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RESEARCH ARTICLE

Media pressure and Body Image Depression (BID) among Chinese high school students: The serial mediating effects of future goals and self-esteem

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ABSTRACT

Based on "stress coping" and "self-determination" theory, the present study aims to explore the potential intervention path of media social pressure affecting body image depression in Chinese high school students by examining the relationships between four variables: media social pressure, future goals, self-esteem, and body image depression (BID). The study sample comprised 825 high school students from four middle schools in Guangdong and Yunnan provinces, aged between 14 and 19 ($M \pm SD = 15.87 \pm 0.98$). The results showed that, first, 57.7% of the surveyed high school students had different degrees of BID, and that the girls' BID score was significantly higher than that of boys ($t = -8.69$, $p < 0.001$). Second, media pressure significantly positively predicted BID in high school students. Third, future goals and self-esteem were shown to play separate mediating roles between media stress and BID. Fourth, the indirect effect between media stress and BID was found to be realized through the chain mediating effect of future goals and self-esteem. The implications as well as the shortcomings and prospects of the present study are also discussed.

Keywords: media social pressure; future goals; self-esteem; body image depression; high school students

1. Introduction

Adolescents are in their second peak of self-awareness[1], passionate about self-exploration, intensely self-concerned[2], and particularly conscious of their body shape and appearance. Studies have shown that adolescents are particularly prone to body dissatisfaction or body image depression[3, 4]. Body dissatisfaction refers to the negative cognitive evaluation of one's own body appearance. The evaluation content of women is mainly focused on weight, while that of men is focused on masculinity[5]. However, body image depression (BID) is a typical emotional experience accompanied by negative cognitive evaluation of one's body appearance. Specifically, BID refers to the psychological depression or frustration caused by teenagers' disappointment in their own body image[6]. A survey of middle school and college students in China found that the BID of Chinese adolescents comprised four aspects: body shape depression (BSD), gender depression (GD), sexual organ depression (SOD), and appearance depression (AD)[6, 7].

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BID is considered to be a negative life event, which if not managed, can lead to serious psychological and behavioral consequences and further affect the healthy adolescent growth[8]. The negative psychological consequences of BID in adolescents are manifested in two levels, the self and the interpersonal communication. With regards to the self, BID damages self-esteem[6, 9], and increases one's level of self-perfectionism[10], depression[11], and social anxiety[12]. As for the interpersonal communication level, BID leads to impaired social support[8] and greater pressure to seek love[13]. Moreover, the negative consequences of BID on one's behavioral level are manifested through negative coping tactics[7] and self-handicapping[14]. To sum up, these negative conclusions on BID suggest that it is very necessary to pay attention to and deeply study the adolescents' BID, especially to explore the mechanism of its occurrence and development as well as intervention countermeasures.

Why is it so common for teenagers to have body dissatisfaction (BD) or body image depression (BID)? There is no clear answer to this question. Some researchers argue that it is due to problems in parent-child attachment during childhood, e.g., the formation of avoidant or ambivalent attachment[15]. Other researchers believe that early adverse experiences may impair one's clarity of self-concept, and low self-concept clarity may increase the risk of "thin-ideal internalization" as a way to define oneself, thus leading them to experience BD or BID[16]. Studies have also shown that socio-cultural variables, such as social standards and social comparison, also affect adolescents' body image[17-19]. While the reason for adolescents experiencing BID remain uncertain, we are also faced with a serious issue in that, due to the advent of the mobile information age, adolescents' body image is being influenced by mass media[20, 21], and the consequences of the popularity and prevalence of media are increasingly serious[22], especially for female youth[18]. These facts can be explained within the framework of social comparison theory which notes that objects used for social comparison, which originally were only seen via newspapers, advertisements, film, or television, are now are widely accessed through mobile media at any time, which in turn means that social comparison can take place non-stop. This priming can be considered implicit, subconscious, and passive. In fact, a recent study shows that adolescents' social media use strongly influences their body concerns, and this pathway is mediated by the sequential mediation role of "appearance-related social comparison" and "internalization of aesthetic standards" [23]. Specifically, research on social comparison in social media has shown that the use of social media will initiate body comparison consciousness, and that the more comparative consciousness is primed, the more inclined one is to be aware of the differences between one's self and body image presented in media, leading to BID[4]. Social media, accessed easily through mobile phones, tablets, and computers, has become a part of teenager life, which brings them convenience but also pressure. Adolescents often actively use social media to follow information related to body image[24]. However, when receiving information about body image as pushed by media, in contrast to adults, adolescents are more likely to be fixated on the body image information and unable to extricate themselves from it, easily internalizing social standards of the ideal physique, face, and beauty[22]. This results in adolescents experiencing huge social comparative pressure, and thereby developing a strong sense of dissatisfaction or depression with their own body appearance. Therefore, in consideration of the findings of previous study[20], we proposed **Hypothesis 1**: There is a positive correlation between adolescents' experience of social media pressure and their BID.

