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FROM SOCIAL MEDIA USE TO WILLINGNESS FOR BARIATRIC SURGERY IN CHINESE INDIVIDUALS: UNRAVELING THE PSYCHOLOGICAL MECHANISM

Wu Yushan[1], Wu Shuping[2]

[1] Department of Journalism, School of Communication, Xiamen University Malaysia, Malaysia
Email: jrn2109434@xmu.edu.my
[2] Anesthesia Operation Center, Chengdu Seventh People's Hospital, Sichuan, China
Email: 865052552@qq.com
[*] Corresponding Author

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Abstract:

Social media has become increasingly significant in life with its convenience and communicative vividness, shaping users' perceptions and reinforcing social norms, including socially accepted beauty standards. In China, the development of domestic social platforms has fueled a desire for achieving thin or muscular ideal bodies. Bariatric surgery, a procedure on the digestive system with substantial post-surgical weight loss, enjoys great popularity for individuals concerned about weight and shape. Given that prior studies have primarily explored the relationship between social media use and willingness for bariatric surgery in Western settings, a notable gap exists regarding this association in the Chinese context. Drawing upon social learning theory and social comparison theory, the current study aims to pioneer an investigation into social media's impact on Chinese individuals' willingness for bariatric surgery and its underlying mechanisms. Unlike previous studies that evaluated social media use by duration, the researcher innovatively assesses social media use from multiple dimensions: intensity, appearance-related preoccupation, and photo-based activities. Using a quantitative approach, a cross-sectional survey involving 385 Chinese participants who use Chinese social platforms and have body weight or shape concerns was conducted. Results reveal a positive relationship between social media use intensity and photo-based activities with willingness for bariatric surgery, while the effect of appearance-related preoccupation is insignificant. Psychological mechanisms include upward social comparison, body dissatisfaction, body ideal internalization, and low self-esteem. While this study primarily focuses on direct relationships, it leaves room for future exploration of mediation and moderation. These findings address the literature gap on how Chinese individuals perceive and contemplate bariatric surgery under social media influence. The study suggests preventive interventions through promoting rational social media use to

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alleviate body image concerns and disseminating accurate information about bariatric surgery.

Keywords:

Social Media Use, Bariatric Surgery, Chinese Individuals, Social Comparison, Body Ideals Internalization, Body Dissatisfaction, Self-esteem

Introduction

Contemporarily, social media has evolved into a pivotal tool for global communication and information exchange, boasting billions of active users across diverse platforms (Farsi, 2021). Beyond its social connectivity role, social media significantly reinforces societal norms and expectations, creating pressures for individuals to conform to narrowly defined appearance standards (Ahadzadeh et al., 2022). This amplification of conformity is exemplified in the work of Brady et al. (2020), where social media communication intensifies deindividuation, compelling individuals to align with societal norms for a favorable image. This positive image could be linked to either ethical virtue or physical attractiveness (Bulatova, 2016). In this context, the emphasis on appearance in social media content is more pronounced compared to traditional media, often leading to the sharing of selectively attractive photos (Saiphoo & Vahedi, 2019). Celebrities, as prominent figures on social media, have also played a role in establishing cultural body ideals, further pressuring women to adhere to these standards (Brown & Tiggemann, 2022).

The realm of social media has prompted investigations into novel variables to assess usage, particularly related to appearance-related preoccupation and photo-based activities (Fioravanti et al., 2023; Ozimek et al., 2023). Online platforms have cultivated an environment where individuals are preoccupied with their appearance, fostering contemplation of their image in photos, which can cause negative outcomes such as depression, body anxiety, and sensitivity to appearance criticism (Hawes et al., 2020). Photo-related activities, including capturing, editing, sharing, and comparing images, deepen appearance fixation and contribute to body dissatisfaction (McLean et al., 2015). The consumption of images depicting beauty and fashion standards on social media, particularly from celebrities, is linked to body dissatisfaction and desires to achieve the idealized body (Brown & Tiggemann, 2022).

Body ideals represent culturally constructed beauty standards that dictate attractive physical appearances within a given society (Jong & Drummond, 2020). These ideals encompass various aspects such as body size, shape, weight, and physical features (Mills et al., 2017). Motivated by body ideals, individuals pursue various means to attain these standards, including dietary changes, exercise, and even surgical interventions like bariatric surgery (Bianciardi et al., 2019). Bariatric surgery, in particular, has gained popularity as it alters dietary and metabolic habits, resulting in significant weight loss and improved well-being (Li et al., 2021).

With the growing popularity of bariatric surgery in China, it is rather crucial to dispel stereotypes surrounding this procedure due to lack of knowledge in public (Crozet et al., 2023). People's concern about risks and potential failures hinder individuals from considering bariatric surgery (Zhu et al., 2021). In addition, limited research has examined the sociocultural and psychological factors influencing the acceptance of bariatric surgery in China. Furthermore, this study pioneers an extensive assessment of social media engagement.

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The study aims to investigate the underlying mechanism through which social media influences Chinese individuals' acceptance of bariatric surgery. The study adopts two key theoretical frameworks: social learning theory and social comparison theory. Social learning theory emphasizes how individuals learn behaviors through observation, modeling, and reinforcement, and it will guide the examination of media influence and modeling behaviors. Social comparison theory will be used to explore how upward social comparison on social media contributes to body image concerns and bariatric surgery acceptance.

Literature Review and Hypotheses Development

Weight Concerns and Bariatric Surgery

Obesity (a body mass index [BMI] of 25–29.9 kg/m2) and overweight (a BMI of 30 kg/m2 and above) have become global health challenges, with over one billion people being obese according to the World Health Organization (2022). In China, over 50% of adults are overweight, leading to increased prevalence of chronic diseases (Bing, 2022). Obesity not only impacts physical health but also has serious mental health implications, often associated with eating disorders and body dysmorphic disorders (Bjornsson et al., 2022).

As the obese population grows, various weight loss methods have emerged, including lifestyle changes, weight-loss drugs, traditional Chinese medicine, liposuction, and bariatric surgery (Wen et al., 2022; Bagatin et al., 2021). Bariatric surgery, a highly effective treatment for obesity, provides sustainable weight loss and improved quality of life. It has evolved significantly since its inception in the 1960s, with laparoscopic techniques enhancing safety and recovery (Faria, 2017). Common types of bariatric surgery include Sleeve Gastrectomy (SG), Roux-en-Y Gastric Bypass (RYGB), and Adjustable Gastric Band (AGB). The mechanism of SG is performed by removing approximately 80% of the stomach. RYGB means the stomach after surgery “in the shape of Y”. AGB is placing a device around the top part of stomach, controlling the fullness. Though many people may worry about the postoperative adverse complications, the actual complication rates of bariatric surgery are lower than common operations.

