unsatisfactory, they may engage in compensatory consumption to compensate for psychological inadequacies or to reduce self-threats [44]. This can make them more prone to impulsive consumption [45]. However, it is important to note that these two psychological factors are not necessarily contradictory. It is possible that both factors play a role in the influence of male celebrity endorsement on female college students' consumer behaviour.

Loneliness is negatively correlated with self-esteem [46,47]. This means that individuals with higher levels of loneliness often have lower self-esteem. In the realm of consumer behaviour, this psychological state may influence perceptions of brand endorsers. The use of highly attractive male endorsers may create a sense of distance between the endorser and the consumer. This psychological mechanism suggests that an endorser's attractiveness advantage may not always lead to a positive attitude among consumers, especially those who experience high levels of loneliness. Individuals with high levels of loneliness may exhibit lower product attitudes when presented with highly attractive endorsers, as they tend to have lower self-esteem, which makes the sense of distance created by highly attractive male endorsers more pronounced. Therefore, it is possible that loneliness could diminish the impact of endorser attractiveness on consumers' positive attitude toward products. This suggests that individuals with high levels of loneliness may exhibit lower product attitudes when presented with highly attractive endorsers.

Therefore, we propose *Hypothesis 4a: Loneliness negatively moderates the effect of male celebrity attractiveness on the positive product attitude of female college students, i.e., for female college students with high levels of loneliness, the positive effect of endorser attractiveness on their positive attitude toward the product will be weaker.*

Individuals with high levels of loneliness are more likely to engage in compensatory consumption as a means of emotional compensation. When their interpersonal relationships fail to meet their needs, they may resort to compensatory consumption to fill psychological voids or reduce self-threat [44].When consumers feel lonely, they are more likely to conform to others, which increases their interest and confidence in online shopping [48]. Loneliness may cause individuals to pay more attention to social interaction and social identity [49]. Therefore, conformity may be a means of satisfying these needs, promoting consumers' integration into social groups, and increasing liking and identification with the product [50]. Therefore, when individuals feel lonely, they may conform to others in order to enhance their social identity, leading to the conformity effect and strengthening their positive attitude toward the product. Second, loneliness can impact consumers' processing methods and attentional bias toward social information [51]. This attentional bias in attention may make consumers more sensitive to social cues. For instance, when individuals feel lonely, they may be more inclined to seek and maintain social relationships with those around them, making them more susceptible to the influence of others' purchases and use of a particular product, and therefore more likely to conform.

In summary, loneliness enhances the effect of conformity, meaning that female college students with high levels of loneliness can alleviate their feelings of loneliness by imitating the purchasing behaviours of others, while at the same time gaining a sense of virtual social belonging. As a result, the influence of conformity factors on their positive product attitude is greater.

Therefore, we propose *Hypothesis 4b: Loneliness positively moderates the effect of conformity in male celebrity endorsements on the positive product attitude of female college students., i.e. for female college students with high levels of loneliness, the positive effect of conformity will have a greater impact on their positive attitude toward the product.*

2.4. Moderated mediation

Based on the above discussion, it can be inferred that female college student consumers' perception of high endorser attractiveness leads to a more positive attitude toward the product, resulting in a higher purchase intention. However, the effect of attractiveness on their positive attitude toward the product decreases as their level of loneliness increases. For female college students with high levels of loneliness, the effect of attractiveness on purchase intention also decreases due to the mediating role of positive attitude toward the product,

Therefore, we propose *Hypothesis 5a: Loneliness negatively moderates the mediating effect of positive product attitude on the relationship between male celebrity attractiveness and purchase intention among female college students., i.e. for female college students with high levels of*
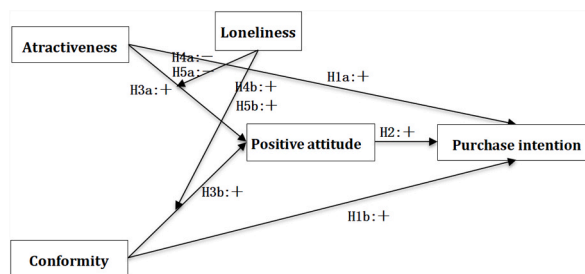
Fig. 1. Research model.

loneliness, the impact of endorser attractiveness on purchase intention through positive attitude toward the product will be weaker.

In a context where female college students are exposed to celebrity-endorsed products, conformity can promote a more positive attitude towards the product. This effect is amplified as their level of loneliness increases. Conformity has a greater impact on purchase intention for females with high levels of loneliness due to the mediating role of positive attitude toward the product.

We propose *Hypothesis 5b: Loneliness moderates the relationship between conformity to male celebrity endorsements and purchase intention among female college students. Specifically, for female college students with high levels of loneliness, the impact of conformity on purchase intention through positive attitude toward the product will be stronger.*

The research model diagram is shown in Fig. 1.

3. Experimental design and implementation

3.1. Experimental design

Laboratory experiments enables researchers to randomly assign participants and control for extraneous variables, thereby increasing the internal validity of research conclusions [52]. This study employed the experimental method to control the influence of extraneous variables and to clarify the causal relationships between variables. Two between-group experiments were conducted using a mixed experimental design. The first group featured a high attractiveness male endorser, while the second group featured a normal attractiveness male endorser. Within each group, three different products were tested: no gender difference, feminine cosmetics, and feminine intimate products. The mixed design included both between-subject and within-subject variables, combining the strengths of both between-subject and within-subject designs. This approach not only saved time for participants, but also improved experimental accuracy by controlling irrelevant variables.

The experiment selected celebrity endorsers, advertised products, and participants on two widely used social media platforms in China, Weibo and Douyin. These platforms are frequented by female college students and contain numerous product advertisements. Male celebrities were selected based on factors such as the number of followers, likes, and comments. Five male celebrities with high attractiveness and popularity and five with average attractiveness but high popularity were selected from each platform. Afterwards, fifty female students from four universities were then randomly selected and interviewed to make their choices. Finally, the study selected two male stars from Chinese TV and film who are well-known to college students. The stars have significant differences in attractiveness but similar levels of popularity, were selected for the study. (Both male stars are well-known to local college students, and the experimental photos are clear. However, to avoid any unnecessary disputes, their identities will remain anonymous.)

The study standardized three product categories for the two male celebrities who endorse different types of products. After careful research and consideration to ensure consistency with real-life scenarios, 'Dun Dun Barrel' water bottle was selected as a gender-neutral product and 'Pechoin' face cream was selected as a product with feminine characteristics. Both were real products endorsed by the highly attractive male celebrity. An experimental product with feminine attributes was chosen to be menstrual pads.

"Endorsement" posters featuring male endorsers with identical compositions were created using Photoshop. Two purchase scenarios were presented for each product: one with lots of people around talking about and buying the product, and one with few people around. This was done to manipulate conformity. The goal was to encourage questionnaire respondents to make choices based on their real-life experiences.

The questionnaire administered to the high average group included two real products, 'Dun Dun Barrel' water bottle and 'Pechoin' facial cream, both of which are real products endorsed by highly attractive male celebrities. This allowed for a direct investigation of the actual level of conformity without the need to set up a conformity scenario group. The only exception was the menstrual pad, which was the experimental product for female privacy attributes and was placed in a conformity situation with four scenarios within the group. Within the low average group. Both conformity and non-conformity situations were set for all three products, resulting in six scenarios within the group.

3.2. Measurement

The questionnaire comprises three sections. The first section requests basic information, including grade level, major, hometown, and monthly living expenses. Grade level options include freshman, sophomore, junior, senior, first-year graduate student, second-year

graduate student and third-year graduate student. As consumption levels in different regions may be influenced by urban economic development or cultural factors, participants' hometowns are classified as first-tier cities, second-tier cities, third-tier cities, or other options. To investigate female college students' propensity to consume, we considered their average monthly living expenses, so we investigate this with options ranging from 1000 yuan or less, 1001–1499 yuan, 1500–1999 yuan, 2000–2499 yuan, 2500–2999 yuan, to over 3000 yuan. Additionally, we inquired about the participants' fandom of the male celebrity to account for potential fan influence. These variables are then utilized as control variables.

The second part measures levels of loneliness, while the third part collects respondents' ratings of male celebrities of varying levels of attractiveness as endorsers. Text experiments are used to gather conformity data by setting up different scenarios, and product attitude and purchase intention are measured for three different types of products.

In this study, the questionnaire was selected from a general, brief scale with high reliability and validity to reduce response time and increase data efficiency. We selected scales developed in China and, for those without a domestic version, we chose commonly used Chinese translation versions.

The attractiveness scale was adapted from Ohanian's (1990) research and consists of three items: "I think this male endorser is handsome," "I think this male endorser is attractive," and "I think this male endorser is very good-looking." [53].

