Beyond the Myth of Slimming: The Impact of Social Norms on Positive Body Image and Caloric Intake among Young Adults[*]

Authors and affiliations

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[*] The original article is in Chinese. The Chinese version shall always prevail in case of any discrepancy or inconsistency between the Chinese version and its English translation.

Abstract

How does the "thin ideal" social norm, which equates thinness with beauty, affect young people's body image and calorie intake? In one questionnaire survey and three intervention experiments (N = 612), we propose that people's beliefs about the "thin ideal" social norm shape their positive body image and caloric intake. Specifically, we find that a stronger belief in the "thin ideal" was associated with a lower level of positive body image, with BMI self-discrepancy mediating this effect (Study 1). To address these misperceptions about the "thin ideal" social norm, we further evaluated social norm interventions, demonstrating their positive impact on positive body image and calorie intake. Since the role of injunctive social norm interventions was limited (Study 2), we adopted the more descriptive interventions and those incorporating role model factors (Study 3), with the latter showing longer-lasting effects (Study 4). These findings enhance understanding of the influence of the "thin ideal" social norm and suggest practical interventions for improving positive body image and health behaviors.

Keywords: social norms, positive body image, self-discrepancy, intervention, role model

In recent years, Chinese social networking platforms have seen numerous discussions on body aesthetics, featuring physical aesthetic challenges like the "A4 waist" (comparing the waist's width to an A4 sheet of paper) and the "coins on collarbones" (placing as many coins as possible in the hollow of one's collarbone to highlight thinness). Additionally, there has been widespread sharing of weight loss methods such as the "21-day weight loss method" (a structured diet plan for 21 days) and "5-day light fasting" (a modified form of intermittent fasting over five days). "Only thinness is the ideal body shape" has gradually become an obsession for many people across both Eastern and Western cultures (Swami, 2015). This obsession affects not only women but also men, who also experience body dissatisfaction and eating disorders (Striegel-Moore et al., 2009). Song and his colleagues (2012) conducted a survey of 2,599 college students in 15 universities in 10 provinces and cities in China and found that 34.6% of women and 12.1% of men were underweight. The sharp contrast between the ideal of becoming thinner and the reality of not achieving such thinness diminishes positive body evaluation. More critically, it leads to adverse physical and mental health effects, including eating disorders (Thompson & Stice, 2001), low self-esteem (Johnson & Wardle, 2005), and depression (Brechan & Kvalem, 2015). Therefore, it is important to address how to change the pursuit of the "thin ideal" among young people to enhance positive body image and reduce unhealthy weight loss behaviors.

The present study posits that under the influence of social and cultural factors (such as family, peers, and media), individuals may overestimate the acceptance of "thin ideal" attitudes (injunctive social norms) and behaviors (descriptive social norms). This can lead to increasingly stringent "thin ideal" standards, thereby widening the gap between the ideal self and the real self in terms of body image. This discrepancy can harm an individual's positive body image. Therefore, it is crucial to adopt effective social norm interventions to enhance the positive perception of body image among normal-weight youth and reduce unhealthy weight loss behaviors (such as insufficient calorie intake). Correcting misperceptions is the most widely used social norm intervention method. Combining this with the role model strategy of promoting positive norms can enhance the effectiveness of social norm interventions. In summary, we explored the impact of "thin ideal" social norms on individuals' positive body image and the mediating role of body image self-discrepancy. Additionally, we further examined the effects of various social norm

interventions on individuals' positive body image and calorie intake.

"Thin Ideal" Social Norms and Positive Body Image

Social norms, recognized and followed by the majority of people in a social group, differ from the mandatory behavioral regulations imposed by laws and statutes (Cialdini & Trost, 1998). Social norms are commonly categorized into descriptive norms, which refer to individuals' perceptions of others' behaviors (what is done), and injunctive norms, which refer to individuals' perceptions of others' attitudes (what ought to be done) (Cialdini & Trost, 1998). When most people in a social group accept and adhere to the belief that "a thin body is the ideal body," the social norm of the "thin ideal" is established (Thompson & Stice, 2001). The descriptive norm is "everyone is striving to become thinner," and the injunctive norm is "everyone believes people should become thinner."

Social norms influence attitudes and behaviors through two main mechanisms: making effective decisions and maintaining social approval (Jacobson et al., 2011). When the "thin ideal" becomes a social norm, individuals may perceive weight loss behaviors as a "wise approach". The desire for conformity and social recognition can lead individuals to adhere to these norms to avoid feelings of guilt or not belonging to the group (Wenzel, 2005). Consequently, the "thin ideal" can shape individuals' perceptions of their body image (Slade, 1994). Body image comprises three aspects: perception (accuracy of body shape judgment), attitude (body satisfaction, attention, and cognitive evaluation), and behavior (situational avoidance behavior due to body appearance concerns) (Raich et al., 1995). Most studies focus on the attitude aspect, particularly body satisfaction (Grogan, 2006). Positive body image differs from negative body image in that it involves not only reducing negative body perceptions but also fostering a positive attitude of love and respect for one's body, accepting aspects that diverge from the "thin ideal" (Tylka, 2011). Thus, positive body image transcends pathology and encompasses richer characteristics, even covering the body image perception of those with non-clinical disorders. While previous research has primarily focused on the body image of young women (Tiggemann, 2004), some large-scale studies have also found that many men experience low body satisfaction (see Austin et al., 2009; Frederick et al., 2007). Both men and women have a desire for muscle and thinness (Kelley et al.,

2010). And low body fat percentage is also a key component of the ideal male body (Cafri et al., 2005). Therefore, this study examines body image issues arising from the desire for thinness in both women and men.

Sociocultural factors significantly impact body image, with family, peers, and particularly the media playing crucial roles (Thompson et al., 1999; Tiggemann, 2011). As social media becomes widely used by young people, its connection to body image has gained increasing importance. For instance, Kim and Chock (2015) found that online behaviors like "social dressing" are positively correlated with a tendency towards thinness and appearance comparison. During the transition from adolescence to adulthood (18-35 years old), social anxiety is closely related to body image concerns (Luqman & Dixit, 2017). Influenced by personalized social media recommendations, individuals may overestimate the prevalence of the "thin ideal" and internalize thinness as the standard of an ideal body shape. When individuals internalize this standard and believe they have not achieved it, their body satisfaction decreases (Heinberg & Thompson, 1995), which harms their positive body image. This dissatisfaction can lead to unhealthy weight loss behaviors, such as consuming too few calories, to attain the ideal body shape (Thompson & Stice, 2001).

Self-discrepancy in Body Image

Self-discrepancy theory proposes a three-part self: the actual self (one's current self-image), the ideal self (desired self-image), and the ought self (self-image based on perceived obligations) (Higgins, 1987). Self-discrepancy refers to the inconsistency between the actual self and the ideal or ought self (Higgins, 1987). In China, the ideal self and the ought self overlap significantly (Guo, 1996), so the present study did not distinguish between the two. Body image self-discrepancy is the difference between actual and ideal body images. The present study focuses on body satisfaction as an attitude (Grogan, 2006), and the difference between actual and ideal weight has been validated as a measure of body dissatisfaction (Williamson et al., 1993). Therefore, the Body Mass Index (BMI), which accurately reflects health and fatness, was used for evaluation. A lower BMI indicates a lighter individual at the same height. Thus, body image self-discrepancy is operationalized as the difference between an individual's actual BMI and ideal BMI.

When individuals accept the social norm of the "thin ideal", they view thinness as the ideal

body shape. This belief forms an ideal self of body image and establishes an ideal BMI. However, an individual's actual BMI does not change rapidly, creating a discrepancy between the ideal BMI and the actual BMI, thereby reducing positive body image. In summary, we proposed that the impact of the "thin ideal" social norm on body image is to increase the gap between the individual's actual body shape and ideal body shape. This discrepancy leads individuals to feel dissatisfied with their body shape.