China is in infancy, but also witnesses an explosive growth. Researchers found that a total of 7,779 bariatric procedures were reported from 2001 to 2015 (Du et al., 2016). In 2023, a study summarized the statistics from the Greater China Metabolic and Bariatric Surgery Database, where 53 centers reported 6,807 surgeries (Tian et al., 2023). The study also found some differences of domestic patients compared to abroad - Chinese patients had a younger age and a lower BMI, and more chose to undergo SG.

Social Media Use Intensity And The Willingness For Bariatric Surgery Of Chinese People With Overweight Concern

Mascherini and Nivakoski (2022) defined intensity of social media use and the time spent on social media. In this study, social media use intensity encompasses both the frequency and duration of social media usage. An international study indicated that social media use intensity could influence one’s well-being (Boer, Van Den Eijnden, et al., 2020). Some study indicated that social media use intensity could cause poor equality of sleep (Permatasari et al., 2023). The reduced physical activities, insufficient sleep, and circadian misalignment caused by intense social media use could increase the risks of obesity (Chaput et al., 2023). Another cross-sectional study illustrated that sedentary time had a more significant effect on metabolic health than physical activities in obese adolescents (Julian et al., 2022). Most studies investigated

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about the intense use of western popular social media platforms (Miguel et al., 2023). Existing research primarily suggests that the frequency of social networking site (SNS) use can indirectly predict adolescents' inclination towards desiring cosmetic surgery by fostering increased investment in appearance (de Vries et al., 2014). Therefore, the hypothesis is developed:

Hypothesis 1a: Social media use intensity is positively associated with the willingness of Chinese people with obesity concern to take bariatric surgery.

Appearance Related Social Media Preoccupation And The Willingness For Bariatric Surgery Of Chinese People With Overweight Concern

The time or frequency of social media usage fails to account for nuanced differences, such as diverse motivations, content, and activities (Widman et al., 2022). Researchers have identified various aspects of appearance-related engagement on social media, including motivated use for appearance or connection and conversations focused on appearance (Jarman et al., 2023). Appearance includes a wide range of characters, such as height, weight, body parts (breast, waist, hips, and legs), facial features (i.e. eye, nose, and lips), color, age and clothing (French, 2002). Appearance-related preoccupation on social media could lead to behaviors like body surveillance, comparing oneself to others, and ultimately result in low self-esteem and even depression (Choukas-Bradley et al., 2019). A longitudinal study also found this preoccupation eventually played a role in the development of body dissatisfaction and eating disorders (Jarman et al., 2023). Associations between appearance related social media activities and people's willingness to take cosmetic surgery have been confirmed in previous studies. Research specifically examining the potential effect of appearance related preoccupation on interest in bariatric surgery is lacking, and their association in the context of Chinese social media platforms is vacant. Thus, the following hypothesis is developed to investigate these gaps:

Hypothesis 1b: Appearance related social media preoccupation could have a positive relationship with the acceptance of bariatric surgery in Chinese people with weight concern.

Photo-Based Social Media Activities And The Willingness For Bariatric Surgery Of Chinese People With Overweight Concern

Photo-based activities helped to construct the self-presentation and self-identity. When entering social media, individuals constructed the identity of oneself through name, profile photo, gender, religion, which would represent how they would socialize in the cyberspace (Candrasari, 2016). In a study on self-impression management in WeChat, it was found that requent modifications of the WeChat homepage, such as changing profile photos, were used to create impressions; and people selectively controlled the visibility of photo-based updates to specific individuals to protect their desired impression (Liu et al., 2022). The study also highlighted that f Scholars have noted that individuals who dedicate their time primarily to photo-based activities on Facebook, such as browsing, visiting, checking, liking, messaging, or commenting on other users' profiles, may experience heightened internalization of body ideals, and increased concern about weight (Ahadzadeh et al., 2017). Besides, previous studies suggested that photo-based social media activities were related to people's acceptance of cosmetic surgeries. A study suggested that young women who were exposed to digital photos depicting the beautiful changes brought about by cosmetic surgery expressed stronger desires to undergo the same procedures (Candice et al., 2021). Chen et al. (2019) also suggested that alternations of lighting and modification of body parts in photos might have effects on cosmetic surgery attitudes. Although there is no existing study directly about association between

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exposure to photos and people's willingness to take bariatric surgery, based on previous studies, the hypothesis can be developed:

Hypothesis 1c: Photo-based social media activities is positively associated with the willingness of Chinese people with weight concern to take bariatric surgery.

Social Comparison and the Willingness for Bariatric Surgery of People with Overweight Concern

Social Comparison Theory suggested that people had a drive to evaluate their own opinions and abilities through comparison with others (Festinger, 1954). There are two categories of social comparison: upward social comparison and downward social comparison. Suls et al. (2020) noted that downward social comparison takes place when people compare themselves to people who are worse off. Upward social comparison refers to people compare themselves to someone better than them, and can simultaneously lower self-evaluation and raise motivation for attainable targets. Due to the rise of social media use, social comparison is happening at "an unprecedented rate and scale" (Verduyn et al., 2020). A study discussing about male Instagram users suggested that self-improvement and perceived model attractiveness caused by upward social comparison can contribute to men's fitspiration (Peng et al., 2019). A study found that the comparison based on appearance between the models and women themselves was average upward, and comparison based on intelligence was average downward (Tiggemann & Polivy, 2010). Since previous studies suggested a positive correlation between upward social comparison and self-improvement, such as practices for ideal body image, this journal will mainly discuss about upward social comparison. There are some existing studies proving the association between upward social comparison and bariatric surgery. In the study of Coleman et al. (2020), participants said social comparison was one of the motivator for them to undergo bariatric surgery. A qualitative study of body image in patients undergoing bariatric surgery said that social comparisons presented both in the use of social media and everyday social environment takes up 6.17% of the presurgical elicitations (Butt et al., 2021). The study also showed that presurgical patients identified positive social comparison as a motivation to change. The following hypothesis is developed:

Hypothesis 2: Upward social comparison is positively related to people's willingness to take bariatric surgery.

Determinants of Upward Social Comparison: Intensity of Social Media Use, Appearance Related Social Media Use, and Photo-Based Social Media Activities

A study conducted in Asian context indicated that the intensity of Instagram use could predict upward social comparison and eating disorders (Teo & Collinson, 2019). Social media users tend to present themselves in overly attractive ways, passive social media use means being exposed to unrealistically editing or flattering photos from others. This exposure may cause feelings of jealousy or upward social comparison (Verduyn et al., 2017). Another study suggested that intensity of social media use could cause more negative body image in young women with the mediating mechanism of social comparison and internalization (Jung et al., 2022). The study of Uusberg et al. (2018) found that women with preoccupation about body size might engage in upward social comparison. The tendencies to social comparison about physical appearance mediated the relationships between photo-based activities and body dissatisfaction and weight loss practices (Fardouly et al., 2018). The appearance related social media use and importance of likes and comments are directly related to upward social comparison (Seekis et al., 2020). The number of "likes" of Instagram photos resulted in appearance related upward social comparison and more body dissatisfaction (Tiggemann et al., 2018). Therefore, the following three hypotheses are developed:

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Hypothesis 3a: Intensity of social media use will positively predict social comparison.
Hypothesis 3b: Appearance related social media use has a positive influence on social comparison.
Hypothesis 3c: Photo-based social media activities has a positive relationship with social comparison.