The conformity scale was developed by Cha Xianjin, Zhang Kun, and Yan Yalan (2022) and includes three items: "Many people around me use this product," "This product has received a lot of positive reviews," and "Many people around me talk about this product." [54].

Attitude toward the product scale was developed by Makenzie and Lutz (1989) and includes three items: "I think this is a great product," "I like this product," and "I have a positive attitude toward this product." [55].

The product attitude scale was developed by Guo Hailing, Zhao Ying, and Shi Haiyan (2019) and includes three items: "I am very likely to buy this product," "I will consider buying this product in the future," and "I tend to buy this product." [56].

The loneliness scale was developed by Lao Ke Fu and Ma Yue Chao (2022) and consists of three items: "I feel neglected in my life," "I often feel lonely," and "I lack friendship in my daily life." [57].

The survey employed a 5-point Likert scale, with responses ranging from 'strongly disagree' to 'strongly agree' on a scale of 1–5.

3.3. Data collection

All respondents voluntarily completed the questionnaire and provided verbal consent. The data analysis process was anonymous. To enhance the questionnaire design and determine the appropriate sample size for the formal survey, a pilot study was conducted at East China Jiaotong University prior to the formal survey. 100 female college students were invited to complete the questionnaire, and 85 valid questionnaires were collected, resulting in an effective response rate of 85%.

Reliability tests were conducted on the data from the pilot study. The reliability coefficients for the attractiveness scale, conformity scale, product attitude scale, purchase intention scale, and loneliness scale were 0.955, 0.909, 0.901, 0.936, and 0.860, respectively. These results indicated good reliability for each scale.

The required sample size for each group was determined using GPower software based on an independent samples t-test with an effect size of 0.5, an alpha level of 0.05 and a power of 0.80. A sample size of 128 participants was required for each product group.

Participants were recruited for the experiment through paid recruitment advertisements posted in QQ groups at 12 universities in Jiangxi Province. The target audience was female college students who had purchased products endorsed by male celebrities at least three times in the previous six months. After selecting willing participants, 500 female college students from 12 universities in Jiangxi Province were enrolled in the study. After identifying the participants, they were assigned random numbers and sorted from highest to lowest. The paticipants were then divided into two groups for the experiment. The data collected after the experiment was screened to exclude questionnaires with response times below 70 s, duplicate IP addresses, and scores more than three standard deviations from the mean. 456 valid questionnaires were returned, resulting in an effective response rate of 91.2%. The study included 184 participants for the general product group, 140 in the skincare product group and 132 in the intimate product group, all of whom met the sample size requirements.

4. Data analysis

Descriptive statistics were performed on the experiment's questionnaires obtained from the experiment using SPSS 26.0 to obtain Z-scores. Questionnaires with absolute values greater than 3 were excluded. All the data obtained were found to be normally distributed and to have homogeneity of variance, allowing for data analysis to be carried out.

4.1. Gender-neutral product

4.1.1. Reliability test
The Cronbach's alpha coefficients for the reliability test in this group were all above 0.8. The reliability coefficients for attractiveness, conformity, positive attitude toward the product, purchase intention, and loneliness scale were 0.962, 0.924, 0.923, 0.919, and 0.857, respectively, indicating good internal consistency.

4.1.2. Common method bias analysis
According to Podsakoff et al. (2003), if the variance explained by the first unrotated factor is less than 50% [58], it can be concluded

that there is no significant common method bias. In this study, we conducted an unrotated factor analysis on all items in the gender-neutral product group using Harman's single-factor test with SPSS 26.0 software. The data did not exhibit any significant common method bias, as the variance explained by the first unrotated factor was 45.244%, which was below the 50% threshold.

4.1.3. Mean comparison

Independent samples t-tests were performed using SPSS26.0 to compare the attractiveness scores and conformity scores between different groups, and separate analyses were performed to compare product attitude and purchase intention.

(1) Attractiveness

The study compared the differences in product attitude and purchase intention between the high and low male celebrity attractiveness groups. The mean attractiveness score for the high attractiveness group was 3.333, while the mean score for the low attractiveness group was 2.931. The difference between the means of the two groups was statistically significant ($p < 0.05$).

As shown in Fig. 2, product attitude and purchase intention were significantly higher (3.837 and 3.563, respectively) when a highly attractive male celebrity was used as an endorser, compared to 2.669 and 2.434 when a less attractive male celebrity was used as an endorser. The results of the independent samples t-tests showed that the p-values were both 0.000, indicating that male celebrity attractiveness had a positive influence on gender-neutral product attitude and purchase intention. This supports hypotheses 1a and 3a.

(2) Conformity

The high attractiveness male celebrity group was divided into low and high conformity groups based on a mean score of 2.484. Meanwhile the low attractiveness male celebrity group was divided into conformity and non-conformity groups based on situational settings. The low conformity group had a mean score of 1.656, while the high conformity group had a mean score of 3.367. The difference between the means of the two groups was significant ($p < 0.001$).

As shown in Fig. 2, product attitude and purchase intention were significantly higher ($p < 0.05$) when perceived conformity was high, with scores of 3.352 and 3.086 respectively, compared to when perceived conformity was low, with scores of 2.583 and 2.358. Independent samples t-tests showed that the p-values were both less than 0.05, indicating that conformity has a positive effect on product attitude and purchase intention for products without gender differences. Hypotheses 1b and 3b were preliminarily tested.

4.1.4. Results of correlation analysis

To explore the relationships between variables, correlation analysis is used. After ensuring the correlations between the variables, bootstrap analysis for mediation and moderation effects should be conducted.

Pearson correlation tests were conducted on the variables using SPSS 26.0. The results are presented in Table 1. As shown in Table 1, which shows a significant positive correlation between endorser attractiveness and product attitude for gender-neutral products ($r = 0.489$, $p < 0.001$), as well as purchase intention ($r = 0.390$, $p < 0.001$). A significant positive correlation was found between conformity and attitude toward the product ($r = 0.651$, $p < 0.001$) as well as purchase intention ($r = 0.572$, $p < 0.001$). Additionally, a significant positive correlation was observed between product attitude and purchase intention ($r = 0.749$, $p < 0.001$). These results offered preliminarily support for the hypotheses.
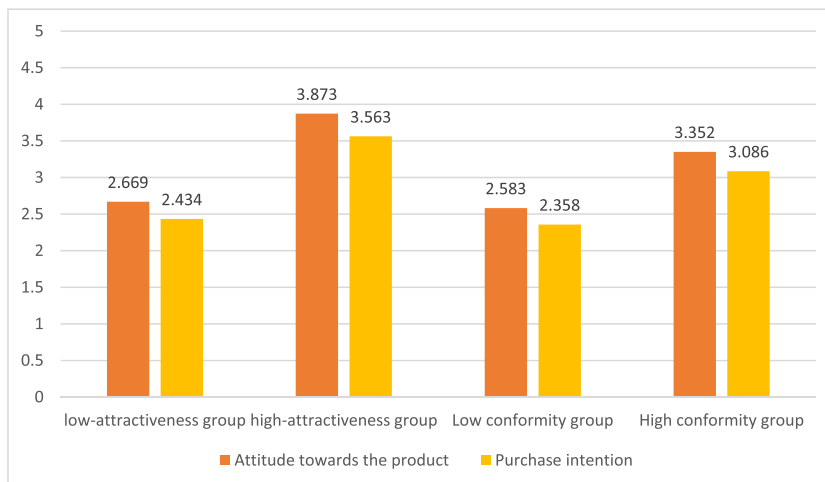

Fig. 2. Comparison of means for product attitude and purchase intention among different attractiveness levels and high/low conformity scores.

Table 1
Correlation analysis results.

	Mean	Standard Deviation	Grade	Major	Hometown	Monthly living expenses	Idol Dorship	Attractiveness	Conformity	Positive attitude	Purchase intention	Loneliness
Grade	2.636	1.021										
Major	3.147	1.982	−0.095									
Hometown	2.212	0.914	−0.040	0.052								
Monthly lLiving eExpenses	2.815	1.101	0.246[b]	−0.013	−0.195[b]							
Idol Worship	2.228	1.117	0.069	−0.018	0.086	−0.152[a]						
Attractiveness	3.029	1.030	−0.172[a]	−0.003	0.146[a]	−0.143[a]	0.675[c]					
Conformity	2.484	1.039	0.059	−0.181[a]	0.058	−0.175[a]	0.399[c]	0.174[a]				
Positive Attitude	2.955	0.820	−0.072	−0.088	0.086	−0.153[a]	0.504[b]	0.489[c]	0.651[c]			
Purchase Intention	2.710	0.924	−0.074	−0.065	0.162[a]	−0.101	0.472[c]	0.390[c]	0.572[c]	0.749[c]		
Loneliness	2.437	0.794	−0.102	−0.169[a]	0.053	−0.149[a]	−0.018	0.157[a]	−0.040	0.126	0.133	

Note: n = 184.
[a] $p < 0.05$.
[b] $p < 0.01$.
[c] $p < 0.001$.