Social Norm Interventions

Damage to positive body image can lead to unhealthy eating disorders, such as overeating, dieting, and vomiting (Thompson & Stice, 2001). Reducing calorie intake is a common method, typically involving low-calorie foods or intermittent fasting (Polivy et al., 2020). However, long-term insufficient calorie intake lowers the body's metabolic rate and increases appetite, potentially triggering binge eating and rapid weight gain, thus creating a vicious cycle of unhealthy eating (Benton & Young, 2017). Individuals with a positive body image are more resistant to negative information presented in social media (Andrew et al., 2015), and tend to engage in fewer unhealthy eating behaviors (Andrew et al., 2016). To improve positive body image and reduce unhealthy weight loss behaviors (i.e., help increase calorie intake), social norm theory can be applied to develop and test intervention strategies. Unlike clinical interventions, social norm interventions can provide concise information and achieve short-term effects (Stok et al., 2014). One effective form of social norm intervention is personalized normative feedback (PNF), which provides individuals with personalized information about themselves and their peers. This form offers credible, specific data and sources, ensuring that participants engage with the intervention information (Miller & Prentice, 2016).

Social norm intervention is based on the premise that people are often unaware of their misperceptions about norms. Therefore, the primary component of social norm intervention is correcting misperceptions (Miller & Prentice, 2016). Misperceptions can lead individuals to mistakenly believe that certain attitudes or behaviors are common in their group, resulting in dangerous behaviors such as alcoholism and substance abuse (Dempsey et al., 2018). Correcting these misperceptions involves informing individuals that their peers generally agree with a certain

concept or behavior (injunctive social norms) or perform a certain behavior (descriptive social norms), thereby changing their erroneous perceptions and behaviors (Miller & Prentice, 2016). This intervention has been effective in reducing alcoholism (Neighbors et al., 2010), promoting energy-saving and environmental protection behaviors (Goldstein et al., 2008), and encouraging tax compliance (Wenzel, 2005). Similarly, the formation of the "thin ideal" cognition may follow this process. In social media environments with personalized information feeds, individuals exposed to "thin ideal" content may overestimate its prevalence, leading to misperceptions that need to be corrected.

Correcting misperception is an effective method, but Legros and Cislaghi (2020) suggest that combining this approach with other factors, such as strategies to increase positive norms, can enhance the effectiveness of social norm interventions. They propose that role models (e.g., social influencers, exemplary peers, and opinion leaders) can exert significant social influence due to personal connections, group-granted authority, and identity recognition. During social learning, individuals often imitate successful role models, including aspects not directly related to their success, such as imitating the clothing choices of sports stars (Mesoudi, 2009). Role models are crucial in motivational processes as they point out specific goals, provide inspiration and hope, and help individuals achieve self-improvement (Lockwood & Kunda, 1997). Peer role models, in particular, can change unhealthy behaviors such as drinking and substance abuse among adolescents (Perkins & Craig, 2002) and significantly impact adolescents' appearance expectations and body image (Carey et al., 2014). In the context of the "thin ideal" social norm, correcting misperceptions involves addressing misconceptions about "thin ideal" attitudes and behaviors, focusing on correcting errors; while role models encourage individuals to abandon the "thin ideal" and reduce unhealthy weight loss behaviors, focusing on setting positive goals. Combining these methods means correcting misconceptions first and then setting positive goals, reflecting a more comprehensive intervention approach.

Overview of the Present Study

The present research examined the impact of "thin ideal" social norms on individuals' positive body image and calorie intake. We hypothesized that the perception of "thin ideal" social

norms negatively predicts positive body image (H1), meaning that the stronger the individual's perceived "thin ideal" social norms, the lower their positive body image level. BMI self-discrepancy mediates the relationship between the perception of "thin ideal" social norms and positive body image, indicating that stronger perceptions of "thin ideal" social norms increase BMI self-discrepancy, thereby reducing the level of positive body image (H2). To enhance positive body image and reduce unhealthy weight loss behaviors, we leverage social norms as an intervention. We proposed that interventions aimed at correcting misperceptions of the "thin ideal" social norm can significantly improve individuals' positive body image (H3a) and increase calorie intake (H3b). Finally, compared to merely correcting misperceptions, an intervention combining the correction of misperceptions with peer role models is more effective in improving positive body image (H4a) and increasing calorie intake (H4b).

Four sub-studies were conducted to verify these hypotheses. Study 1 preliminarily tested the mediating role of self-discrepancy in the relationship between "thin ideal" social norms and positive body image through a questionnaire survey. The subsequent studies focused on solving practical problems through intervention: Study 2 explored whether social norm-based misconception correction interventions could improve positive body image and increase calorie intake. Study 3 compared the effects of misconception correction with a combination of misconception correction and the role model. Study 4 extended the duration of the intervention to examine whether its effects were lasting based on the effectiveness of the intervention method.

Study 1

Study 1 examined the mechanism of the effect of "thin ideal" social norms on positive body image. A questionnaire survey was conducted to test the relationship between "thin ideal" social norms, BMI self-discrepancy, and positive body image. We hypothesized that the perception of the "thin ideal" social norm is significantly negatively correlated with positive body image (H1) and that BMI self-discrepancy mediates the relationship between the perception of the "thin ideal" social norm and positive body image (H2).

Method

Participants

The required sample size was calculated using G*Power 3.1 (Faul et al., 2009), assuming a medium explanatory power $R^2 = 0.13$ (Cohen, 1977, p. 413), with statistical power $1 - \beta = 0.8$ and a significance level $\alpha = 0.05$. At least 68 participants were needed to run the multiple regression model. We distributed questionnaires to college students on the Wenjuanxing platform (a questionnaire platform in China), recruiting a total of 269 participants. After excluding 58 participants who did not complete the survey attentively (e.g., the survey completion time was less than 30 seconds or they failed the attention check question), we had 211 valid responses. The final sample consisted of 113 females and 98 males, aged between 18 and 27 years old ($M = 22.31$, $SD = 2.10$). The average BMI for females was 21.53 ± 3.45 kg/m², and for males, it was 22.56 ± 2.93 kg/m².

Measures

The "thin ideal" social norm. Adapted from the Green Travel Intention (GTI) scale by Ru et al. (2018), the scale comprised six items across two dimensions: descriptive social norms (*e.g., "Many people in society now are losing weight, exercising, or taking other actions to achieve thinness"*) and injunctive social norms (*e.g., "Many people in society now think that thin bodies are more beautiful"*), corresponding to the three dimensions proposed by Thompson et al. (1999): family, peers, and media. A 7-point Likert scale (1 = *strongly disagree,* 7 = *strongly agree*) was used, with higher scores indicating a higher level of perceived "thin ideal" social norms. Confirmatory factor analysis results showed that after deleting the item "Many of my relatives now think that thin bodies are more beautiful" from the injunctive social norms dimension, the fit index of the 2-factor model was relatively ideal ($\chi^2(4) = 9.874$, CFI = 0.979, TLI = 0.948, RMSEA = 0.08). The reliability of the descriptive social norms subscale was 0.776, the reliability of the injunctive social norms subscale was 0.711, and the reliability of the total scale was 0.708.

BMI self-discrepancy. Participants reported their actual BMI, ideal BMI, and actual height. Actual BMI = actual weight (kg)/height^2 (m^2). Ideal BMI = ideal weight (kg) / height^2 (m^2). BMI self-discrepancy = actual BMI − ideal BMI.

Positive body image. The Chinese version of the Body Appreciation Scale-2 revised by Ma et al. (2020) was used, with a total of 10 items (*e.g.,* "*I respect my body*"; α = 0.902) ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Higher scores indicate a higher level of positive body image.

Results

Common Method Variance (CMV) and Descriptive statistics

Harman's one-factor test was conducted using exploratory factor analysis on the "thin ideal" social norms scale and the positive body image scale, comprising a total of 15 items. Principal component analysis was employed without rotating the results. The common method bias results indicated that three factors with eigenvalues greater than 1 were extracted, with the first factor explaining 39.76% of the variance, which is below the critical threshold of 40%, suggesting no serious common method bias (Podsakoff et al., 2003).

Descriptive statistics and correlation analysis are presented in Table 1. Descriptive statistics and correlation analysis are presented in Table 1. The descriptive and injunctive social norms of the "thin ideal" were significantly negatively correlated with positive body image (r = -0.42, p < 0.001; r = -0.14, p = 0.048). Additionally, these social norms were significantly positively correlated with BMI self-discrepancy (r = 0.34, p < 0.001; r = 0.17, p = 0.012). BMI self-discrepancy was significantly negatively correlated with positive body image (r = -0.28, p < 0.001).