Body Dissatisfaction, Body Ideals Internalization, and Self-Esteem as Predictors of The Willingness for Bariatric Surgery of People with Overweight Concern

Body Dissatisfaction

Body dissatisfaction refers to the negative subjective evaluation of one's own body and is the effect caused by perceived discrepancy between actual body image and the desired ideal state of the body (Gruszka et al., 2022). More recent evidence shows body dissatisfaction occurs across gender, but might have different body ideals: the thin ideal and muscular/athletic ideal (Wagner et al., 2022). A meta-analysis study found body dissatisfaction is strongly related to internalization of body ideals (Paterna et al., 2021). Many studies have examined the relationship between body dissatisfaction and bariatric surgery. In addition to concerns about physical health, it has been observed that patients often experience significant body dissatisfaction and a strong desire to alter the appearance of specific body parts, which resulted in decisions to undergo bariatric surgery (Pearl et al., 2019). A study gave focus on the application of cognitive behavior therapy in the bariatric surgery, but failed to assess the effectiveness of cognitive behavior interventions to reduce body dissatisfaction and increase self-esteem (Cheroutre et al., 2020). Evidence has accumulated that body dissatisfaction has a positive relationship with the willingness to undergo bariatric surgery of whom are concerned about their weight. Therefore, the following hypothesis is developed:
Hypothesis 4a: Body satisfaction has a positive relationship with overweight people's willingness to undergo bariatric surgery.

Body Ideals Internalization

Body ideals internalization refers to the active endorsement of the socially accepted beauty as personal beliefs and goals (Cafri et al., 2005). The body ideals can be mainly categorized as thin ideal and muscular/athlete ideal (Roberts et al., 2022). Many journals generally suggested that internalization mediated the social media use and body dissatisfaction (Jung et al., 2022). Social media can be viewed as the place to promote beauty ideals, of which the standards is even unattainable (Seekis & Barker, 2022). Some studies found that the editing of photo and selfie into ideal appearance could result in body ideal internalization (Kwon, 2023). Western social platforms, such as TikTok, Snapchat, and Instagram, influence how people internalize the skinny or fit body ideals (Butt et al., 2022). Scholars Wang et al. (2019) said that Chinese Internet celebrities' selfies on SNS had common features like "big eyes, a pointy chin, a high-bridged nose, and fair skin" and conveyed idealized facial beauty; and in return, the extent of people internalized the ideal increased as they saw these edited selfies. There are few proofs showing that internalization is related to the willingness to take bariatric surgery. However, many studies have discovered the body ideals internalization is associated with people's choice for cosmetic surgery. A research found that beauty-ideal internalization was a positive predictor for Chinese women's attitudes towards cosmetic surgery, and partly attributed it to the collectivistic culture in China where women strived to meet and internalize the social standard (Alleva et al., 2022). A study illustrating the association between social media use and internalized weight stigma suggested that bariatric patients internalized the idea that a smaller

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body type is perfect and would like to confirm these beliefs (Butt et al., 2022). Therefore, the hypothesis is developed according to current related literatures:

Hypothesis 4b: Body ideals internalization is a positive predictor for people's willingness to undergo bariatric surgery.

Self-Esteem

Self-esteem refers to a person's subjective evaluation of self-worth, involving self-verification, self-acceptance and self-respect (Blascovich et al., 1991). In the research of Saiphoo et al. (2020), under the social networking sites usage background, self-esteem can be a buffer against harmful content to ensure one's overall well-being. In Maslow's theory (1987), one needs both acknowledgment from other people and self-acceptance from inner self to build esteem. In this article, self-esteem will mainly focus on the inner self evaluation. Low self-esteem appeared common in bariatric surgery candidates (Cella et al., 2019). Some pre-bariatric surgery patients had a poor health-related quality of life due to weight bias internalization and low self-esteem (Zhang et al., 2022). Abilés et al. (2010) learnt the psychological characters of obese candidates for bariatric surgery who had higher levels of stress and eating disorder symptoms, and lower levels of self-esteem. Beside profound weight loss, there is evidence showing that self-esteem was enhanced after the bariatric surgery, which patients were most satisfied with (Proczko et al., 2022). Thus, the following hypothesis is developed:

Hypothesis 4c: Low self-esteem is positively related to people with overweight concern and seeking for bariatric surgery.

Upward Social Comparison as the Determinant of Body Dissatisfaction, Body Ideals Internalization and Low Self-Esteem

A wide range of studies have found social comparison is related to body dissatisfaction, body ideals internalization, and low self-esteem. The frequency of social comparison of physical appearance to whom people followed on social media could also predict body dissatisfaction and drive for thinness (Jiotsa et al., 2021). Liu (2022) said in her study that the unconscious process of upward social comparison on social media would cause Chinese women's negative body image and promote the ideal body in an objection way, where women are viewed as objects that serve as visual entertainment. Another study suggested that intensity of social media use can cause more negative body image in young women with the mediating mechanism of social comparison and internalization (Jung et al., 2022). Betz et al. (2019) found that exposure to thin, curvy and athletic body ideals all can lead to increased social comparison, and this social comparison can result in increased self-surveillance, decreased body appreciation, and decreased body esteem. Therefore, the following hypotheses is developed:

Hypothesis 5a: Upward social comparison is positively related to body dissatisfaction.

Hypothesis 5b: Upward social comparison is positively related to body ideals internalization.

Hypothesis 5c: Upward social comparison is a positive predictor for low self-esteem.

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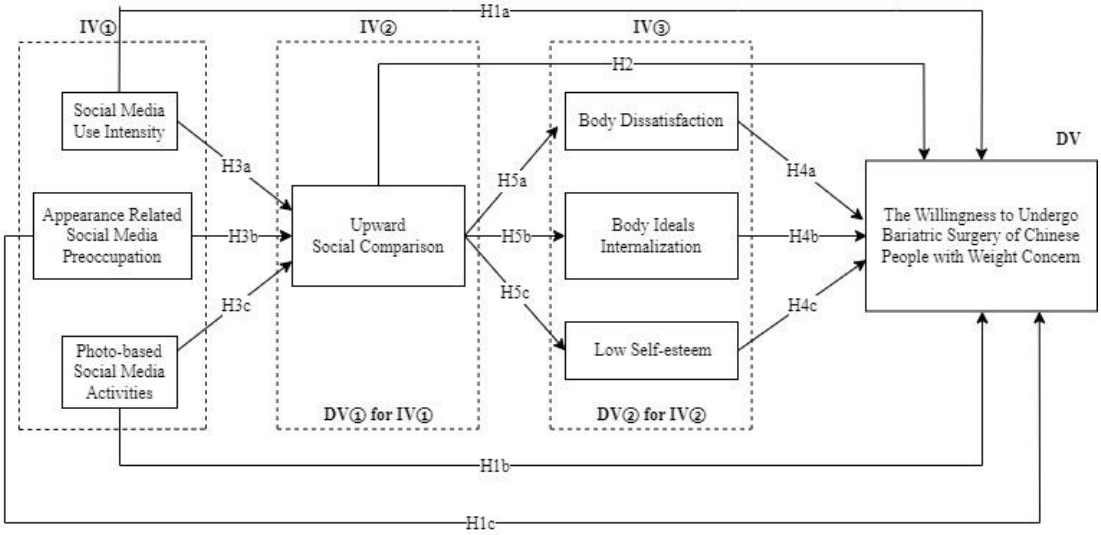