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Table 2
Bootstap analysis.

Control Variable	Positive Attitude				Positive Attitude				Purchase Intention			
	β	p	SE	[LLCU, ULCI]	β	p	*SE*	[LLCU, ULCI]	β	p	SE	[LLCU, ULCI]
Grade	−0.047	0.262	0.042	[-0.129,0.035]	−0.039	0.370	0.042	[-0.123,0.046]	−0.063	0.184	0.047	[-0.157,0.030]
Major	0.027	0.198	0.021	[-0.014,0.068]	0.014	0.517	0.021	[-0.028,0.055]	0.002	0.935	0.023	[-0.043,0.047]
Hometown	−0.008	0.858	0.044	[-0.095,0.079]	0.002	0.959	0.045	[-0.087,0.092]	0.108	0.324	0.050	[0.009,0.206]
Monthly Living Expenses	0.028	0.471	0.039	[-0.048,0.104]	0.024	0.541	0.040	[-0.054,0.102]	0.058	0.183	0.043	[-0.028,0.143]
Idol Worship	0.055	0.309	0.054	[-0.051,0.161]	0.046	0.403	0.055	[-0.063,0.155]	0.126	0.038	0.060	[0.007,0.246]
Independent Variable												
Attractiveness	0.606	0.000	0.118	[0.372,0.839]	0.246	0.000	0.058	[0.131,0.361]	−0.045	0.501	0.066	[-0.175,0.086]
Conformity	0.437	0.000	0.044	[0.351,0.523]	0.597	0.000	0.113	[0.375,0.820]	0.123	0.047	0.061	[0.002,0.244]
Mediator Variable												
Positive Attitude									0.679	0.000	0.082	[0.517,0.842]
Moderator Variable												
Loneliness	0.618	0.000	0.162	[0.299,0.938]	0.239	0.040	0.116	[0.011,0.468]				
Interaction Term												
Loneliness* Attractiveness	−0.151	0.001	0.045	[-0.240,-0.061]								
Loneliness * Conformity					−0.057	0.203	0.044	[-0.144,0.031]				
R^2	0.607				0.586				0.599			
F	29.822	0.000			27.320	0.000			32.615	0.000		

Note: n = 184.

4.1.5. Bootstrap analysis

The bootstrap method is a powerful statistical and machine learning tool that generates multiple samples by resampling with replacement. This allows each data point to potentially be used multiple times or excluded in multiple iterations, thus making more use of the given data set. In stepwise regression, model selection can be affected by data partitioning and selection bias. The bootstrap method reduces this bias through random sampling [59].

Therefore, in this study, the Process plugin in SPSS 26.0 was used to validate and analyze Model 7 using the bootstrap method with 1000 resamples. Controlling for attractiveness and conformity, the effects on positive attitude and purchase intention were obtained, as presented in Table 2.

(1) Direct effect

As shown in Table 2, the direct effect of attractiveness on purchase intention of gender-neutral products was not significant ($\beta = -0.045$, $p > 0.05$). The direct effect of conformity on purchase intention of gender-neutral products was significantly positive ($\beta = 0.123$, $p < 0.05$). Therefore, Hypothesis 1a was not confirmed and hypothesis1b was confirmed.

(2) Indirect effect

As shown in Table 2, when conformity was used as a control variable, attractiveness had a significant positive effect on the positive attitude toward gender-neutral products ($\beta = 0.606$, $p < 0.001$). However, the influence of attractiveness was no longer significant ($\beta = -0.045$, $p > 0.05$), when the positive attitude toward products was included in the model. Nevertheless, the positive attitude significantly affected purchase behaviour ($\beta = 0.679$, $p < 0.001$), indicating that the positive attitude plays a significant mediating role between attractiveness and purchase intention. Hypotheses 2 and 3a were supported.

When attractiveness was used as a control variable, conformity had a significantly positive effect on the positive attitude ($\beta = 0.597$, $p < 0.001$). However, when the positive attitude toward products was included in the model, the impact of conformity was greatly weakened ($\beta = 0.123$, $p < 0.05$). This suggested that the positive attitude partially mediates the relationship between conformity and purchase intention ($\beta = 0.679$, $p < 0.001$). Hypotheses 2 and 3b were confirmed.

The impact of attractiveness on purchasing intentions was found to be insignificant ($\beta = -0.045$, $p > 0.05$) after including a positive attitude toward products. However, conformity still had a significant positive effect on purchase intention ($\beta = 0.123$, $p < 0.05$). Therefore, when male celebrities endorse gender-neutral products, consumers' purchase intention is positively affected by the product's attractiveness, which in turn positively influences their attitude towards the product. Additionally, conformity can also impact consumers' purchasing behaviour by mediating their positive attitude and directly influencing their purchase intention.

As mentioned above, when female college students who purchase gender-neutral products endorsed by male celebrities are positive influenced by both the appearance factor and the conformity factors. However, the conformity factor has a greater influence than the spokesperson's attractiveness, indicating "be coerced".

(3) Moderating Effects

The interaction between attractiveness and loneliness had a significant negative effect on the positive attitude toward products ($\beta = -0.151$, $p < 0.01$). This suggested that loneliness significantly reduces the effect of attractiveness on the positive attitude toward products. Hypothesis 4a was supported.

However, the interaction between conformity and loneliness had no significant effect on the positive attitude toward products ($\beta = -0.057$, $p > 0.05$). This suggested that loneliness does not affect the impact of conformity on the positive attitude toward products.
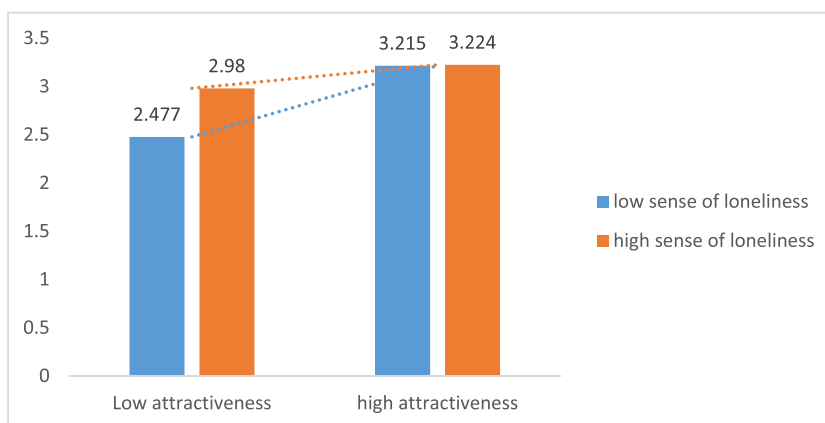

Fig. 3. Moderating effect of loneliness on the relationship between endorser attractiveness and product attitude.

Hypothesis 4b was not supported.

The study also analyzed the moderating effect of loneliness on the relationship between attractiveness and product attitude, as shown in Fig. 3. For female college students with high levels of loneliness, there was no significant difference in product attitude between high and low attractiveness endorsers, with scores of 3.224 and 2.980, respectively. However, for female college students with low levels of loneliness, product attitude was significantly higher for high than for low attractiveness endorser, with scores of 3.218 and 2.477, respectively. This suggested that loneliness negatively moderats the relationship between endorser attractiveness and product attitude for products with no gender differences endorsed by male celebrities.

(4) Moderated Mediation Effect

The moderated mediation effect of was established, CI = [−0.175, −0.041]. When the level of loneliness was low, the effect size of celebrity attractiveness on purchase intention through positive product attitude was 0.243, CI = [0.163, 0.340]. At the moderate level of loneliness, the effect size was 0.243 (95% CI [0.163, 0.340]). At a moderate level of loneliness, the effect size was 0.162 (95% CI [0.085, 0.242]). However, when loneliness was high, the effect size was 0.081 (95% CI [−0.014, 0.184]), which was no longer significant. Thus, for female college students with lower levels of loneliness, the mediating effect of male celebrity endorsement attractiveness on gender-neutral product purchase intention through positive product attitude is negatively moderated by loneliness. This means that as loneliness increases, the impact of celebrity attractiveness on purchase intention for gender-neutral products through positive product attitude decreases until it vanishes. Hypothesis 5a was confirmed.