Table 1

Descriptive Statistics and Correlation Matrix of Each Variable (N = 211)

variable	*M*	*SD*	1	2	3	4	5	6	7	8	9
1. Gender [a]	–	–	–								
2. Age(age)	22.31	2.10	0.19**	–							
3. Education [b]	1.38	0.54	−0.08	0.52**	–						
4. Disposable monthly income [c]	2.67	1.05	−0.21**	0.17*	0.08	–					
5. Socioeconomic status	5.07	1.61	0.10	0.05	0.18**	0.25**	–				
6. "Thin Ideal" descriptive social norm	5.08	1.03	−0.004	−0.02	−0.12	−0.02	0.08	–			

	M	SD	1	2	3	4	5	6	7	8	9
7. "Thin Ideal" injunctive social norms	5.71	0.86	−0.21**	0.04	0.13	−0.003	0.21**	0.24**	–		
8. BMI self-discrepancy	2.08	1.38	−0.01	−0.08	−0.04	−0.08	−0.06	0.34**	0.17*	–	
9. Positive body image	2.31	0.66	0.06	0.06	0.08	0.06	−0.09	−0.42**	−0.14*	−0.28**	–

Note: [a] Gender, female = 0, male = 1; [b] Education, bachelor's degree = 1, master's degree = 2, doctorate = 3; [c] Disposable monthly income, < 2000 yuan = 1, 2000-3000 yuan = 2, 3000-5000 yuan = 3, 5000-10000 yuan = 4, > 10000 yuan = 5. $^*p < 0.05$, $^{**}p < 0.01$.

The mediating role of BMI self-discrepancy

Model 4 in PROCESS for SPSS plug-in (version 4.0) developed by Hayes (2013) was used. The bias-corrected Bootstrap method (repeated sampling 5000 times) tested the mediating role of BMI self-discrepancy between the two social norms and positive body image (see Figures 1 and 2). The results indicated that the perceived descriptive social norm of the "thin ideal" positively predicted BMI self-discrepancy ($b = 0.15$, $SE = 0.03$, $t = 5.18$, $p < 0.001$, 95% CI = [0.09, 0.20]), and BMI self-discrepancy negatively predicted positive body image ($b = −0.92$, $SE = 0.35$, $t = −2.63$, $p = 0.009$, 95% CI = [−1.61, −0.23]). BMI self-discrepancy partially mediated the relationship between descriptive social norms and positive body image (direct effect = −0.87, $SE = 0.16$, 95% CI = [−1.18, −0.57]; indirect effect = −0.14, *Boot SE* = 0.06, 95% CI = [−0.28, −0.03]).

Similarly, the perceived injunctive social norms of the "thin ideal" positively predicted BMI self-discrepancy ($b = 0.16$, $SE = 0.03$, $t = 4.80$, $p < 0.001$, 95% CI = [0.10, 0.23]), and BMI self-discrepancy negatively predicted positive body image ($b = −1.14$, $SE = 0.36$, $t = −3.17$, $p = 0.002$, 95% CI = [−1.85, −0.43]). BMI self-discrepancy also partially mediated the relationship between injunctive social norms and positive body image (direct effect = −0.73, $SE = 0.19$, 95% CI = [−1.10, −0.36]; indirect effect = −0.19, *Boot SE* = 0.08, 95% CI = [−0.36, −0.06]).
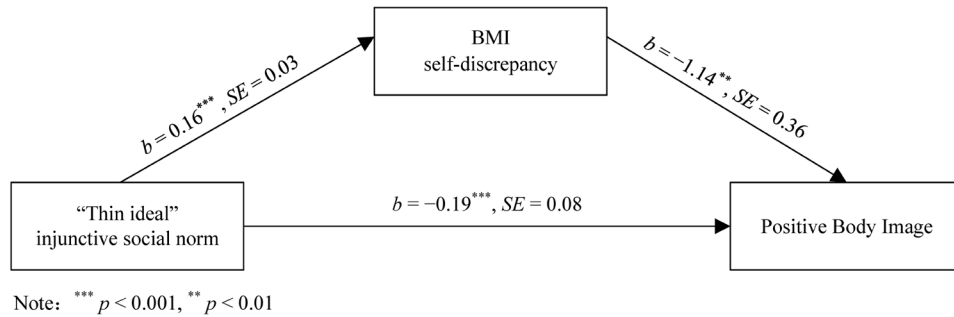
Figure 1
The Mediation Model of the Descriptive Social Norm of "Thin Ideal" on Body Image
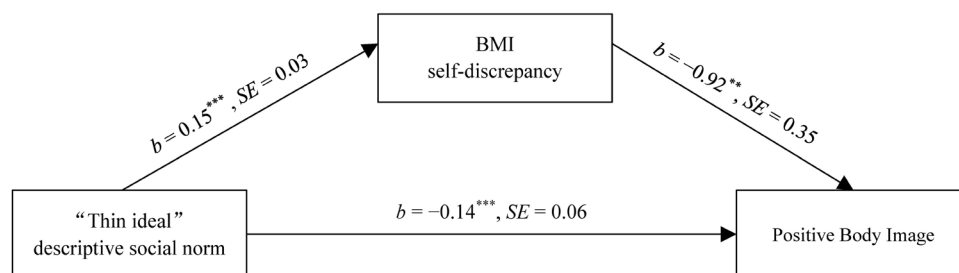
Note：$^{***}p < 0.001$, $^{**}p < 0.01$

Figure 2

The Mediation Model of the Injunctive Social Norms of "Thin Ideal" on Body Image

Note： $^{***}p < 0.001$, $^{**}p < 0.01$

Discussion

The results of Study 1 supported H1 and H2. Both the descriptive and injunctive social norms of the "thin ideal" negatively predicted positive body image, indicating that the stronger the perceived social norm of the "thin ideal" corresponds to lower levels of positive body image. BMI self-discrepancy partially mediated the relationship between these social norms and positive body image, meaning that the perceived social norms of the "thin ideal" reduced positive body image by increasing BMI self-discrepancy. Consistent with previous evidence, internalization of the "thin ideal" social norm causes individuals to continually compare their real body shape with their ideal body shape. The greater the discrepancy between the two, the lower their body satisfaction and the more negative their body image (Furnham et al., 2002; Harrison, 2001; Vartanian, 2012).

An interesting additional finding was that the independent sample t-test showed no significant difference in positive body image between participants of different genders (t(209) = 0.9, p = 0.37), which contradicts previous studies suggesting that men generally have higher positive body image than women (Tylka, 2011). In addition, while gender was not significantly correlated with descriptive social norms, it was significantly negatively correlated with injunctive social norms (r = −0.21, p = 0.002), indicating that women perceive higher injunctive social norms. This suggests that women feel more pressure from the "thin ideal" social norms, likely because the media often presents "ideal" female images emphasizing thinness (Holland & Tiggemann, 2016), which may be more impactful than behavioral norms.

Study 1 examined the mechanism of the "thin ideal" social norm on positive body image, laying the groundwork for influencing positive body image and caloric intake by intervening in the "thin ideal" social norm. Study 2 employed a personalized norm feedback intervention strategy to correct misconceptions and explore the impact of "thin ideal" social norm intervention on positive body image and caloric intake among young people. Since the online environment aligns well with how individuals receive social media information, and the effectiveness of online interventions has been confirmed by previous studies (Buckner et al., 2019), Study 2 utilized an online experiment.

Study 2

Study 2 explored the effect of the "thin ideal" social norm intervention on positive body image and calorie intake. Specifically, it examined whether combining descriptive and injunctive intervention strategies to correct misperceptions could significantly improve positive body image (H3a) and calorie intake (H3b).

Method

Participants

A priori analysis was conducted using G*Power 3.1 software (Faul et al., 2009), with an effect size of $f = 0.25$, a statistical power of 0.8, and a significance level of $\alpha = 0.05$ (Cohen, 1992). This analysis indicated the need for 98 and 82 participants to calculate the 2×2 and 2×4 repeated measures ANOVA designs, respectively. Data were collected in five waves through the Credamo platform (a questionnaire platform in China), with 18 to 30 participants per wave. Initially, 139 participants were recruited, of whom 9 failed the practice test and 13 dropped out during the experiment. Ultimately, 117 participants (79 females and 38 males), aged 18 to 30 years ($M = 22.56$, $SD = 2.28$), completed the study. The average BMI for females was 20.91 ± 3.06 kg/m², and for males, it was 22.46 ± 2.87 kg/m². There were no significant differences between missing and complete participants in terms of gender (χ^2 $(1, n = 130) = 0.02$, $p = 0.90$)、BMI (F $(1, 128) =$

1.19, $p = 0.28$), positive body image ($F(1, 128) = 0.41$, $p = 0.52$), or caloric intake ($F(1, 128) = 1.15$, $p = 0.29$).