Figure 1: Research Framework

Source: Proposed by the author

Note:
Based on the social learning theory and social comparison theory, the present study develops a structural model consisting of social media use, upward social comparison, body dissatisfaction and internalization, low self-esteem, and the willingness to undergo bariatric surgery of Chinese people with weight concern (see Figure 1). Specifically, social media use will be measured in three dimensions - social media use intensity, appearance-related social media preoccupation, and photo-based social media activities. The dependent variable (DV) is the willingness to undergo bariatric surgery of Chinse people with weight concern. Social media use is an independent variable (IV①) for DV. Upward social comparison is IV② for DV. Body dissatisfaction, body ideals internalization, and low self-esteem are IV③ for DV. Upward social comparison is DV① for IV①. Body dissatisfaction, body ideals internalization, and low self-esteem are DV② for IV②. The willingness to undergo bariatric surgery of Chinse people with weight concern is DV for IV③.

Method

Research Design

The present study adopts a traditional objective research methodology, which is the quantitative method. The investigator conducts cross-sectional study and distributes online questionnaire through Wenjuanxing. The questionnaire contains close-ended questions, which are adapted from authorized measurements and translated from English into Chinese version.

Population and Sampling

Target populations of the current study are Chinese people who worry about their weight and body image. According to previous literatures, Chinese women often had a higher level of body dissatisfaction and anxiety than men (Gao et al., 2020). Therefore, the majority of participants might be Chinese women, and there could be a small amount of male participants who also concern about body image. As for age, this research might mainly include young people in China, as most previous studies indicated young people who had more intense and longer social media use with a higher level of negative body image (Frederick et al., 2022).

Using a priori power analysis on G*Power, with an alpha = 0.05, power = 0.95 and medium effect size = 0.15, number of predictors = 7, the projected sample size needed for ‘Linear multiple regression: fixed model, R2 deviation from zero’ 3.1.9.4 was 153 (Faul & Erdfelder,

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1992). As Memon et al. (2020) suggested, the sample-to-item ratio should not be less than 5-to-1. Therefore, this study should have at least 225 responses, as there are 45 items in the survey. More sample size will contribute to a more solid conclusion (Osborne & Costello, 2004).

This study adopts purposive sampling method which is a non-random sampling. Inclusion and exclusion criteria should be set before the data collection, which will affect the access to the target populations. To select population of interest, the criteria include:

1. They must be Chinese.
2. They have concern or once had concern about weight or body shape (i.e. once having consulted medical staff about weight related or body shape issues, once been suggested by family or friends to lose weight or get better shape, or having negative feelings towards one's own weight or body shape).
3. They have at least one social media account in either QQ, WeChat, Douyin, Weibo, Xiaohongshu, Bilibili, or Tieba. As reported by CNNIC (2022), WeChat Moments has the highest usage rate at 85%, followed by QQ Zone (41.6%) and Sina Weibo (40.4%).

Measurements

Dependent Variable

Acceptance of Cosmetic Surgery Scale (ACSS)

The ACSS is a 15-item scale covering three dimensions: Intrapersonal (5 items), Social (5 items) and Consider (5 items) (Henderson-King & Henderson-King, 2005). All these items in this research will be rated on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). The researchers had examined ACSS had high internal consistency, with Intrapersonal Cronbach's $\alpha = 0.88$-0.91, Social $\alpha = 0.84$-0.88, and Consider $\alpha = 0.86$-0.92 (Henderson-King & Henderson-King, 2005). Researchers translated the ACSS to Chinese version which showed excellent internal consistency with all Cronbach's alphas >.90 (Alleva et al., 2020). Since there is no any scale about the acceptance of bariatric surgery, the researcher will adapt the ACSS to measure the dependent variable of this study. To some extent, cosmetic surgery and bariatric surgery both fulfill people's need to become the socially accepted ideal beauty, thus the ACSS can be a guideline for measuring people's acceptance of bariatric surgery. The researcher will replace the "cosmetic surgery" with "bariatric surgery".

Independent Variables

Time Spent on Social Media

Previous studies measuring time of social media use by asking the time on weekdays and weekends respectively (You et al., 2023). Therefore, in the questionnaire, there will be two items asking about time on weekdays and weekends. The response options will range from 1 to 5 (1= less than 1 hour, 2 = 1-2 hours, 3 = 2-3 hours, 4 = 3-4 hours, 5 = more than 4 hours). Respondents will be given background information: "Social media consists of all user-driven platforms where people upload content, send messages in diverse forms, and connect to others (Aichner et al., 2021). In present study, social media include Chinese social platforms like WeChat, QQ, Douyin, Xiaohongshu, Weibo, Zhihu, and etc." Hawes et al. (2020) examined the correlation of social media use on weekday and weekend day, which showed high correlation ($r = .78$, $p < .001$).

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Intensity of Social Media Use

Two items from the study of Boer, Stevens, et al. (2020) will be used to measure intensity of social media use, of which the Cronbach's α ranged from .84 to .86. Questions cover the frequency of social media use and sending out instant messages. Participants will respond on a 5-point scale, with 1 = less than once a day, 2 = 1 – 10 times a day, 3 = 11 – 20 times a day, 4 = 21 – 30 times a day, and 5 = more than 30 times a day. Apart from frequency of social media use, two items will also ask about people's emotional connectedness to social media. Hawes et al. (2020) has selected some items from Facebook Intensity Scale (Ellison et al., 2007) and slightly modified the items to more general subject - "social media use".

The Social Media Appearance Preoccupation Scale (SMAPS)

The SMAPS is a valid and reliable measurement developed by Zimmer-Gembeck et al. (2021). The researchers conducted exploratory factor analysis and confirmation factor analysis. Items of the SMAPS mainly focus on three aspects - online self-presentation, appearance-related activity online, and appearance comparison. The variables showed significant correlations. In two analyses, online self-presentation Cronbach's $\alpha > .90$, appearance activity $\alpha > .80$, and appearance comparison $\alpha > .90$, which showed excellent coherence. The present survey chooses 6 items out of the total 18 items.