4.2. Female skincare product

4.2.1. Reliability test

The Cronbach's alpha coefficients of this group were all greater than 0.8, indicating good internal consistency. Specifically, the reliability coefficients of the attractiveness, conformity, product attitude, purchase intention, and loneliness scales were 0.963, 0.910, 0.891, 0.933, and 0.893, respectively.

4.2.2. Common method bias analysis

We conducted an unrotated factor analysis on all items in the female skincare product group using Harman's single-factor test with the SPSS 26.0 softwareto analyze common method bias. The data did not show any significant common method bias, as the first unrotated factor explained only 44.271% of the variance, which is below the 50% threshold [58].

4.2.3. Mean comparison

The study employed independent samples t-tests in SPSS26.0 to compare the attractiveness scores and conformity scores of different groups. Additionally, product attitude and purchase intention were analyzed separately.

(1) Attractiveness

The attractiveness scores of high attractiveness celebrity and low attractiveness celebrities were compared separately to analyze the differences in product attitude and purchase intention. The mean attractiveness score for the high attractiveness group was 4.197, which was significantly higher than the mean score of 2.425 for the low attractiveness group ($p < 0.05$).
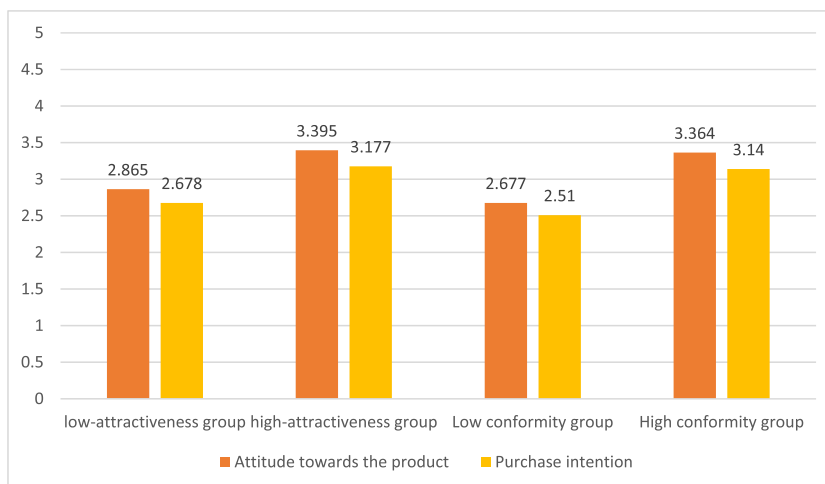

Fig. 4. Comparison of means for product attitude and purchase intention among different attractiveness levels and high/low conformity scores.

Table 3
Correlation analysis.

	Mean	Standard Deviation	Grade	Major	Hometown	Monthly living expenses	Idol Dorship	Attractiveness	Conformity	Positive attitude	Purchase intention	Loneliness
Grade	2.686	0.997										
Major	3.121	2.062	−0.100									
Hometown	2.136	0.850	−0.136	0.019								
Monthly Living Expenses	2.929	1.136	0.241[b]	0.038	−0.154							
Idol Worship	2.293	1.116	−0.078	−0.081	0.087	−0.256[b]						
Attractiveness	3.045	1.038	−0.130	−0.013	0.142	−0.276[b]	0.715[c]					
Conformity	2.648	0.901	−0.122	−0.016	−0.012	−0.201[a]	0.270[b]	0.215[a]				
Positive Attitude	3.050	0.789	−0.160	0.055	0.201[a]	−0.181[a]	0.477[c]	0.428[c]	0.643[c]			
Purchase Intention	2.852	0.874	−0.095	0.156	0.172[a]	−0.052	0.477[c]	0.400[c]	0.531[c]	0.797[c]		
Loneliness	2.438	0.834	−0.044	−0.113	−0.013	−0.271[b]	−0.05	0.168[a]	0.036	0.009	−0.090	

Note: n = 140.
[a] $p < 0.05$.
[b] $p < 0.01$.
[c] $p < 0.001$.

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Table 4
Bootstrap analysis.

Control Variable	Positive Attitude				Positive Attitude				Purchase Intention			
	β	p	SE	[LLCU, ULCI]	β	p	SE	[LLCU, ULCI]	β	p	SE	[LLCU, ULCI]
Grade	−0.032	0.492	0.046	[-0.123,0.060]	−0.023	0.642	0.049	[-0.119,0.074]	0.021	0.644	0.046	[-0.070,0.112]
Major	0.037	0.106	0.023	[-0.008,0.082]	0.015	0.496	0.023	[-0.029,0.060]	0.045	0.037	0.022	[0.003,0.088]
Hometown	0.141	0.009	0.053	[0.036,0.247]	0.164	0.004	0.055	[0.055,0.273]	0.043	0.433	0.054	[-0.065,0.150]
Monthly Living Expenses	0.041	0.343	0.044	[-0.045,0.127]	0.037	0.413	0.045	[-0.052,0.127]	0.097	0.021	0.042	[0.015,0.180]
Idol Worship	0.145	0.016	0.059	[0.028,0.262]	0.156	0.012	0.061	[0.035,0.278]	0.102	0.087	0.059	[-0.015,0.218]
Independent Variable												
Attractiveness	0.525	0.000	0.134	[0.260,0.791]	0.101	0.128	0.066	[-0.029,0.231]	0.027	0.667	0.062	[-0.096,0.149]
Conformity	0.479	0.000	0.052	[0.377,0.581]	0.685	0.000	0.136	[0.416,0.953]	0.079	0.227	0.065	[-0.050,0.209]
Mediator Variable												
Positive Attitude									0.756	0.000	0.083	[0.592,0.920]
Moderator Variable												
Loneliness	0.570	0.001	0.174	[0.227,0.914]	0.210	0.181	0.156	[-0.099,0.520]				
Interaction Term												
Loneliness* Attractiveness	−0.174	0.001	0.049	[-0.271,-0.077]								
Loneliness * Conformity					−0.085	0.127	0.056	[-0.196,0.025]				
R^2	0.597				0.566				0.676			
F	21.422	0.000			18.850	0.000			34.147	0.000		

Note: n = 140.

Fig. 4 shows that the scores for attitude towards the product and purchase intention were higher for the high attractiveness celebrity endorsement group (3.395 and 3.180, respectively) than for the low attractiveness celebrity endorsement group (2.865 and 2.678, respectively). Independent sample t-tests showed that both results were statistically significant ($p < 0.001$), indicating that endorser attractiveness has a positive effect on product attitude and purchase intention for women's skincare products. Therefore, hypotheses 1a and 3a were preliminarily verified.

(2) Conformity

The high attractiveness group was divided into low and high conformity groups based on the mean score of 2.647. Meanwhile, the low attractiveness group was divided into conformity and non-conformity groups according to the situational setting. The mean score of the low conformity with high attractiveness and the non-conformity group of low attractiveness was 1.844. In contrast, the high conformity group of high attractiveness and conformity group of low attractiveness had a mean score of 3.325, showing a significant difference between the two groups ($p < 0.001$).

As shown in Fig. 4, scores of attitude toward the product and purchase intention for high conformity were 2.510 and 3.140, respectively, which were both higher than those for low conformity with scores of 2.677 and 3.364, respectively. The independent sample t-tests yielded significant results ($p = 0.000 < 0.001$), indicating that conformity has a positive effect on product attitude and purchase intention for women's skincare products. Hypotheses 1b and 3b were preliminarily verified.

4.2.4. Results of correlation analysis

Pearson product-moment correlation tests were conducted on the variables in the female skincare product group using SPSS 26.0. As shown in Table 3, there was a significant positive correlation between celebrity endorser attractiveness and product attitude ($r = 0.173$, $p < 0.05$), as well as purchase intention ($r = 0.423$, $p < 0.001$), after conducting a correlation analysis on variables in the women's skincare product group. Conformity was also significantly positively correlated with product attitude ($r = 0.421$, $p < 0.001$) and purchase intention ($r = 0.537$, $p < 0.001$). Additionally, there was a significant positive correlation between product attitude and purchase intention ($r = 0.801$, $p < 0.001$). These results provided preliminary support for all hypotheses.

4.2.5. Bootstrap analysis

To further estimate the relationships between the variables in the model, Bootstrap analysis was performed following the same procedure as in the gender-neutral product group. The validation results are shown in Table 4.

(1) Direct Results

The study found that there was no significant direct effect of attractiveness ($\beta = 0.027$, $p > 0.05$) or conformity ($\beta = 0.079$, $p > 0.05$) on purchase intention for skincare product. As a result, Hypotheses 1a and 1b were not supported in the skincare product group.