Procedure and Measures

For positive body image, a two-factor mixed experimental design of 2 (time: Day 1 vs. Day 4) × 2 (social norm intervention: intervention group vs. control group) was used. For calorie intake, a two-factor mixed experimental design of 4 (time: Day 1 vs. Day 2 vs. Day 3 vs. Day 4) × 2 (social norm intervention: intervention group vs. control group) was adopted. Time was the within-group variable, type of social norm intervention was the between-group variable, and body image and calorie intake were the dependent variables.

The experiment was conducted on the Credamo platform (see Figure 3). Based on Wally and Cameron's (2017) 8-day social norms intervention study, which effectively increased physical activity, and Stok et al.'s (2014) findings on injunctive social norms affecting fruit intake behavior within two days, this study set a high-frequency intervention cycle of 4 days.

Figure 3

The Flowchart of the Social Norm Intervention
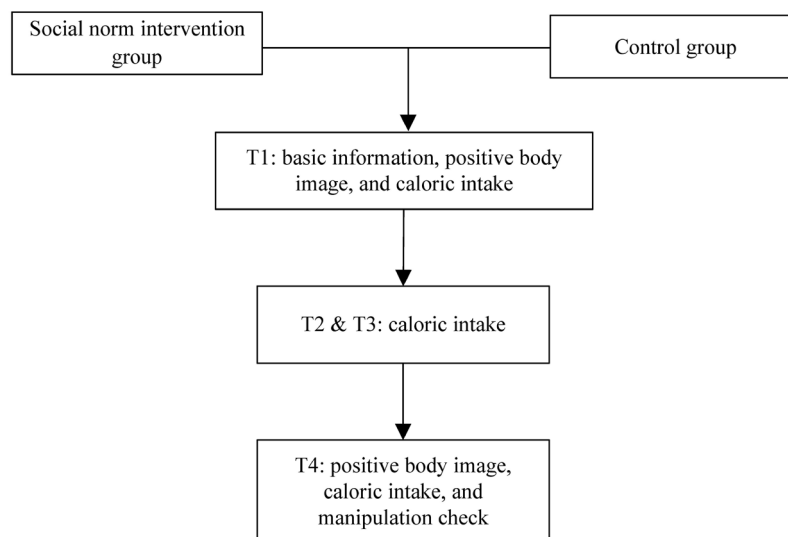
The university's ethics review board approved the study. Recruitment information described the study as an exploration of social feedback and dietary calorie tracking. Interested participants signed informed consent and were compensated. Participants were randomly assigned to the "thin

ideal" social norm intervention group or the control group and learned to use *Mint Health* (https://www.boohee.com/), which provides healthy nutrition management functions, including calorie query, photo recognition of food calories, diet analysis, etc.

On the first day, participants filled in basic information (age, gender, height, weight). They completed the body image scale on the first and fourth days, using the Chinese version of the Body Appreciation Scale-2 (Ma et al., 2020; $\alpha_{\text{before}} = 0.915$, $\alpha_{\text{after}} = 0.905$), which has 10 items rated on a 5-point scale (*1 = strongly disagree, 5 = strongly agree*), with higher scores indicating a higher body image assessment.

Participants received a questionnaire link each night for 4 consecutive nights, uploading photos of consumed food and screenshots of calorie intake from *Mint Health*. Calorie intake was calculated by searching for food types and selecting the weight of food consumed, with the app automatically calculating the total calorie value.

The "thin ideal" social norm intervention group received a feedback message: "Thank you very much for your diet check-in today! So far, our experimental participants have reached 463 people [the number of participants increases daily, varying randomly between 30 and 50]. They come from all corners of the country and are distributed across different regions. According to our statistics, 67.1% [the value changes daily, varying randomly between 51% and 99% to increase credibility] of participants prefer normal and meaty bodies over very thin bodies (injunctive part). Today's calorie intake check-in ranking shows that 79.6% [the value changes daily, varying randomly between 51% and 99% to increase credibility] of boys/girls [participants see the same gender as themselves here] who participated in the experiment today have a higher calorie intake than you (descriptive part)." The control group did not receive feedback. To ensure participants read the feedback, the page required a minimum reading time of 3 minutes, and participants had to enter a percentage value from the feedback to confirm comprehension. Incorrect entries indicated a failed attention test.

After receiving all feedback, participants completed a 2-item manipulation test adapted from the "thin ideal" social norm measurement. One item tested the descriptive part ("*Many people are engaged in weight loss plans or behaviors*"), and the other tested the injunctive part ("*Many people believe that people should pursue a thin body*"), both rated on a 7-point scale (*1 = strongly disagree, 7 = strongly agree*), with higher scores indicating worse manipulation test outcomes.

Result

Baseline data analysis

The baseline data analysis of the "thin ideal" social norm intervention group and the control group showed that the differences in BMI, positive body image baseline, and calorie intake baseline between the two groups were not significant, making them suitable for subsequent analysis (see Table 2).

Table 2

Baseline Data of the Two Groups of Participants (M ± SD)

Variable	Social Norm Intervention Group (n = 67)	Control Group (n = 50)	F	p
BMI	21.77 ± 3.55	20.94 ± 2.23	2.08	0.15
Positive body image baseline	3.53 ± 0.74	3.55 ± 0.64	0.01	0.92
Caloric intake baseline	1325.16 ± 417.38	1431.94 ± 540.70	1.45	0.23

Manipulation Check

The manipulation test results showed that the descriptive part of the intervention, focusing on testing social norms, was not successfully manipulated ($p = 0.075$). However, the injunctive part of the intervention was successfully manipulated ($M_{intervention} = 4.07$, $M_{control} = 5.76$), $F(1, 115) = 38.689$, $p < 0.001$. This indicates that the social norm intervention manipulation was more effective in the injunctive part.

The effect of the intervention on positive body image

A 2×2 repeated measures ANOVA was conducted with social norm intervention as the independent variable, positive body image as the dependent variable, and gender as the covariate. The results showed that the main effects of time ($p = 0.79$) and social norm intervention ($p = 0.82$) were not significant. The interaction effect between time and social norms also did not reach significance (p = 0.94). 3.2.4
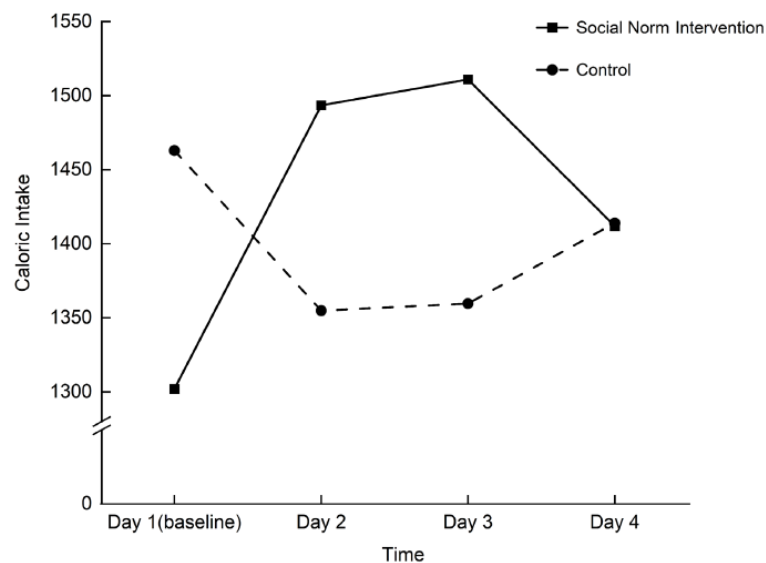
The effect of the intervention on caloric intake

A 2×4 repeated measures ANOVA was performed with social norm intervention as the independent variable, caloric intake as the dependent variable, and gender as the covariate. The results showed that the main effects of time ($p = 0.65$) and social norm intervention ($p = 0.62$) were not significant. However, the interaction between time and social norm was significant, $F(3, 112) = 5.96$, $p = 0.001$, $\eta_p^2 = 0.13$. Simple effects tests (see Figure 4) showed that the caloric intake of the "thin ideal" social norm intervention group on day 2 ($M = 1493.47$, $SD = 55.65$ $p = 0.005$), and day 3 ($M = 1510.96$, $SD = 47.57$, $p = 0.001$) was significantly higher than on day 1 ($M = 1302.06$, $SD = 56.13$). However, the difference between day 4 and day 1 did not reach significance ($p = 0.53$). The difference in caloric intake of the control group over the four days was not significant ($p_{t2} = 0.58$, $p_{t3} = 0.58$, $p_{t2} = 1.00$).