Photo-Based Social Media Activities

Photo-based social media activities will be measured by the photo subscale of The Facebook Questionnaire (FBQ) of Meier and Gray (2014) and the editing behaviors measurement of Othman et al. (2020). The Cronbach's α for the whole FBQ scale (24 items) was .87 and for photo subscale (8 items) was .82. The study measured people's photo editing behaviors by collecting information about which editing applications they use, how often they use the applications, why they use them, and the impacts of these applications on their decision to take cosmetic procedures. Researchers test the statistical significance was $P < 0.05$. In present questionnaire, photo-editing applications refer to Meitu and Xingtu, which are popular in China.

Sociocultural Attitudes Towards Appearance Questionnaire-4 (SATAQ-4)

The SATAQ-4 is an evaluation of internalization of appearance ideals and appearance pressures to achieve the societal ideal (Schaefer et al., 2017). It measures 22 items on a 5-point Likert-type. In the latest study about the Mandarin Chinese version of SATAQ-4, found highly consistencies of each subscale with Thin $\omega = 0.79\text{-}0.85$ and Muscular $\omega = 0.86$ (Beltrán-Garrayo et al., 2023).

The Iowa–Netherlands Comparison Orientation Measure (INCOM)

The INCOM (Gibbons & Buunk, 1999) included 11 items to measure a person's tendency to make social comparisons. A study using the Chinese version of a short version of INCOM showed good internal reliability with .88 and .86 at two times respectively (Fu et al., 2018).

Figure Rating Scale (FRS)

The FRS developed by Stunkard et al. (1983) is a pictorial measurement of body dissatisfaction. Mutale et al. (2016) developed the FRS by using DAZ Studio 4 software to create 3D version of body figure, depicted at a 25-degree angle, which enabled more realistic visual of body shape than simply front view bodies (see Figure 2). Nine bodies were created in total which range from extremely thin to obese. Different body figures represent different levels of BMI: bodies 1-3 are underweight, bodies 4-6 are in the normal range and bodies 7-9 are

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overweight/obese. Participants need select their actual body figure and the ideal body figure. The discrepancy between the number of actual body figure and ideal body figure can display the extent of their body dissatisfaction. The bigger the difference in numbers is, the higher level of body dissatisfaction participants have.

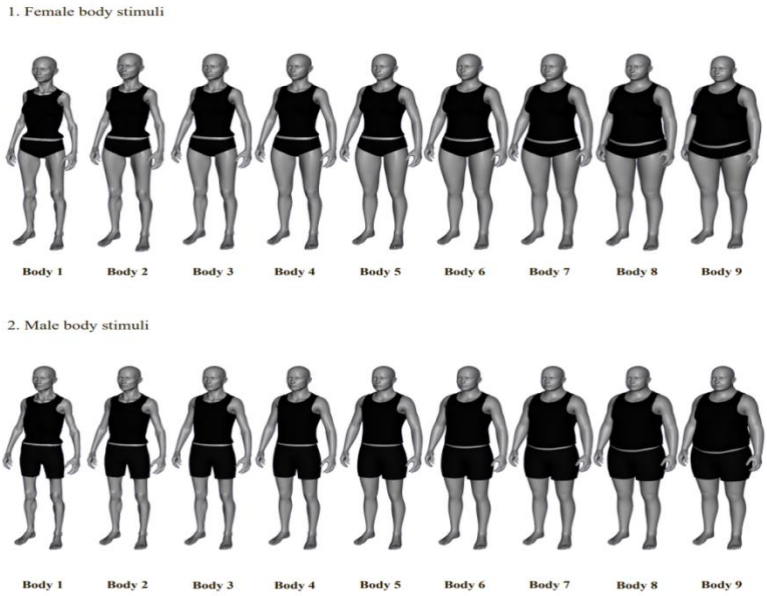

Figure 2: Models of Figure Rating Scales

Source: Mutale et al., 2016

Rosenberg Self-Esteem Scale (RSES)

The RSES developed by Rosenberg (1965) measure general feelings of self-esteem. The RSES has 10 items on a 4-point Guttman scale. The test-retest reliability over 2 weeks reveals correlations of $\alpha = 0.85\text{-}0.88$ in Spanish version, which indicates high stability (Beltrán-Garrayo et al., 2023). In the study of Chien et al. (2020) which used Chinese version of RSES, the Cronbach's α was .89.

Translation of Questionnaire

The investigator adopted Chinese version of some measurements whose validity and reliability had already been tested in previous studies, include the ACSS, SATAQ-4, INCOM, and RSES. The remaining followe back-translation, which is translating the target language back to the original source (Brislin, 1970). Since the mother language of all participants will be Chinese (i.e. target language), the researcher needs to translate the original English scales into Chinese version for respondents' convenience and better understanding. Discrepancies had been spotted, and necessary revisions were made.

Ethical Considerations

The researcher must be careful with the privacy, anonymity, and confidentiality of participants, the authenticity and credibility of research, and data collection and storage (Creswell & Creswell, 2018). Participants were asked to sign an informed consent form. The questionnaire of this research did not include personal identity, sensitive, illegal, or confidential answers. The dataset backup is uploaded onto OneDrive, to which only the researcher has access, and will be discarded after 5 years.

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Assessment of Standard Method Biases

Common method biases may arise due to people's social desirability, mood states and inclinations to respond moderately or extremely (Jordan & Troth, 2020). To address them, several methods will be taken to mitigate common method variance (CMV) in the research design. For questionnaire, the following methods suggested by Rodríguez-Ardura and Meseguer-Artola (2020) will be implemented:

(1) The researcher will give a randomize order of questions about predictors and theoretical framework.

(2) Respondents will be promised to keep the anonymity and confidentiality of responses.

(3) The researcher will emphasize there is no right or wrong answer, encouraging participants to answer honestly.

Data Collection

The investigator distributed 398 questionnaires and collected the responses. After removing some possible outliers (i.e. participants who did not meet the sample inclusion criteria), 385 participants were eventually included in the analysis which satisfied the required sample size calculated by G*Power. It took the researcher 30 days from August 2023 to September 2023 for data collection.

Data Analysis

The researcher exported the results in Excel and presented the data in SPSS and SmartPLS. SPSS version 27 was used to perform descriptive and inferential analyses of the data (Pallant, 2020). SmartPLS 4 was used to perform 5,000 samples bootstrapping for standardised path coefficients analysis and generating graphic models (Ringle et al., 2022). Using SPSS calculation, the Cronbach's α of all variables in actual study are above 0.7, which shows a high level of consistency (see Table 1).