(2) Indirect Results

When conformity was the control variable, attractiveness had a significant positive effect on product attitude ($\beta = 0.525$, $p < 0.001$). After product attitude was included in the model, it positively influenced purchase intention ($\beta = 0.781$, $p < 0.001$). The effect of attractiveness became insignificant ($\beta = 0.027$, $p > 0.05$). Therefore, Hypotheses 2 and 3a were supported in the skincare product
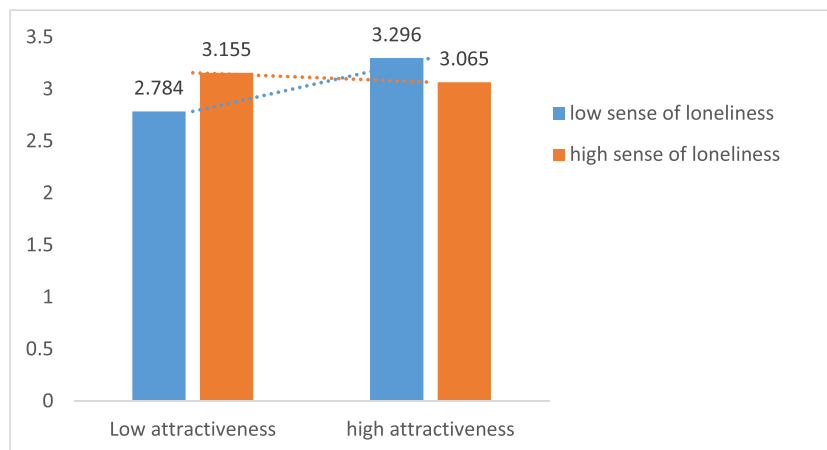

Fig. 5. Moderation effect of loneliness on the relationship between male celebrity endorser attractiveness and product attitude for skincare products.

group.

When attractiveness was used as the control variable, the results showed that conformity had a significant positive effect on product attitude ($\beta = 0.685$, $p < 0.001$). However, when product attitude was included in the model, the impact of attractiveness on purchase intention remained significant ($\beta = 0.027$, $p > 0.05$), while the effect of conformity became insignificant ($\beta = 0.079$, $p > 0.05$). This suggested that product attitude fully mediates the relationship between conformity and purchase intention of skincare products ($\beta = 0.756$, $p < 0.001$). Therefore, Hypotheses 2 and 3b were confirmed.

In summary, the positive effect of conformity on product attitude is much greater than that of appearance. Additionally, for female skincare products endorsed by male celebrities, conformity influences consumers' purchase intention through its positive effect on product attitude. This suggests that female college students are more likely to be "coerced", when purchasing female skincare products endorsed by male celebrities.

(3) Moderation Results

The negative interaction between attractiveness and loneliness on the positive attitude toward products was significant ($\beta = -0.174$, $p < 0.01$), with loneliness having a significant negative moderating effect, confirming Hypothesis 4a.

However, the interaction between conformity and loneliness on the positive attitude toward products was not significant ($\beta = -0.085$, $p > 0.05$), indicating that the moderating effect of loneliness is not significant. Thus, as loneliness increased, conformity did not significantly affect the positive attitude toward the product, and Hypothesis 4b was not supported.

The study analyzed the moderating effect of loneliness on the relationship between attractiveness of endorsers and product attitude. As shown in Fig. 5, for female college students with high levels of loneliness, there was no significant difference in product attitude between high and low attractiveness endorsers. However, product attitude was lower for high attractiveness endorsers (3.065) compared to low attractiveness endorsers (3.155). For female college students with low levels of loneliness, the product attitude towards high attractiveness was significantly higher in the high attractiveness group than in the low attractiveness group, with scores of 3.296 and 2.784, respectively. This suggested that loneliness has a negative moderating role in the relationship between male celebrity endorser attractiveness and product attitude for skincare products.

(4) Moderated Mediation Effect

The moderated mediation test results were significant, CI = [−0.215, −0.050]. When the level of loneliness was low, the effect size of celebrity attractiveness on purchase intention through positive product attitude was 0.186, 95% CI = [0.081, 0.345]. At a moderate level of loneliness, the effect size was 0.077, CI = [−0.008, 0.164], which was not significant. When loneliness was at a high level, the effect size was −0.033, CI = [−0.140, 0.083], which was also not significant. Thus, for consumers with lower levels of loneliness, male celebrity endorsement attractiveness has a negative effect on the purchase behaviour of female skincare products through positive product attitudes. However, as loneliness increases, the impact of celebrity attractiveness on the purchase intention of female skincare products through positive product attitudes disappears. Hypothesis 5a was supported.

4.3. Female's intimate care product

4.3.1. Reliability test
The reliability test results for this group showed that all Cronbach's alpha coefficients were above 0.800. Specifically, the reliability coefficients of the attractiveness, conformity, product attitude, purchase intention, and loneliness scales were 0.961, 0.910, 0.853, 0.896, and 0.877, respectively.

4.3.2. Common method bias analysis
We conducted an unrotated factor analysis on all items in the female intimate care product group using Harman's single-factor test with the SPSS 26.0 software. The data did not exhibit any significant common method bias, as the variance explained by the first unrotated factor was 39.969%, which was below the 50% threshold [58].

4.3.3. Mean comparison
Independent samples t-tests were conducted using SPSS26.0 to compare the attractiveness scores and conformity scores between different groups, and separate analyses were performed for product attitude and purchase intention.

(1) Attractiveness

AS shown in Fig. 6, the attractiveness scores of two groups, high attractiveness celebrity and low attractiveness celebrity, were compared for differences in product attitude and purchase intention scores. The mean attractiveness score for the high attractiveness group was 4.159, while that for the low attractiveness group was 2.469. There was a significant difference between the means of the two groups ($p < 0.05$).

Independent samples t-tests showed that both product attitude and purchase intention were significantly higher for endorsements by highly attractive celebrities (3.029 and 3.065, respectively) than for those by less attractive celebrities. This suggested that endorser attractiveness has a positive impact on product attitude and purchase intention for women's intimate care products, providing
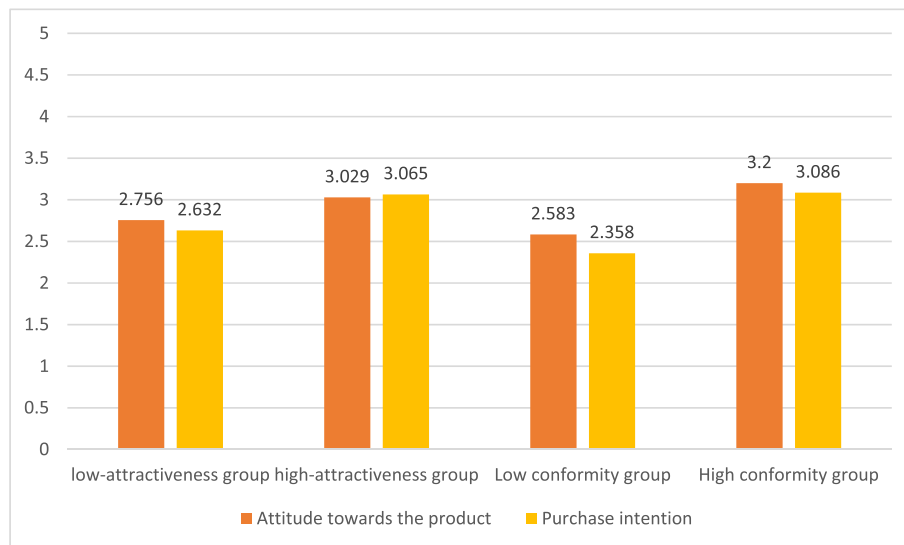
Fig. 6. Comparison of means for product attitude and purchase intention among different attractiveness levels and high/low conformity scores.

preliminary support for Hypotheses 1a and 3a.

  (2) Conformity

As showed in Fig. 6, The non-conformity and conformity situations for both the high attractiveness group and the low attractiveness group were combined. The mean score for the low conformity group was 1.817, while that for the high conformity group was 3.243, with a significant difference between the two group means ($p < 0.001$).

The study found that product attitude and purchase intention scores were significantly higher in the high conformity situation (3.200 and 3.091, respectively) than in the low conformity situation (2.457 and 2.436, respectively) at $p < 0.001$ according to independent samples t-tests. These results suggested that conformity has a positive impact on product attitude and purchase intention for women's intimate care products, preliminarily verifying Hypotheses 1b and 3b.