Figure 4

Changes in Caloric Intake Over Time Under Different Social Norm Interventions

Discussion

Study 2 partly verified H3. In terms of positive body image, compared with the control group, no positive effect of the "thin ideal" social norm intervention was observed, and H3a was not verified. In terms of calorie intake, the calorie intake of the "thin ideal" social norm intervention group on the second and third days was significantly higher than the baseline level, while the

control group did not show such an increase trend, which showed a positive effect of social norm intervention on calorie intake, verifying H3b.

The current injunctive social norm intervention significantly increased calorie intake but failed to find a significant increase in the level of positive body image. Moreover, from the trend of calorie intake changes, it only increased significantly on the second day, slowed down on the third day, and even began to decline on the fourth day, returning to the level before the intervention. This can be improved from two points: First, the manipulation test results showed that the manipulation of the descriptive part did not reach a significant level, possibly because it was not clearly reflected in the manipulation materials. Additionally, descriptive and injunctive social norms play intertwined roles. Descriptive norms provide information for making accurate and effective choices, while injunctive norms are related to the interpersonal goals of establishing and maintaining social relationships. Therefore, it is crucial to distinguish between these two types of information (Jacobson et al., 2011). Although both descriptive and injunctive social norms can successfully change attitudes and behaviors (Miller & Prentice, 2016), descriptive social norms can offer more advantages in information processing during behavioral decision-making. For example, Stok et al. (2014) found that descriptive norms had a lasting impact on fruit intake behavior, while injunctive norms showed a certain resistance effect in the short term. Based on previous studies and the results of Study 2, this study chose to continue exploring the intervention effect of descriptive social norms in correcting misperceptions. Secondly, this may also indicate that the traditional intervention method of correcting misperceptions is limited in effect, and more effective intervention methods need to be further explored. Therefore, Study 3 introduced the role model factor, combining correcting misperceptions with role model interventions to address the "thin ideal" social norms. The study compared the effectiveness of this combined approach with the traditional method of correcting misperceptions.

Study 3

Study 3 aimed to test the intervention effect of descriptive social norm intervention (correcting misperceptions) on positive body image (H3a) and caloric intake (H3b). Additionally, it explored whether the combined intervention method of correcting misconceptions and role models is more effective than the intervention method of solely correcting misperceptions on positive body image (H4a) and caloric intake (H4b).

Method

Participants

A priori analysis was performed using G*power 3.1 software (Faul et al., 2009), with an effect size of $f = 0.25$, statistical power = 0.8, and a significance level of $\alpha = 0.05$ (Cohen, 1992). At least 120 and 102 participants were required to calculate the 2×3 and 4×3 repeated measures ANOVA designs, respectively. Six waves of data collection were conducted through the Credamo platform, with 30 to 35 participants in each wave. A total of 193 participants were recruited, 12 of whom failed the practice test, and 26 were lost during the experiment. In the end, there were 155 participants (111 females and 44 males), aged between 18 and 28 years ($M = 22.06$, $SD = 2.13$). The average BMI of females was 20.69 ± 3.42 kg/m², and the average BMI of males was 22.53 ± 2.99 kg/m². There was no significant difference between the missing participants and the complete participants in terms of gender ($\chi^2(1, n = 181) = 3.29$, $p = 0.07$)、BMI ($F(1, 179) = 1.07$, $p = 0.30$), Positive Body Image($F(1, 179) = 0.50$, $p = 0.48$), caloric intake($F(1, 179) = 1.38$, $p = 0.24$) were not found to have significant differences.

Procedure and Measures

For positive body image, a 2 (time: Day 1 vs. Day 4) × 3 (social norm intervention: correction group vs. correction-role model group vs. control group) two-factor mixed experimental design was used. For caloric intake, a 4 (time: Day 1 vs. Day 2 vs. Day 3 vs. Day 4) × 3 (social norm intervention: correction group vs. correction-role model group vs. control group) two-factor mixed experimental design was employed. Time was the within-group variable, social norm intervention was the between-group variable, and positive body image and caloric intake were the dependent variables.

The experimental procedure followed the same steps as in Study 2. All participants provided informed consent and were compensated accordingly. Participants were randomly assigned to the correction group, correction-role model group, or control group, and filled out the Body Appreciation Scale-2 on the first and fourth days ($\alpha_{before} = 0.915$, $\alpha_{after} = 0.905$), and recorded calorie intake for 4 consecutive days.

Finally, the correction group received a feedback message:

"Thank you very much for your diet check-in today! So far, our experimental participants have reached 463 people [the number of participants increases daily, varying randomly between 30 and 50]. They come from all corners of the country and are distributed across different regions. According to our statistics, 67.1% [the value changes daily, varying randomly between 51% and 99% to increase credibility] of participants currently have no weight loss plan or implement weight loss behavior. Today's calorie intake check-in ranking shows that 79.6% [the value changes daily, varying randomly between 51% and 99% to increase credibility] of boys/girls [participants see the same gender as themselves here] who participated in the experiment today have a higher calorie intake than you (descriptive social norms)."

The correction-role model group received a feedback message:

"Thank you very much for your diet check-in today! So far, our experimental participants have reached 463 people [consistent with the correction group]. Many of them have won the honorary title of excellent students and have received praise and recognition from many friends around them (role model factor). According to our statistics, 67.1% of the participants [consistent with the correction group] currently have no weight loss plan or implement weight loss behavior. Today's calorie intake check-in ranking shows that 79.6% [consistent with the correction group] boys/girls [participants see the same gender as themselves here] who participated in the experiment today have a higher calorie intake than you (descriptive social norms)."

The control group did not receive any feedback information. To ensure that participants read the feedback carefully, a minimum reading time of 3 minutes was set for the feedback page. Participants were also required to enter the percentage value from the manipulation sentence to confirm their understanding. Those who entered the incorrect value were deemed to have failed the attention test.

After receiving all the intervention information, participants completed a manipulation test of descriptive social norms. This test consisted of one item: "*Many people are engaged in weight loss plans or behaviors*," rated on a 7-point scale (*1 = strongly disagree, 7 = strongly agree*). A higher score indicated a poorer manipulation test effect.

Result

Baseline data analysis

The results of the baseline data analysis for the "thin ideal" social norm intervention group and the control group showed that the differences in BMI, positive body image baseline, and calorie intake baseline between the three groups were not statistically significant, making them suitable for subsequent analysis (see Table 3).

Table 3

Baseline Data of Participants in Three Groups (M ± SD)

Variable	Correction Group (n = 69)	Correction-Role Model Group (n = 51)	Control Group (n = 35)	F	p
BMI	21.33 ± 3.34	21.35 ± 2.60	20.78 ± 4.44	0.36	0.70
Positive body image baseline	3.58 ± 0.64	3.55 ± 0.61	3.67 ± 0.63	0.42	0.66
Caloric intake baseline	1270.00 ± 421.45	1344.76 ± 415.60	1403.74 ± 481.44	1.18	0.31

Manipulation Check

The results of the manipulation test showed that the descriptive social norms intervention was successfully manipulated, $F(2, 152) = 20.69$, $p < 0.001$. Both the correction group ($M = 3.68$, $SD = 1.68$) and the correction-role model group ($M = 3.69$, $SD = 1.74$) had significantly lower scores than the control group ($M = 5.66$, $SD = 1.14$), with both comparisons yielding $p < 0.001$.