Table 1: Results of Reliability Tests

	Pilot Study (N=30)		Actual Study (N=385)	
Variables	Items	Cronbach's α	Items	Cronbach's α
WBS	10	.93	10	.94
SMUI	6	.75	6	.86
ARSMP	4	.63	4	.89
PSMA	3	.71	3	.79
SC	4	.85	4	.87
BII	4	.77	4	.84
SE	4	.85	4	.91

WBS = Willingness for bariatric surgery; SMUI = Social media use intensity; ARSMP = Appearance related social media preoccupation; PSMA = Photo-based social media activities; SC = Social comparison; BII = Body ideals internalization; SE = Self-esteem; BD = Body dissatisfaction.

Results

Demographic Data

After filtering out the non-target population, participants were 385 (51.17% female) Chinese people who had worries about weight and had at least one social account on popular Chinese social platforms. The majority (n=292, 75.84%) were aged between 16 and 31, with 17.92% (n=69) aged 32-39 and 6.23% (n=24) aged 40 and above. According to the Asian BMI standard,

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24.0 kg/m^2 is a cutoff point for overweight, and 28.0 is the cutoff point for obesity (Ji et al., 2021). More than half of the participants (n=227, 58.96%) were overall overweight and obesity, with 30.13% (n=116) being overweight and 28.83% (n=111) being obesity (see Table 2).

Table 2: Demographic Profile of Total Participants (N=385)

Variables	N (%)	Variables	N (%)
Gender		Age	
Male	188 (48.83%)	16-23	137 (35.58%)
Female	197 (51.17%)	24-31	155 (40.26%)
		32-39	69 (17.92%)
		40-47	15 (3.9%)
		48-55	8 (2.08%)
		56-63	1 (0.26%)
BMI, kg/m^2			
≥28.0 (obesity)		111 (28.83%)	
24.0-27.9 (overweight)		116 (30.13%)	
18.5-23.9 (normal weight)		147 (38.18%)	
< 18.5 (underweight)		11 (2.86%)	

Descriptive Analysis

Assessment of Measurement Model

Partial least squares structural equation modeling (PLS-SEM) is a widely used multivariate data analysis in social science and health science studies (Memon et al., 2021). With the help of PLS-SEM, the researcher can do the confirmatory factor analysis to test the 7 main independent variables in this study, and the path analysis which quantifies the relationships between multiple variables (Wright, 1921).

The study initially examined the reliability, convergent validity, and discriminant validity of the main variables (Hair et al., 2021). One factor loading (Item 36) was found to be below the threshold of 0.70 (Hair et al., 2021) and therefore was excluded from the analysis. Factor loadings of other items were above 0.70, representing good correlations between items and the factors. All measurement items, including the one that was eliminated due to low loading, are displayed in Table 3 along with their factor loadings. Table 4 presents the mean, standard deviation, the assessment of average variance extracted (AVE), composite reliability (CR), discriminant validity, and correlations. The AVE values exceeded the threshold of 0.50, indicating good convergent validity (see Figure 3). Similarly, the CR values were above 0.70, demonstrating satisfactory reliability. Most variables had significant correlations with others, except for body dissatisfaction (see Table 4).

Table 3: Measurement Items and Factor Loadings

Items	Factor Loading
Body Ideal Internalization	
1. I think a lot about looking muscular.	0.87
2. I think a lot about looking thin.	0.77
3. I spend a lot of time doing things to look thinner.	0.88

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4. I spend a lot of time doing things to look more muscular.	0.77
Social Media Use Intensity	
5. How much time do you usually spend on social media per weekday?	0.78
6. How much time do you usually spend on social media per weekend day?	0.74
7. How many times a day do you make response to (i.e. 'like', comment, and share) messages, photos, videos from others on social media?	0.76
8. How times a day do you send a message, photo, or video via your electronic communication devices through social media?	0.83
9. Using social media has become part of my daily routine.	0.73
10. I feel out of touch when I haven't logged onto social media for a while.	0.76
Appearance Related Social Media Activities	
11. I prefer to only upload photos of myself to social media where I look physically attractive.	0.79
12. When others upload photos of me to social media, I focus on whether I looked good.	0.90
13. When on social media, my friends post, comment on, share, or like the content about getting or staying fit and/or muscular.	0.88
14. When on social media, I post, comment on, share, or like the content about getting or staying fit and/or muscular.	0.91
Photo-based Social Media Activities	
15. How often do you use photo editing applications? (such as Meitu, Xingtu, or any other photo editing or filtering applications)	0.72
16. I use photo editing applications because I want to post the modified photos on social media.	0.92
17. I do not regret discovering and using the photo editing application(s).	0.91
Social Comparison	
18. I always pay a lot of attention to how I do things compared with others do things.	0.87
19. I often like to talk with others about mutual opinions and experiences.	0.83

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20. I feel inadequate in appearance compared to my friends on social media.	0.87
21. How I feel about my body and appearance is influenced by other people's social media pictures.	0.84
Self-esteem	
22. On the whole, I am satisfied with myself.	0.87
23. At times, I think I am no good at all.	0.87
24. I feel that I have a number of good qualities.	0.91
25. I feel that I'm a person of worth, at least on an equal plane with others.	0.91
Body Dissatisfaction	
26. The discrepancy scores between the ideal body image and perceived actual body image.	1.00
Willingness for Bariatric Surgery	
27. I have sometimes thought about having bariatric surgery.	0.84
28. People who are unhappy with their weight or body figure should consider bariatric surgery as one option.	0.76
29. It makes sense to have bariatric surgery of simple procedures rather than spending years feeling bad about the way you look.	0.75
30. In the future, I could end up having some kind of bariatric surgery.	0.82
31. If I could have a surgical procedure done for free, I would consider trying bariatric surgery.	0.87
32. If I knew there would be no negative side effects or pain, I would like to try bariatric surgery.	0.83
33. I would think about having bariatric surgery in order to keep looking thin.	0.85
34. If it would benefit my career, I would think about having bariatric surgery.	0.87
35. I would seriously consider having bariatric surgery if my partner/friend/family would find me more attractive.	0.86
36. Bariatric surgery can be a big benefit to people's self-image.	0.66 (Dropped)

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Table 4: Descriptive Statistics, Correlations, Reliability And Validity Assessment

	M (SD)	CR	AVE	WBS	SMUI	ARSMP	PSMA	SC	BII	SE	BD
WBS	40.07 (8.66)	0.90	0.59	1							
SMUI	22.04 (4.65)	0.93	0.76	.42***	1						
ARSMP	14.30 (3.67)	0.89	0.73	.38***	.36***	1					
PSMA	10.77 (2.68)	0.91	0.72	.43***	.44***	.52***	1				
SC	14.77 (3.52)	0.89	0.68	.38***	.43***	.49***	.57***	1			
BII	14.56 (3.33)	0.94	0.79	.37***	.36***	.38***	.4***	.38***	1		
SE	6.69 (2.87)	0.95	0.66	-.49***	-.2***	-.2***	-.18*	-.18**	-.06*	1	
BD	2.38 (1.83)	-	-	.159**	$-.01^{ns}$	$.0^{ns}$	$-.03^{ns}$	-.12*	$-.04^{ns}$	-.15**	1

M = Mean; SD = Standard diviation; CR = Composite reliability; AVE = Average variance extracted. WBS = Willingness for bariatric surgery; SMUI = Social media use intensity; ARSMP = Appearance related social media preoccupation; PSMA = Photo-based social media activities; SC = Social comparison; BII = Body ideals internalization; SE = Self-esteem; BD = Body dissatisfaction. ***p < .001; **p < .01; *p < .05; ns = not significant.