4.3.4. Results of correlation analysis

Pearson product-moment correlation tests were conducted on the variables in the female intimate products group using SPSS 26.0. As shown in Table 5, there was a significant positive correlation between celebrity endorser attractiveness and positive attitude ($r = 0.272$, $p < 0.01$), as well as purchase intention ($r = 0.405$, $p < 0.001$). Additionally, conformity was significantly positively correlated with positive attitude ($r = 0.637$, $p < 0.001$) and purchase intention ($r = 0.440$, $p < 0.001$). Furthermore, a noteworthy positive correlation was found between positive attitude and purchase intention ($r = 0.647$, $p < 0.001$). These findings offered preliminary support for the hypotheses.

4.3.5. Bootstrap analysis

To further estimate the relationships between variables in the model, Bootstrap analysis was performed following the same procedure as in the gender-neutral product and female skincare product groups. The validation results are presented in Table 6.

  (1) Direct results

As shown in Table 6, the direct effect of attractiveness on purchase intention for women's intimate product was not significant ($\beta = 0.100$, $p > 0.05$), and neither was the direct effect of conformity on purchase intention for women's intimate products ($\beta = 0.094$, $p > 0.05$). Therefore, hypotheses 1a and 1b were not supported.

  (2) Indirect results

When conformity was the control variable, the positive effect of celebrity attractiveness on the positive attitude toward skincare product was not significant ($\beta = 0.126$, $p > 0.05$). After adding the positive attitude toward product, the impact of attractiveness on purchase intention was still not significant ($\beta = 0.100$, $p > 0.05$). The positive attitude toward the product significantly influences the purchase intention($\beta = 0.674$, $p < 0.001$). Hypothesis 2 was supported and Hypothesis 3a was not supported in the intimate product group.

When attractiveness was used as the control variable, conformity had a significantly positive effect on positive attitude ($\beta = 0.466$,

Table 5
Correlation analysis.

	Mean	Standard Deviation	Grade	Major	Hometown	Monthly living expenses	Idol Dorship	Attractiveness	Conformity	Positive attitude	Purchase intention	Loneliness
Grade	2.652	1.091										
Major	3.136	2.007	−0.135									
Hometown	2.068	0.840	−0.140	0.013								
Monthly Living Expenses	2.886	1.202	0.202[a]	0.006	−0.189[a]							
Idol Worship	2.189	1.049	0.171[a]	0.067	0.037	0.060						
Attractiveness	3.058	1.013	0.018	−0.018	0.109	−0.015	0.634[c]					
Conformity	2.573	0.857	−0.274[b]	−0.139	0.189[a]	−0.272[b]	−0.040	0.111				
Positive Attitude	2.851	0.718	−0.330[c]	−0.032	0.165	−0.303[c]	0.061	0.272[b]	0.637[c]			
Purchase Intention	2.783	0.826	−0.071	0.012	0.209[a]	−0.135	0.300[c]	0.405[c]	0.440[c]	0.647[c]		
Loneliness	2.513	0.863	−0.030	−0.139	−0.059	−0.068	0.142	0.394[c]	0.030	0.228[b]	0.138	

Note: n = 132.
[a] $p < 0.05$.
[b] $p < 0.01$.
[c] $p < 0.001$.

Table 6
Bootstrap analysis.

Control Variable	Positive Attitude				Positive Attitude				Purchase Intention			
	β	p	SE	[LLCU, ULCI]	β	p	SE	[LLCU, ULCI]	β	p	SE	[LLCU, ULCI]
Grade	−0.096	0.040	0.046	[-0.188,-0.004]	−0.095	0.041	0.046	[-0.186,-0.004]	0.099	0.061	0.052	[-0.005,0.202]
Major	0.018	0.454	0.024	[-0.030,0.066]	0.018	0.457	0.024	[-0.030,0.065]	0.021	0.425	0.027	[-0.031,0.074]
Hometown	0.009	0.882	0.057	[-0.105,0.121]	0.009	0.876	0.057	[-0.104,0.121]	0.101	0.115	0.063	[-0.025,0.226]
Monthly Living Expenses	−0.065	0.114	0.041	[-0.145,0.016]	−0.065	0.110	0.041	[-0.146,0.015]	0.037	0.423	0.046	[-0.054,0.128]
Idol Worship	−0.009	0.883	0.059	[-0.125,0.108]	−0.010	0.874	0.060	[-0.128,0.109]	0.124	0.061	0.066	[-0.006,0.254]
Independent Variable												
Attractiveness	0.126	0.354	0.135	[-0.142,0.394]	0.116	0.078	0.065	[-0.013,0.245]	0.100	0.150	0.070	[-0.037,0.237]
Conformity	0.459	0.000	0.062	[0.337,0.581]	0.466	0.003	0.155	[0.160,0.773]	0.094	0.245	0.080	[-0.065,0.252]
Mediator Variable												
Positive Attitude									0.674	0.000	0.100	[0.475,0.872]
Moderator Variable												
Loneliness	0.135	0.449	0.178	[-0.217,0.487]	0.126	0.368	0.139	[-0.149,0.401]				
Interaction Term												
Loneliness* Attractiveness	−0.004	0.932	0.048	[-0.100,0.091]								
Loneliness * Conformity					−0.002	0.968	0.057	[-0.115,0.110]				
R^2	0.507				0.507				0.524			
F	13.957	0.000			13.956	0.000			16.954	0.000		

Note: n = 132.

$p < 0.001$). However, when product attitude was included in the model, the effect of conformity became insignificant ($\beta = 0.094$, $p > 0.05$), suggesting that positive attitude fully mediates the relationship between conformity and the intention to purchase skincare products ($\beta = 0.674$, $p < 0.001$). Hypotheses 2 and 3b were supported.

In summary, conformity has a greater positive influence on female intimate product attitude than endorser's attractiveness. For male celebrity endorsements of female intimate products, when the conformity factor is present, the endorser's attractiveness does not impact consumers' product attitude and purchase intention. Instead, conformity acts as a complete mediator by positively influencing product attitude and subsequently affecting consumers' purchase intention. This suggests that female college students are more likely to be "coerced"when purchasing female intimate products endorsed by male celebrities.

(3) Moderating effect

The study found that the interaction effect between attractiveness and loneliness on the positive attitude toward products was not significant ($\beta = -0.004$, $p > 0.05$). Hypothesis 4a was not supported.

Similarly, the interaction effect between conformity and loneliness on the positive attitude toward products was also not significant ($\beta = -0.002$, $p > 0.05$), indicating that the moderating effect of loneliness is not significant. Thus, the study found that as loneliness increases, conformity has no significant effect on the positive attitude toward the product. Therefore, Hypothesis 4b was not supported.

4.4. Hypothesis testing results

Through the above data analysis process, the hypothesis testing results of this study are presented in Table 7.

5. Conclusion and discussion

5.1. Research conclusion

In this study, the male celebrity endorser attractiveness factor was referred to as "being tempted", while the conformity factor is referred to as "being coerced". The results showed that appearance does not always have an impact in the three product scenarios, whereas conformity holds true in all situations. Furthermore, when attractiveness does have an impact, the influence of conformity far outweighs that of appearance. In other words, in all product scenarios endorsed by male celebrities, "being coerced" is the main reason for female college students to purchase products. This study specifically discovered these findings through text experiments:

Firstly, for gender-neutral products, male endorser's attractiveness can positively influence female college students' positive attitude toward the product ($\beta = 0.606$, $p < 0.001$) and promote their purchase intention intention ($\beta = 0.679$, $p < 0.001$). However, for those with high loneliness, the positive impact of the endorser attractiveness on their positive attitude toward the product is diminished ($\beta = 0.243$, CI $= [0.163, 0.340]$), and the effect on purchase intention through influencing their product attitude is also reduced. Additionally, conformity can directly promote purchase intention, and enhance positive attitude toward the product, regardless of the level of loneliness experienced by female college students.

Secondly, when it comes to female skincare products, the attractiveness of a male endorser has a positive impact on the attitude

Table 7
Hypothesis testing results.