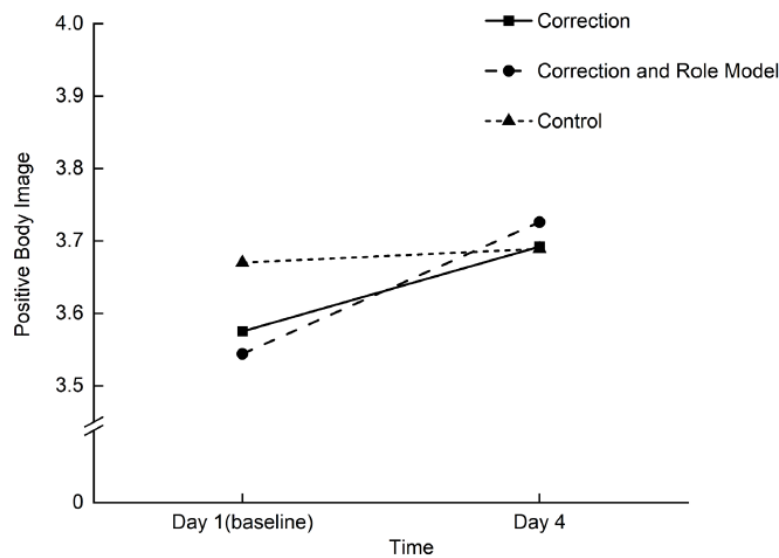*The effect of the intervention on positive body image*

A 2×3 repeated measures ANOVA was conducted with social norm intervention as the independent variable, positive body image as the dependent variable, and gender as the covariate.

The results showed that the main effects of time ($p = 0.79$) and social norm intervention ($p = 0.92$) did not reach a significant level. According to the standards of Olsson-Collentine et al. (2019), the interaction between time and social norm intervention was marginally significant, $F(2, 151) = 2.89$, $p = 0.059$, $\eta_p^2 = 0.037$. Simple effect analysis showed (see Figure 5) that the positive body image on day 4 ($M = 3.69$, $SD = 0.07$) in the Correction Group was significantly higher than on day 1 ($M = 3.58$, $SD = 0.08$), $p = 0.002$, $\eta_p^2 = 0.06$. In the correction-role model group, positive body image on day 4 ($M = 3.73$, $SD = 0.08$) was significantly higher than those on day 1 ($M = 3.54$, $SD = 0.09$), $p < 0.001$, $\eta_p^2 = 0.11$. The difference in positive body image scores between day 1 and day 4 in the control group was not significant, $p = 0.71$.

Figure 5

Changes in Positive Body Image Over Time Under Different Social Norm Interventions

*The effect of the intervention on caloric intake*

A 3×4 repeated measures ANOVA was conducted with social norm intervention as the independent variable, caloric intake as the dependent variable, and gender as the covariate. The results showed that the main effects of time ($p = 0.10$) and social norm intervention ($p = 0.13$) did not reach a significant level. However, the interaction between time and social norm intervention was significant, $F(6, 300) = 3.08$, $p = 0.006$, $\eta_p^2 = 0.058$. Simple effect tests showed (see Figure 6) that for the correction group, caloric intake on day 2 ($M = 1476.91$, $SD = 51.91$, $p < 0.001$), day 3

(M = 1491.22, SD = 54.19, p = 0.002) and day 4 (M = 1406.14, SD = 48.99, p = 0.038) was significantly higher than that on day 1 (M = 1268.43, SD = 50.41). For the correction-role model group, caloric intake on day 2 (M = 1552.84, SD = 60.62, p = 0.001), day 3 (M = 1617.26, SD = 63.28, p < 0.001), and day 4 (M = 1621.28, SD = 57.20, p < 0.001) was significantly higher than that on day 1 (M = 1326.66, SD = 58.87). The differences in caloric intake over the four days in the control group did not reach a significant level (all p = 1.00). Additionally, on day 4, the caloric intake of the correction-role model group (M = 1621.28, SD = 57.20) was significantly higher than that of the correction group (M = 1406.14, SD = 48.99, p = 0.038) and the control group (M = 1340.06, SD = 69.27, p = 0.007), while the difference between the correction group and the control group did not reach a significant level (p = 0.67).

Figure 6

Changes in Caloric Intake Over Time Under Different Social Norm Interventions
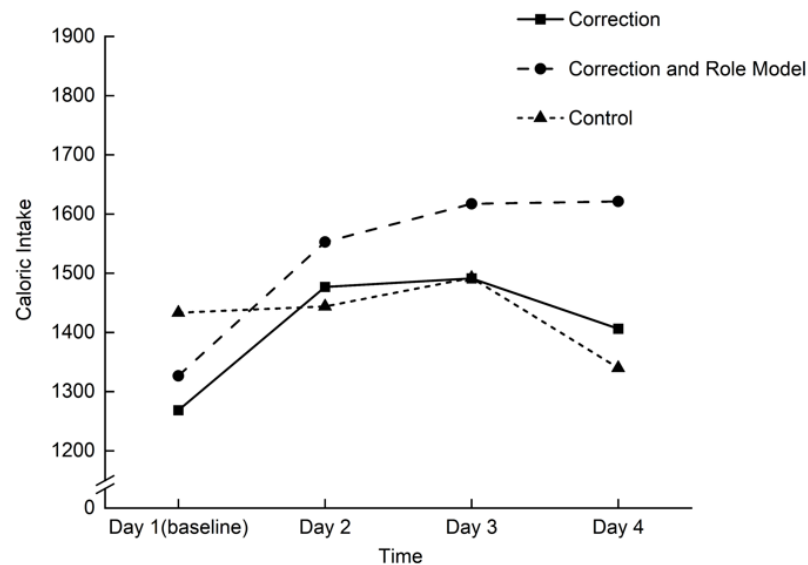
Discussion

Study 3 verified both H3 and H4. For positive body image and calorie intake, the correction group and the correction-role model group showed continuous and significant improvements compared to the baseline level, whereas the control group did not show a significant improvement. In terms of positive body image, the effect size of the correction-role model group was higher than that of the correction group. Regarding calorie intake, the correction-role model group had

significantly higher intake than the correction group on the fourth day. Additionally, the trend of calorie intake in the correction-role model group showed a continuous upward trend, while the correction group exhibited a downward trend, suggesting the potential efficacy of the correction-role model intervention. Therefore, Study 4 will further extend the intervention duration and specifically target young individuals with normal weight and restrictive eating behaviors.

Study 4

Study 4 focused on young individuals with normal BMI and restrictive eating behaviors, comparing the intervention effects of correcting misperceptions based on descriptive social norms with a combined intervention of correction and role models. The intervention period was extended to 10 days. This study aimed to further test the efficacy of the combined intervention, hypothesizing that it would be more effective than merely correcting misconceptions in improving positive body image (H4a) and calorie intake (H4b).

Method

Participants

A priori analysis was performed using G*power 3.1 software (Faul et al., 2009), with an effect size of $f = 0.25$, statistical power = 0.8, and a significance level of $\alpha = 0.05$ (Cohen, 1992). At least 120 and 96 participants were required to calculate the 2×3 and 5×3 repeated measures ANOVA designs, respectively. Five waves of data collection were conducted through the Credamo platform, with each wave including 22 to 35 participants. A total of 148 participants were recruited, 8 of whom failed the practice test, and 11 were lost during the experiment. In the end, there were 129 participants (89 females and 40 males), aged between 18 and 29 years old ($M = 22.57$, $SD = 2.10$). The average BMI of females was 20.28 ± 1.65 kg/m², and the average BMI of males was 22.16 ± 1.78 kg/m². There were no significant differences between the missing participants and the

complete participants in terms of gender ($\chi^2(1, n = 140) = 0.004$, $p = 0.95$), BMI ($F(1, 138) = 1.30$, $p = 0.26$), positive body image ($F(1, 138) = 1.92$, $p = 0.17$), and caloric intake ($F(1, 138) = 1.92$, $p = 0.17$).

Procedure and Measures

The intervention duration of this experiment was 10 days. For positive body image, a 2 (time: T1 vs. T5) × 3 (social norm intervention: correction group vs. vs. correction-role model group vs. control group) mixed experimental design was used. For caloric intake, a 5 (time: T1 vs. T2 vs. T3 vs. T4 vs. T5) × 3 (social norm intervention: correction group vs. vs. correction-role model group vs. control group) mixed experimental design was employed. Time was the within-group variable, the type of social norm intervention was the between-group variable, and body image and caloric intake were the dependent variables.