Discriminant validity was evaluated by comparing the square root of AVE for each construct with the correlations among the latent variable. To assess discriminant validity, heterotrait-monotrait (HTMT) values were also used, with each value needing to be equal to or less than 0.90 to meet the criterion. Based on the findings presented in Table 5, it can be concluded that discriminant validity was achieved.

Table 5: Discriminant Validity Using Heterotrait-Monotrait (HTMT)

	ARSMP	WBS	BII	PSMA	SC	SE	SMUI	BD
ARSMP								
WBS	0.42							
BII	0.43	0.42						
PSMA	0.61	0.49	0.48					
SC	0.55	0.41	0.44	0.69				
SE	0.22	0.52	0.08	0.20	0.19			
SMUI	0.41	0.46	0.42	0.52	0.49	0.23		
BD	0.03	0.16	0.04	0.04	0.13	0.16	0.06	

WBS = Willingness for bariatric surgery; SMUI = Social media use intensity; ARSMP = Appearance related social media preoccupation; PSMA = Photo-based social media activities; SC = Social comparison; BII = Body ideals internalization; SE = Self-esteem; BD = Body dissatisfaction.

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Assessment of Structural Model and Hypotheses Testing

The structural model was evaluated using standardised path coefficients (β-value), significance level (t statistic) and P values (see Table 6 and Figure 3). The path loadings (interpreted as standardised regression coefficients) indicate the strength of the relationship between independent and dependent variables (Hair et al., 2021).

Based on the structural model, Hypothesis 1a where social media use intensity was hypothesized to positively influence Chinese individuals' willingness for bariatric surgery was accepted (β = .38, p < .001). Similarly, photo-based social media activities were found to positively predict willingness for bariatric surgery (β = .13, p < .05), supporting Hypothesis 1b. However, Hypothesis 1c where appearance related social media preoccupation was hypothesized to positively influence willingness for bariatric surgery was not supported (β = .17, p = .178). Hypothesis 2 that upward social comparison is positive predictor for willingness for bariatric surgery was not supported as well (β = .06, p = .202).

Positive determinants of upward social comparison were social media use intensity (β = .19, p < .001), photo-based social media activities (β = .40, p < .001), and appearance related social media preoccupation (β = .21, p < .001). Therefore, Hypothesis 3 was supported: social media use (i.e. intensity, photo-based social media activities, and appearance related social media preoccupation) was positively associated with the willingness for bariatric surgery. Body dissatisfaction was found to positively affect willingness for bariatric surgery (β = .12, p < .01), supporting Hypothesis 4a. Hypothesis 4b that body ideals internalization has a positive relationship with willingness for bariatric surgery was also accepted (β = .18, p < .001). Furthermore, self-esteem was found to negatively relate to willingness for bariatric surgery (β = -.38, p < .001), which supported Hypothesis 4c. Results suggested upward social comparison is negatively related to body dissatisfaction (β = -.12, p < .05), which contradicts Hypothesis 5a. But both Hypothesis 5b and Hypothesis 5c were supported where upward social comparison was hypothesized to positively influence body ideals internalization (β = .38, p < .001) and negatively influence self-esteem (β = -.17, p < .05).

Table 6: Results of Path Coefficients (β-Value) Testing

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
SC -> BII	0.38	0.38	0.05	7.00	<.001
PSMA -> SC	0.40	0.40	0.06	6.76	<.001
SE -> WBS	-0.39	-0.38	0.06	6.49	<.001
ARSMP -> SC	0.21	0.21	0.05	3.97	<.001
BII -> WBS	0.18	0.18	0.05	3.93	<.001
SMUI -> SC	0.19	0.19	0.05	3.63	<.001
SMUI -> WBS	0.16	0.17	0.05	3.57	<.001
BD -> WBS	0.12	0.12	0.04	2.82	.005
SC -> SE	-0.17	-0.17	0.07	2.55	.011
SC -> BD	-0.12	-0.12	0.05	2.31	.021
PSMA -> WBS	0.13	0.13	0.06	2.22	.027
ARSMP -> WBS	0.06	0.07	0.05	1.35	.178
SC -> WBS	0.07	0.06	0.05	1.28	.202

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WBS = Willingness for bariatric surgery; SMUI = Social media use intensity; ARSMP = Appearance related social media preoccupation; PSMA = Photo-based social media activities; SC = Social comparison; BII = Body ideals internalization; SE = Self-esteem; BD = Body dissatisfaction.

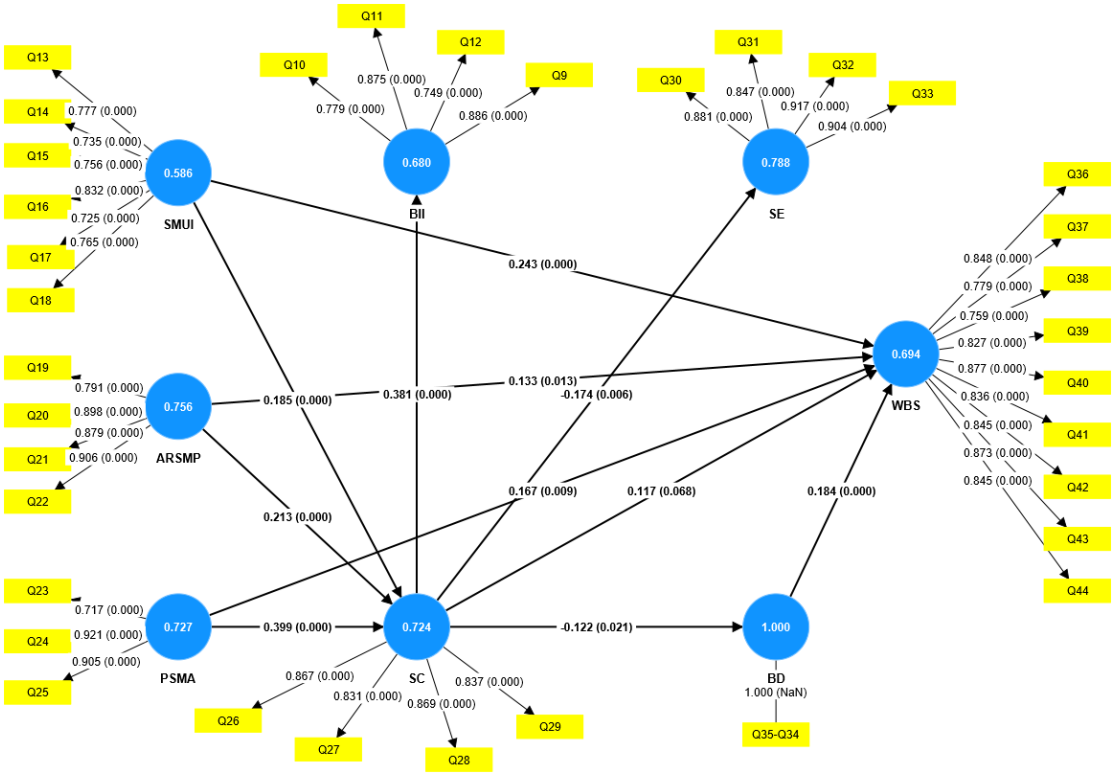

Figure 3: AVE, Factor Loadings with P Values, and Path Coefficients with P Values