Number	Hypothesis Content	Test Results		
		Gender-neutral Product Group	Female Skincare Product Group	Female Intimate Product Group
1a	Endorser attractiveness has a significant positive affect on purchase intention among female college student.	Not confirmed	Not confirmed	Not confirmed
1b	Conformity to male celebrity-endorsed product has a significant positive affect on purchase intention among female college student.	Confirmed	Not confirmed	Not confirmed
2	Positive attitude has a significant positive influence on purchase intention among female college student.	Confirmed	Confirmed	Confirmed
3a	Positive product attitude mediates the relationship between the attractiveness of the endorser and the purchase intention of female college student.	Confirmed	Confirmed	Not confirmed
3b	Positive product attitude mediates the relationship between conformity and the purchase intention of female college students.	Confirmed	Confirmed	Confirmed
4a	Loneliness negatively moderates the impact of male celebrity attractiveness on the positive product attitude of female college students.	Confirmed	Confirmed	Not confirmed
4b	Loneliness positively moderates the effect of conformity on the positive product attitude of female college students.	Not confirmed	Not confirmed	Not confirmed
5a	Loneliness negatively moderates the mediating effect of positive product attitude on the relationship between male celebrity attractiveness and purchase intention among female college students.	Confirmed	Confirmed	Not confirmed
5b	Loneliness positively moderates the mediating effect of product attitude on the relationship between conformity and purchase intention among female college students.	Not confirmed	Not confirmed	Not confirmed

towards the product ($\beta = 0.525$, $p < 0.001$). This, in turn, affects the purchase intention ($\beta = 0.756$, $p < 0.001$) of female college students. It is worth noting that the effect of attractiveness on the positive attitude toward the product is not significant ($\beta = -0.004$, $p > 0.05$) for individuals with high levels of loneliness. Conformity can promote purchase intention by enhancing the positive attitude toward products, and this effect is not influenced by the female college students' loneliness.

Third, for highly intimate female products such as sanitary pads, the attractiveness of male celebrity endorsers does not have an impact on the female college students' positive attitude ($\beta = 0.126$, $p > 0.05$) and purchase intention ($\beta = 0.100$, $p > 0.05$) of female college students, and this effect is not influenced by their own sense of loneliness. However, conformity promotes purchase intention ($\beta = 0.674$, $p < 0.001$) by enhancing their positive attitude toward the products ($\beta = 0.466$, $p < 0.01$). This effect is also not affected by the female college students' loneliness.

5.2. Discussion

This study examined the mechanisms by which male celebrities influence female college students' purchase intention for products, based on the Theory of Planned Behaviour. Beyond previous research that has only examined the separate effects of conformity or attractiveness on consumer behaviour, this study found that the effect of "being tempted," which refers to the endorser's attractiveness, is context-specific, while the positive influence of "being coerced," which represents conformity, is universal. Loneliness reduces the impact of attractiveness on product attitude in gender-neutral and female skincare product scenarios. However, the influence of conformity remains stable regardless of the context.

Firstly, this study demonstrates the contextual nature of the influence of attractiveness on female college students' consumer psychology and purchase intention, and finds that attractiveness does not always influence their purchase intention. This refutes the previous view that attractiveness has a positive effect on consumers and confirms the boundary conditions under which attractiveness affects purchase intention. By refuting the conclusion that attractiveness positively influences purchase intention, it suggests a more complex set of motivations and psychological processes behind consumer behaviour.

For gender-neutral products, the attractiveness of a male endorser has a significant positive effect on consumers' positive attitude toward them and subsequently impacts their purchase intention. This means that for gender-neutral products, female college students may develop a positive attitude toward them and subsequently intend to purchase them due to the high attractiveness of the male endorsers, thereby promoting their purchase intention. For female-oriented products and highly private female products, attractiveness has a significant impact on the positive attitude toward products and purchase intention in correlation analysis and independent sample t-tests. However, in bootstrap analysis, attractiveness does not affect the positive attitude toward products and purchase intention of female college students when conformity is present. The reason for this may be that the independent samples t-test did not consider other control variables. The positive impact of attractiveness is significantly reduced when conformity is present.

Previous research has demonstrated that physically attractive individuals can elicit positive emotional responses from others, resulting in positive reinforcement effects and triggering approach behaviour [14]. When consumers see an endorser with high attractiveness, they often associate this with the product and are more likely to purchase it [18]. However, in the context of gender-neutral products, the effect of attractiveness on the product attitude and purchase intention of female students has been tested, while attractiveness has no significant effect on skincare products and sanitary napkins. Previous studies have suggested that male endorsement can have a positive effect on lipstick-type products to some extent. However, male endorsement has a negative effect on intimate products such as obstetrics and gynecology hospitals and underwear have negative effects [1]. This may be due to the high attractiveness of male endorsers for feminine products with gender attributes, which may cause consumers to feel distant from them. As a result, brand credibility is reduced, leading to a lower positive product attitude. This study did not find the negative effect mentioned above. It was discovered that the attractiveness of male endorsers does not influence female college students' product attitude and purchase intention for skincare products and sanitary napkins,. This may be due to the specific characteristics of this group of female college students. Further research is needed to explain and verify this.

Secondly, this study demonstrates the universality of the influence of conformity on college women's consumer psychology and purchase intention. It finds that conformity consistently affects their purchase intention, supporting the theoretical validity of conformity theory in the consumer behaviour of female college students and verifying the stability of the influence of conformity on consumer behaviour. As a subjective norm in the Theory of Planned Behaviour (TPB), conformity is generally considered to be an important factor influencing individual behaviour. This study also demonstrates the universality and stability of the conformity psychology across different product categories, deepening the understanding of how consumers form behavioural intentions under social pressure.

Conformity can significantly positively influence female college students' positive attitude toward the product and thus positively affect their purchase intention in the three contexts of gender-neutral product, female-oriented product, and highly private female product. Moreover, for gender-neutral products, product attitude partially mediates the effect between conformity and purchase intention meaning that conformity can directly influence female college students' purchase intention and can also have a positive influence through their positive attitude.

Previous research has demonstrated that individuals are susceptible to influence from significant others within their social network, including friends, partners, family members, and admired/respected leaders [60]. The attitudes, intentions, and behaviours of online shoppers are also significantly affected by those who hold importance to them [24]. Female college students exhibit the conformity effect in all three types of product purchasing experimental situations. However, conformity can directly lead to purchase intention among female college students, for gender-neutral products. On the other hand, for products with female attributes and highly private female products, female college students first develop a positive attitude towards the product before generating a purchase intention.

Female college students may prefer functional products and consider the environment and opinions of acquaintances when making purchasing decisions. They also prioritize product effectiveness and reviews.

Previous studies have shown that male endorsers can have a negative impact on the sales of obstetrics and gynecology products and underwear, due to identity threat [1]. However, in the context of this study, conformity factors negate the negative effect, indicating that conformity has a significant impact on female college students' positive attitude toward the product.

Thirdly, this study found that loneliness reduces the impact of endorser attractiveness on female college students' positive attitude toward gender-neutral and female-oriented products. This reveals the boundary conditions of the moderating effect of loneliness and provides a new perspective for exploring the complex relationship between attractiveness and consumer psychology. At the same time, it implies that when applying the Theory of Planned Behaviour to explain individual consumer behaviour, it is necessary to consider the diversity and complexity of individual psychological states.

Loneliness negatively moderates the relationship between endorser attractiveness and female college students' positive attitude toward gender-neutral products and skincare products. Specifically, when the endorser is highly attractive, the greater the loneliness of the college student, the lower their corresponding positive attitude toward the product, resulting in a lower the purchase intention. The moderating effect of loneliness is not significant for the highly private female product group.

Some researches suggest that loneliness may lead individuals to pay more attention to their self-image and appearance [49]. Therefore, the attractiveness of endorsers may serve as a way of satisfying these needs, stimulating consumers' purchasing behaviour and loyalty, and increasing their liking and identification with the product. When individuals feel lonely, they may be more inclined to alleviate their loneliness by seeking out more attractive and charming endorsers [61]. However, the results of this study do not support this view.

Loneliness negatively moderates the relationship between endorser attractiveness and female college students' positive attitude toward gender-neutral and feminine products. This may be due to consumers feeling more sensitive to social threat stimuli and allocating more attentional resources to negative information when they are lonely [62]. They perceive themselves as vulnerable to potential risks [63], and therefore avoid high-risk consumption activities. Furthermore, a study by Wen et al. (2017) [64] found that feelings of loneliness can lead to pessimistic thoughts in consumers. This can cause them to pay more attention to negative information presented in advertisements and prefer a defensive message a framing style to avoid risks [65]. The emotional state of consumers affects their cognitive evaluation and purchasing behaviour [31]. Therefore, when an individual experiences high levels of loneliness, the impact of endorser attractiveness on product attitude is limited. This is due to the negative state of the individual and their inability to effectively focus on the endorser's attractiveness. For highly private female products, attractiveness alone cannot affect their product attitude because female college students value functionality more, and loneliness does not have a significant moderating effect.

Fourthly, this study found that loneliness does not alter the conformity effect on female college students' positive attitude toward products in any situation. The study demonstrates the universality and persistence of conformity in the consumer decision-making process. Additionally, the study suggests that loneliness does not significantly affect the influence of conformity on contemporary college women's consumer behaviour. Instead, consumer conformity behaviour may be influenced by other various complex factors. This fragment provides new ideas and directions for future research, which requires further exploration of the psychological mechanisms and factors behind consumer decision-making in order to gain a more comprehensive understanding of the consumer psychology of contemporary college women.