All participants signed informed consent forms and were compensated accordingly. Before the experiment, participants completed the restrained eating subscale of the Dutch Eating Behavior Questionnaire (Van Strien et al., 1986), which has demonstrated applicability among Chinese college students (Li et al., 2018). Participants with a BMI within the normal range (18.5–24 kg/m²; China Nutrition Study) were selected. The subsequent experimental procedures were the same as those in Study 3. Participants were randomly assigned to the correction group, the correction-role model group, or the control group, and filled out the Body Appreciation Scale-2 on the 1st and 10th days ($\alpha_{before} = 0.876$, $\alpha_{after} = 0.879$). Participants recorded their caloric intake for 10 consecutive days. The average of the 2-day data was used as the caloric intake value, with time point T1 being the 1st to 2nd days, T2 being the 3rd to 4th days, and T3, T4, and T5 following similarly. The correction group and the correction-role model group received feedback consistent with that in Study 3, while the control group did not receive feedback. To ensure participants read the feedback carefully, a reading time of at least 3 minutes was set on the feedback page. Participants were also required to enter the percentage value of the manipulation sentence to ensure their reading and understanding. Participants who entered the wrong value were considered to have failed the attention test.

Result

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Baseline data analysis

The results of the baseline data analysis of the "thin ideal" social norm intervention group and the control group showed that (see Table 4) the differences between the three groups in BMI, positive body image baseline, and calorie intake baseline were not statistically significant, making them suitable for subsequent analysis.

Table 4

Baseline Data of Participants in Three Groups (M ± SD)

Variable	Correction Group (n = 46)	Correction-Model Role Group (n = 44)	Control Group (n = 39)	F	p
BMI	20.90 ± 1.91	20.85 ± 2.15	20.82 ± 1.61	0.022	0.98
Positive body image baseline	3.22 ± 0.71	3.10 ± 0.64	3.15 ± 0.69	0.32	0.73
Caloric intake baseline	1133.07 ± 333.71	1262.91 ± 395.42	1236.23 ± 283.86	1.80	0.17

The effect of the intervention on positive body image

A 2×3 repeated measures ANOVA was conducted with social norm intervention as the independent variable, positive body image as the dependent variable, and gender as the covariate. The results showed that the main effects of time ($p = 0.30$) and social norm intervention ($p = 0.72$) were not significant. Additionally, the interaction between time and social norm intervention did not reach a significant level ($p = 0.31$).

The effect of the intervention on caloric intake

A 5×3 repeated measures ANOVA was conducted with social norm intervention as the independent variable, caloric intake as the dependent variable, and gender as the covariate. The results showed that the main effect of time was significant, $F(4, 122) = 2.64$, $p = 0.037$, $\eta_p^2 = 0.08$. Multiple comparisons (Bonferroni) showed that T2 ($M = 1427.45$, $SD = 24.97$, $p < 0.001$), T3 ($M = 1367.06$, $SD = 26.71$, $p < 0.001$), T4 ($M = 1387.38$, $SD = 25.94$, $p < 0.001$), T5 ($M = 1355.54$, $SD = 25.97$, $p = 0.001$) was significantly higher than that at T1 ($M = 1234.49$, $SD = 28.83$). The main effect of social norms was significant, $F(2, 125) = 11.11$, $p < 0.001$, $\eta_p^2 = 0.15$. Multiple comparisons (Bonferroni) showed that the caloric intake of the correction-role model group ($M =$

1483.75, $SD = 34.22$) was significantly higher than that of the correction group ($M = 1321.47$, $SD = 33.43$, $p = 0.003$) and the control group ($M = 1267.02$, $SD = 38.73$, $p < 0.001$).

The interaction between time and social norms was significant, $F(8, 246) = 2.19$, $p = 0.029$, $\eta_p^2 = 0.066$. Simple effect tests showed (see Figure 7) that for the correction-model role group, T2 ($M = 1533.55$, $SD = 42.70$, $p = 0.001$), T3 ($M = 1528.64$, $SD = 45.67$, $p < 0.001$), T4 ($M = 1535.69$, $SD = 44.36$, $p = 0.002$) and T5 ($M = 1505.93$, $SD = 44.41$, $p = 0.002$) was significantly higher than at T1 ($M = 1314.94$, $SD = 49.30$). For the correction group, caloric intake at T2 ($M = 1468.11$, $SD = 41.71$, $p < 0.001$), T3 ($M = 1336.69$, $SD = 44.62$, $p = 0.008$), and T4 ($M = 1333.62$, $SD = 43.33$, $p = 0.05$) was significantly higher than at T1 ($M = 1175.15$, $SD = 48.16$), but not at T5 ($M = 1293.79$, $SD = 43.39$, $p = 0.17$).

Figure 7

Changes in Caloric Intake Over Time Under Different Social Norm Interventions
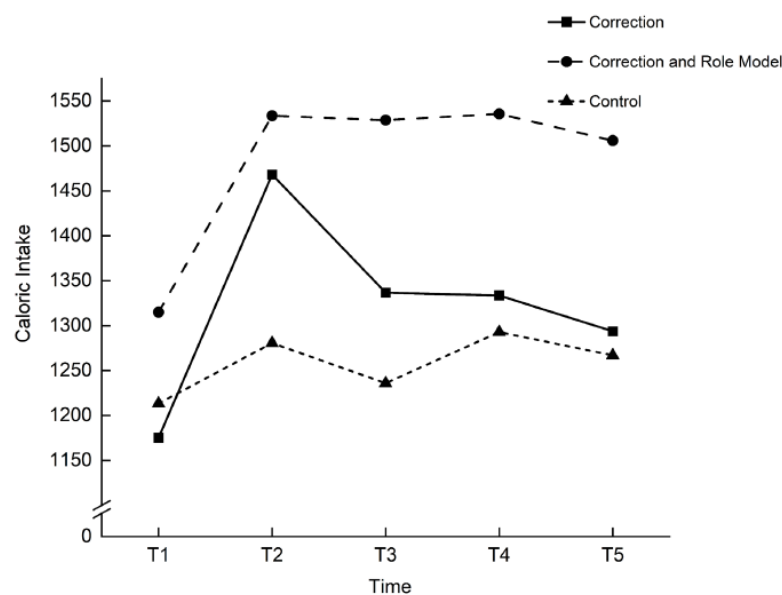
Discussion

Study 4 partially verified H4. In terms of positive body image, the interventions in the misperception correction group and the correction-role model group were not significantly better than those in the control group, so H4a was not verified. This may be because the participants, who exhibited restrictive eating behaviors, placed more importance on body image than the general population, making it more difficult to change their views on body image. In terms of

calorie intake, compared with the control group, both social norm interventions significantly increased calorie intake, and the calorie intake in the correction-role model intervention was significantly higher than that in the simple correction of misperceptions intervention, verifying H4b. Specifically, the correction of misperceptions intervention showed an overall downward trend after T2 and the difference in calorie intake at T5 compared to the control group did not reach a significant level. In contrast, the correction-role model group had significantly higher calorie intake than the control group at T2, T3, T4, and T5, indicating that the combined intervention of correction and role models lasted longer than the simple correction of misperceptions intervention.

An unexpected finding was that compared to Study 3, which involved the general population, Study 4, which targeted the restricted eating group, had a better intervention effect on caloric intake behavior. Specifically, the effect size ($\eta_p^2 = 0.066$) was higher than that of Study 3 ($\eta_p^2 = 0.058$). This may be because restrictive eaters are more focused on body image and more sensitive to diet-related intervention information. Therefore, once the intervention measures take effect, they exhibit a more noticeable improvement in calorie intake behavior compared to the general population.

General Discussion

Across four studies, we explored the mechanism of the impact of the "thin ideal" social norm on the positive body image of young people and, on this basis, examined the effects of different social norm interventions on their positive body image and calorie intake. Study 1 verified the mediating role of BMI self-discrepancy in the relationship between the "thin ideal" social norm and positive body image. Specifically, the stronger the perceived descriptive or injunctive social norms of the "thin ideal", the greater the BMI self-discrepancy and the lower the level of positive body image perception. Building on this, Studies 2-4 further explored the effects of interventions targeting the "thin ideal" social norm. Study 2 showed that injunctive social norms can significantly increase caloric intake but did not significantly improve positive body image. Therefore, Study 3 focused on descriptive social norms, which were relatively more effective. The results indicated that both the intervention methods of correcting misperceptions and combining

correction with role modeling improved positive body image and caloric intake, with the combined intervention being more effective. Study 4 limited the participants to individuals with normal BMI and restrictive eating behavior, extending the intervention period to 10 days. Although no significant effect of social norm intervention on positive body image was found, the results for caloric intake indicated that the combined intervention of correcting misperceptions and role modeling had a longer-lasting effect on caloric intake in the youth group compared to the intervention method of correcting misperceptions alone.