AVE = Average variance extracted; WBS = Willingness for bariatric surgery; SMUI = Social media use intensity; ARSMP = Appearance related social media preoccupation; PSMA = Photo-based social media activities; SC = Social comparison; BII = Body ideals internalization; SE = Self-esteem; BD = Body dissatisfaction.

Discussion

Most hypotheses were supported, suggesting how social media use could influence Chinese individuals' willingness to undergo bariatric surgery. Findings showed that the majority of participants used social media intensely and had a dependent attitude toward social media, which had associations with willingness for surgery (H1a). Li et al. (2022) supported this idea by displaying bidirectional influence between smartphone addiction, excessive SNS use and fear of missing out in Chinese university students. Besides, the positive relationship between social media use and willingness for bariatric surgery (H2) is further in line with the study of Sharman et al. (2016), which demonstrated that more individuals seek bariatric surgery with exposure to social networks.

Most participants showed a tendency for appearance-related social media preoccupation. Although this study didn't find a significant relationship between appearance-related social media preoccupation and willingness for bariatric surgery (H1c), a longitudinal study also failed to find the influence of online appearance preoccupation in the early stage (Zimmer-Gembeck et al., 2023). However, these scholars found that online appearance preoccupation was related to internalization of appearance ideals and emotional eating. As predicted (H1b and H3c), most participants reported frequent use of photo-editing application, intending to

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post modified pictures on social media, which positively associated with social comparison and willingness for surgery. This parallels with the correlation between photo manipulation, social comparison, and body image esteem proposed by Pham et al. (2022). This also further confirms the relationship between selfie editing, facial dissatisfaction and consideration of cosmetic surgery among young Chinese women (Sun, 2021).

The results also supported the predication (H3) that participants tended to make upward social comparisons, stemming from social media use. Furthermore, those people were more likely to experience body dissatisfaction (H5a), internalize body ideals (H5b), and have low self-esteem (H5c). The results can validate social comparison theory, which was developed decades ago and still applies to current situation. These findings further validate the mediating role of upward social comparison between appearance related social media activities and body dissatisfaction in adolescents girls (Scully et al., 2023). It also echoes with the findings of McComb and Mills (2022) where upward social comparison on Instagram was related to body ideal internalization and decreased self-esteem.

A supportive attitude towards bariatric surgery was observed in most respondents, who also displayed a substantial level of body dissatisfaction (H4a), body ideals internalization (H5b), and low self-esteem (H5c). These findings further confirm the factors (i.e. body dissatisfaction and the desire to attain body ideals) motivating the decision to seek bariatric surgery (Pearl et al., 2019). Results also aligns with the weight bias internalization and low self-esteem in pre-bariatric surgery candidates (Liu et al., 2022). Surgical costs, side effects after surgery, and support from close people were identified as potential factors for presurgical consideration but were not included in the structure model. This contributes to a growing body of research demonstrating the cost-effectiveness of bariatric surgery versus medication therapy for Chinese obese patients (Wan et al., 2019). It also supports the review about risks and benefits of bariatric surgery in adults (Arterburn et al., 2020).

This research has both theoretical and practical implications. The study empirically supports social learning theory and social comparison theory by examining relationships among social media use intensity, photo-based activities, appearance-related preoccupation, and the desire for bariatric surgery. The findings unveil potential mechanisms, including upward social comparison, body ideals internalization, body dissatisfaction, and low self-esteem. From a practical standpoint, the study suggests vital interventions to address body image concerns in the Chinese context. While acknowledging the positive trend of individuals seeking advanced methods like bariatric surgery for health maintenance, the research emphasizes the need for constructive preventive measures to alleviate undue body dissatisfaction. Recommendations span government regulations monitoring social media content, NGO-led campaigns promoting positive body image, medical workers' ethics in medicine and media, and educational programs fostering positive values like self-compassion and self-esteem. These initiatives aim to cultivate public digital health literacy and media literacy, thus creating a healthy online environment and increasing the overall well-being of Chinese citizens.

This study should be interpreted in light of limitations. The 8-month time constraints hindered a more exhaustive literature review and consideration of potential influencing factors on Chinese individuals' willingness for bariatric surgery, such as gender, BMI, education levels, and income conditions. Participants' primary consideration being health threats from obesity, surfacing through social media, adds complexity. Additionally, as the researcher's inaugural venture into academia, potential limitations in experience and knowledge in quantitative

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research and thesis writing may exist. Geographically, the concentration of participants in urban areas of southwestern China raises concerns about generalizability. The study's reliance on a modified 3D-version of the Figure Rating Scale (Mutale et al., 2016), with acknowledged limitations in accuracy, and the potential lack of validation, further challenges the robustness of the findings. Scholars caution against the interference factors of FRS accuracy (Hudson et al., 2020; Jayawardena et al., 2021), potentially influencing the correlations of body dissatisfaction with upward social comparison and willingness for bariatric surgery.

Recommendations for future research include conducting longitudinal and experimental research to explore temporal relationships, investigating potential mediation and moderation effects, validating the modified Figure Rating Scale, and incorporating textual and graphic scales for participants' better understanding. Additionally, there is a need to examine gender-specific influences of social media on body image and to expand participant diversity across age, regions, and education levels. Extending the study to other East Asian countries with similar phenomena, such as Japan and South Korea (Ando et al., 2021; Yoon & Kim, 2020), would provide valuable comparative insights.

Conclusion

This study builds upon previous research by confirming the impact of social media use on body image among Chinese individuals, specifically connecting it to the willingness for bariatric surgery. Employing a quantitative approach, the research establishes a positive relationship between social media use intensity, photo-based activities, and the inclination for bariatric surgery, with the effects of appearance-related preoccupation appearing insignificant. The findings unveil a complex psychological mechanism involving upward social comparison, body ideals internalization, body dissatisfaction, and low self-esteem. Despite some unsupported hypotheses, the study successfully constructs and validates a model, highlighting the enduring relevance of social learning and social comparison theories. The research provides practical implications for developing health literacy and media literacy, and suggests further investigations within a broader scope of East Asian countries.

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