Previous research has demonstrated that individuals' attitudes, intentions, and online shopping behaviour are significantly influenced by important people in their lives [24]. The social surrogacy theory posits that when consumers experience loneliness, it triggers their social needs, leading them to seek social substitutes through consumption behaviour to satisfy those needs and alleviate their loneliness [65]. Loneliness has been found to increase consumers' willingness to watch popular TV shows [65] and use social media applications such as Facebook, Twitter, and Weibo [66]. However, some studies suggest that lonely consumers may perceive a lack of control and tend to avoid risks, resulting in a reduced preference for uncertain consumption [67]. Based on the separation strategy [68], individuals who experience loneliness tend to view social contact as a threat and may opt to distance themselves from social consumption activities. However, this study did not reflect either of these theories. This could be attributed to the fact that female college students typically exhibit conformity behaviour, which shows little variation among individuals with different levels of loneliness. Therefore, female college students with high or low levels of loneliness are likely to have a positive attitude and purchase intention due to conformity factors, with little difference between the two.

5.3. Theoretical implications

This study empirically examines the effects of male celebrity attractiveness and conformity on the purchase intention of female college students in different product contexts, using the Theory of Planned Behaviour (TPB). The study provides new validation and extension to the theory. The research findings support the TPB's assertion that behavioural intention is a significant predictor of behaviour. Additionally, the findings reveal the varying effects of attractiveness and conformity on behavioural intention in different contexts, leading to a more comprehensive understanding of consumer behaviour. This study validates the effectiveness of the TPB in explaining consumer behaviour. It also provides new perspectives and empirical support for the theory by introducing new moderating variables and considering product attributes.

In terms of validation of the theory, the study confirms that attractiveness and conformity are two significant factors that influence behavioural intention, corresponding to behavioural attitude and subjective norms in the TPB. Attractiveness can be considered a part of behavioural attitude, reflecting consumers' positive evaluation of products or proponents, while conformity is similar to subjective

norms, reflecting the impact of social pressure on individual behaviour. The effectiveness of the TPB in explaining consumer behaviour is further validated by the contextual impact of attractiveness on purchase intention and the universal influence of conformity.

In terms of extension of the theory, research on loneliness typically falls within the realm of social psychology. However, this study enriches the theoretical content of the TPB by introducing loneliness as a moderating variable in consumer behaviour. As a form of individual psychological state, loneliness moderates the effects of attractiveness and conformity, suggesting that individual psychological states and emotional factors play an important role in the formation of behavioural intentions. This finding highlights the need to consider the diversity and complexity of individual psychological states when applying the TPB. It contributes to the development of a more comprehensive theoretical framework for understanding individual behaviour in social settings and demonstrates the potential application of social psychological theories in explaining consumer behaviour.

5.4. Practical implications

This study has the following implications for the selection of product endorsers and the design of advertising marketing.

Firstly, when the product has no gender attributes, a male celebrity with a high level of attractiveness can be selected as an endorser. If the endorser's personal characteristics do not match the brand attributes but the gender attribute is general (e.g. skincare and cosmetics products that can also be used by men)., this can still be effective. However, male celebrities with average attractiveness can be considered as endorsers for female college students with high levels of loneliness. For female students with low levels of loneliness, endorser attractiveness does not affect their choice. This study found that when the product is of a feminine and highly private nature, such as sanitary napkins, attractiveness does not affect female college students' product attitude and purchase intention. Therefore, companies should avoid selecting male celebrities as endorsers for such products.

Secondly, when marketing various products to female college students, it is important to actively create conformity situations and expand publicity through various means. This can be achieved by cooperating with internet celebrities, anchors, and posting product information on social media. These actions can increase female college students' positive attitude toward the products and expand online and offline communication channels between consumers. This can lead to better advertising results, enhance credibility among the target consumer group, and increase brand loyalty. To optimize product advertising and branding effects, it is important to make female college students aware of the product's popularity among influential figures or people around them. It can stimulate their positive attitude toward the product and trigger purchase intention.

5.5. Limitations and future directions

This study has several limitations.

Firstly, we were unable to sample the entire population of China due to research constraints. As a result, the female students studied in this paper were all from universities in Jiangxi Province, China. It is important to note that Jiangxi Province differs from cities such as Beijing, Shanghai, and Shenzhen in terms of economic development and consumer attitudes. The external validity of the research findings may be limited due to the influence of the economy and culture of the province. However, the participants, although studying in Jiangxi Province, come from different provinces and cities in China. Therefore, they may be representative of the female college student population in China. Future research could sample sample areas with higher levels of economic development and more open consumer attitudes, such as the coastal cities in eastern China, to increase the external validity of the study and conduct cross-cultural comparative research.

Secondly, when discussing the relationship between the spokesperson gender and the female consumers' attitudes towards and intention to purchase products, this article considers gender-neutral product, product with a strong female attribute, and exclusively female private product. However, only one representative product was chosen for each category. Future research should select products more rigorously and conduct in-depth experiments with a wider range of products.

Thirdly, the study used advertising images as experimental materials. Future research could expand the range of advertising materials used, such as videos and social media posts, to better capture consumer attention and potentially influence attitudes and behaviours through storytelling or emotional appeals. To enhance the external validity of the study, future research could include a range of advertising materials such as videos and social media content could be incorporated to more comprehensively simulate real-world marketing environments. This would enable a more accurate assessment of the actual impact of male celebrity attractiveness and conformity scenarios on the purchase intention of female college students across different media environments.

In addition, this study focused on the physiological gender of endorsers and investigated the effects of cross-gender endorsements based on biological definitions. However, it is important to note that social and cultural factors also contribute to the construction of a broader range of masculine and feminine traits. Further research is necessary to determine whether male endorsers with feminine traits will cause female consumers to feel threatened and alter their consumption behaviour.

Finally, future research should investigate potential moderating factors beyond loneliness that may influence the purchasing behaviour of female college students toward products endorsed by male celebrities. Personality traits, such as independence, are important psychological characteristics that may affect an individual's identification with brands and endorsers, as well as their purchasing decisions. Consumers who value independence may be more likely to base their purchasing decisions on personal preferences and values, rather than being influenced solely by social factors or the opinions of others. Furthermore, consumers' self-identification may also moderate their purchasing behaviour. These factors, combined with loneliness, may influence female students' perceptions and reactions to male celebrity endorsers.

Ethics statement

The procedures were formal and legal. Participants were volunteering for the experiment, were informed in detail about the purpose of the research prior to the investigation. The process was not harmful to the participants. All data collected was strictly confidential and used for academic research only, and there was no conflict of interest in the research content or research results. We received ethical approval for this study from the School of Economics and Management, East China Jiaotong University.

Informed consent statement

The method we use is a questionnaire, in the introductory sentence of the questionnaire it is written that "we will keep all the data confidential and will only use it for academic research, and will not cause any harm to the participants, if you agree, please fill in the following", and when filling in the questionnaire on the spot, the researchers will also make the same reminder and obtain the verbal consent of the respondent, so all participants are willing to fill in after consent.

Data availability statement

Data will be made available on request.

Additional information

No additional information is available for this paper.

CRediT authorship contribution statement

Jin Wan: Project administration, Funding acquisition, Data curation, Conceptualization. **Hang Ma:** Writing – original draft, Methodology, Investigation. **Wenjun Zhou:** Supervision, Software, Formal analysis. **Mingyue Qin:** Writing – review & editing, Writing – original draft, Resources. **Pingping Li:** Visualization, Validation.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

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Appendix

Table 8
Scale Items and Their Reliability

Variable	Item	Cronbach's α Coefficient		
		No Gender Difference Group	Female Skincare Product Group	Female Intimate Product Group
Attractiveness	I think this male celebrity is very handsome. I think this male celebrity has a high level of attractiveness. I find this male celebrity's appearance very attractive.	0.962	0.963	0.961

(*continued on next page*)

Table 8 (*continued*)

Variable	Item	Cronbach's α Coefficient		
		No Gender Difference Group	Female Skincare Product Group	Female Intimate Product Group
Conformity	Many people around me use this product. I see a lot of positive reviews for this product. Many people around me are talking about it.	0.924	0.910	0.910
Positive attitude	I think this is a very good product. I like this product. I hold a positive attitude toward this product.	0.923	0.891	0.853
Purchase intention	I am very likely to buy this product. I will consider buying this product in the future. I am inclined to buy this product.	0.919	0.933	0.896
Loneliness	I feel neglected in life. I often feel lonely. I usually lack friendship.	0.857	0.893	0.877

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