Theoretical Implications

The current research introduces the social norm perspective into the field of body image, expanding the research on its influencing mechanisms. Many previous studies, based on the sociocultural perspective (Thompson et al., 1999), emphasize the role of "thin ideal internalization" in leading to negative body image and eating disorders (e.g., Fitzsimmons-Craft et al., 2012; Myers & Crowther, 2007). The present research takes a different approach, combining social norms theory with self-discrepancy theory to explain how the perception of the "thin ideal" social norm affects an individual's positive body image. While the sociocultural perspective and the social norms perspective share similarities, including factors like family, peers, and media, social norms theory posits that individuals have "misperceptions" about body evaluation and achieving ideal standards. In the context of social media and algorithm-driven content dissemination (Acerbi, 2023; Kim & Chock, 2015), the "thin ideal" social norms are more widely spread, causing individuals to overestimate the prevalence (descriptive social norms) and acceptability (injunctive social norms) of the "thin ideal," thereby deepening its internalization (Harrison, 2001). These theoretical shifts help us better understand body image influences and offer practical intervention strategies to reduce "thin ideal" perceptions.

Secondly, the present work verifies the intervention effect of social norms in the realm of body image. Bergstrom and Neighbors (2006) identified three types of body image interventions: (1) media literacy education to recognize unrealistic ideal body shapes, (2) feedback comparing the self-body image with others, and (3) social norms interventions. This study focuses on the misperception of the prevalence of "thin ideal" information and verifies the positive effect of personalized norm feedback interventions on positive body image and calorie intake. This

provides empirical evidence for interventions and expands the application of social norm interventions in body image research. Previous studies have focused on preventing and improving negative body image, but positive body image includes appreciation, respect, and perceptions of individuals without clinical disorders (Tylka, 2011). This study uses social norm interventions to offer new approaches for improving positive body image, demonstrating the advantages of personalized social norm interventions in quickly affecting attitudes and behaviors with minimal cost.

Finally, the present findings propose a more effective intervention method by combining correcting misperceptions with role models, compared to the single application of correcting misperceptions. There is often a gap between perceived and actual social norms (Chung & Rimal, 2016), and traditional interventions aim to correct these misperceptions to change behavior (Miller & Prentice, 2016). The present study confirms that combining correction with role models is more effective in improving positive body image and calorie intake. Role models enhance the intervention effect by promoting norm diffusion and encouraging behavior imitation within groups (Legros & Cislaghi, 2020). While correcting misperceptions focuses on addressing mistakes, role models set positive goals, providing a logically coherent and deeper intervention method. Additionally, in the field of body image, Carey et al. (2014) found that role models may put great pressure on adolescents in terms of appearance expectations and have a strong negative impact on their body image. The present findings show that we can also leverage the power of role models to positively impact body image.

Practical Implications

This paper confirms the mechanism by which the "thin ideal" social norm influences body image and proposes a more effective intervention that combines correcting misperceptions with role models. This approach offers practical intervention strategies for normal-BMI individuals with negative body images or unhealthy weight loss behaviors. Role models significantly enhance the effect of social norm interventions beyond traditional misperception correction methods. Recognized role models, such as outstanding students and social media influencers, should be aware that their behavior sets an example for others. They should promote diverse body image

standards rather than a singular "thin ideal," encouraging a positive body image within their communities.

Additionally, the present research provides some suggestions for commercial organizations in the health field. The findings show that "thin ideal" social norm interventions can effectively improve young people's positive body image and calorie intake. Today, people often encounter "thin ideal" social norms through social media and fitness apps. Therefore, relevant commercial organizations (e.g., *Mint Health* and *Keep* in China) should assume social responsibility. These organizations can enhance public understanding of body aesthetics through effective communication, reduce the promotion of body anxiety, and encourage a positive self-image. Moreover, they should promote scientific dieting and fitness methods to help people avoid unhealthy weight loss practices.

Limitations and Future Work

Several limitations should be considered when interpreting the results. First, the longest intervention period in the current study, so it remains uncertain whether the observed changes in positive body image and calorie intake would persist over a longer duration. Additionally, although the social norm intervention had a significant effect on the calorie intake of the restrictive eating group, its impact on improving their positive body image needs further investigation. Future studies can more precisely limit the participants to individuals with low positive body image and restrictive eating behaviors, examining specific behaviors rather than just tendencies.

Second, the present study focused on normal-BMI youth without addressing whether the "thin ideal" social norm intervention might negatively affect overweight youth. Some researchers express concern that attempts to improve body image by reducing "thin ideal" perceptions might inadvertently increase the likelihood of being overweight (Stice & Shaw, 2004). Future research can explore whether this social norm intervention has adverse effects on overweight individuals and consider how personalized smart push technology can achieve differentiated interventions for normal-BMI and overweight individuals.

Third, this study did not directly compare the intervention effects of descriptive and injunctive social norms. Miller and Prentice (2016) believed that the implicit association between

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descriptive and injunctive social norms between these norms can successfully change attitudes and behaviors. However, Göckeritz et al. (2010) suggest that these norms can sometimes be "misaligned" in their effects. Specifically, people may believe that individuals perform certain behaviors out of fear of negative consequences, not necessarily because they approve of the behavior, or that others may approve of the behavior but will not act on it. Future research can further explore the consistency and difference between these two types of social norm interventions.

Additionally, for restrictive eaters (Study 4), the social norm intervention did not significantly improve positive body image but did have a substantial effect on caloric intake, even surpassing the effect size of Study 3, which targeted the general population. This finding raises interesting questions: Is social norm intervention more effective at changing caloric intake (a behavioral indicator) than positive body image (an attitudinal indicator) for restrictive eaters? One hypothesis is that restrictive eaters place greater importance on body image than the general group. The "thin ideal" social norm intervention may lead to dual cognitive conflicts. On the one hand, it concerns body image, transitioning from the belief that "only thinness is beautiful" before the intervention to "thinness is not the only standard of beauty" during the intervention. On the other hand, it involves eating behavior, shifting from "others don't eat much, only I eat a lot" before the intervention to "others may eat more than me" during the intervention. Restrictive eaters attach more importance to body image than normal eaters, so they are more sensitive to information about diet, and the intervention has a greater impact on caloric intake. Changing body image, however, is more challenging because it is closely tied to self-concept. Furthermore, we speculate that groups placing more importance on body image, such as restrictive eaters, will more strictly control their calorie intake based on their body image. This suggests a stronger relationship between body image and calorie intake in these groups. Therefore, if their body image perception changes and they no longer use thinness as a primary criterion for self-evaluation, their eating behavior may also change more significantly. Future research can test this theoretical reasoning by examining the degree of attention given to body image.

Finally, the original intention of the present study was to explore the common desire for weight loss between both sexes, so gender differences were not specifically considered. However, gender is an important factor in the field of body image. In Study 1, the difference in positive body

image between genders did not reach a significant level. In Study 2~4, there were too few male participants to make statistically feasible comparisons between the sexes. However, the disparity in the proportion of male and female participants in the study recruitment just shows that women may attach more importance to body image than men. Therefore, future research can continue to explore the different levels of importance and different connotations given to body image by both sexes based on the present study. For example, women may prefer thinness, while men may prefer muscularity. On this basis, future studies can develop social norm interventions that consider gender differences.

Conclusion

From the perspective of the influencing mechanism of the "thin ideal" social norms, the stronger an individual's perception of descriptive and injunctive social norms related to the "thin ideal," the lower their level of positive body image. BMI self-discrepancy mediates this process: the stronger the perception of the "thin ideal" social norms, the greater the individual's BMI self-discrepancy, resulting in a decreased level of positive body image. From the perspective of intervention, both methods—correcting misperceptions and combining correcting misperceptions with role models—can improve positive body image and increase calorie intake among youth. However, the combined method of correcting misperceptions and incorporating role models is more effective and has a longer-lasting impact.

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