Social comparison induced by media pressure is only one aspect that needs to be paid attention to, what we need to pay more attention to is the psychological aftereffect caused by the process of media pressure triggering social comparison. American psychologists Folkman and Lazarus proposed the stress coping theory, which focuses on the general tendency of individuals to deal with stressful events in a particular way. According to this theory, whether one becomes stressed or not when confronted with a stressor depends on two key psychological processes: cognitive assessment and coping[25]. Cognitive assessment refers to the cognitive process through which individuals perceive whether the situation has an impact on them. Coping refers to the application of actions or cognitive methods used to adapt to the conflict between situations or

individuals. Cognitive assessment corresponds to social comparison in response to media image information, while coping relates to one's behavioral reaction after the social comparison. To some extent, social comparison is horizontal in that, when adolescents compare themselves to the body image information they see presented in media, for example by seeing models or celebrities, it is based on a comparison to a relatively static imagery in the present moment, while their own body image in that moment will not change greatly over a short period of time. According to time perspective theory and its balanced state, when individuals are dissatisfied with and have negative ideas about their current state or circumstance, they may place more hope on the future[26]. In other words, when adolescents do not perceive themselves as measuring up well in their "present horizontal comparison" against others or the outside world, they are more likely to place the social comparison of body image in the "future vertical comparison". Indeed, one survey also showed that teenagers are generally concerned about the future and have a strong perception of their future[27].

Self-determination theory holds that individual behaviors are generated based on different types of motivation, specifically autonomous or controlling motivation[28]. Autonomous motivation is an individual's strong motivational tendency to engage in future behaviors based on their recognition of the ongoing value of an activity or behavior (e.g., heartfelt love, thinking that an activity or behavior is meaningful, etc.). Meanwhile, controlling motivation refers to individuals' behavior and motivational tendency which is based on external stimuli (e.g., obtaining rewards, avoiding punishment, achieving social recognition, etc.)[28]. Autonomous motivation can be controlled by the individual and is optional, and one's degree of self-determination in this type of motivation is relatively high. However, controlling motivation is uncontrollable and generally unavoidable, thus the degree of self-determination involved in this type of motivation is relatively low[29]. Combining this with the concepts of stress coping, balanced time perspective, and self-determination theory, we argue that after experiencing social comparison pressure through media regarding body image, adolescents experience an increased negative mood and, at the same time, fall into an internal response mode while focusing on the future in an attempt to change their current situation, all of which is an attempt to ease BID. The process of taking a future-focused perspective is to make an autonomous future goal of self-improvement, growth, and significance, that is, an internal future goal. However, it is also a controlling future goal focused on obtaining external recognition or avoiding BID, namely, an external future goal. With this in mind, we proposed **Hypothesis 2**: Media pressure affects adolescents' BID through both intrinsic and extrinsic future goals.

Adolescents' self-esteem is unstable and significantly negatively correlated with negative emotions, particularly with depression[30]. Furthermore, a previous study has shown that social media use does affect self-esteem levels[31]. Therefore, it is reasonable to speculate that the social media pressure adolescents experience regarding body image will be negatively correlated with their level of self-esteem. At the same time, a large number of studies have shown that self-esteem is significantly negatively correlated with physical image depression [6, 9, 14], drive for thinness[32], and actual ideal weight discrepancy[33]. As an important personality trait, self-esteem is not only affected by media pressure, but also one of the main causes of BID. Therefore, we proposed **Hypothesis 3**: Media pressure affects adolescents' BID by affecting their self-esteem level.

Future achievement goals affect self-esteem levels. Research has shown that at the individual level, individual-oriented achievement motivation can significantly positively predict self-esteem[34]. At the level of social achievement goals, social demonstration-avoidance goals are associated with maladaptive patterns, e.g., low level of happiness, high levels of fear, shame, or sadness[35]. Meanwhile, social demonstration-approach goals are positively associated with happiness, but not with other emotions. While, social demonstration-approach goals have been shown to buffer the negative emotions and amplify the positive emotional experiences of students with low self-esteem, social demonstration-avoidance goals are particularly harmful for students with low self-esteem[35]. In summary, future goals affect self-esteem at both the individual and social levels. Based on the above description of the two relationships, namely, the relationship between media

social pressure and future goals, and the relationship between self-esteem and BID, we put forward **Hypothesis 4**: The influence of media pressure on adolescents' BID is realized through a chain mediating effect of future goals and self-esteem.

2. Materials and methods

2.1. Participants

Students from three senior high school in Guangdong province, and one senior high school in Yunnan Province were selected for the research samples. 760 paper questionnaires and 123 electronic questionnaires were distributed – a total of 883 questionnaires – and 825 valid questionnaires were returned, with a questionnaire recovery rate of 93.43%. The high school students who participated in the survey were between 14 and 19 years of age, with a standard deviation of 0.98. The study also considered demographic variables such as gender, grade, whether they were an only child, and the nature of their household registration. The basic demographic information is shown in **Table 1**.

Table 1. Demographic information.

		Number	Percentage of total sample
Gender	Male	382	46.3%
	Female	443	53.7%
Grade	Senior one	500	60.6%
	Senior two	220	26.7%
	Senior three	105	12.7%
Only child	Yes	218	26.4%
	No	607	73.6%
Household registration location	Rural	422	51.2%
	City or town	403	48.8%

2.2. Measures

2.2.1. The adolescent body image depression questionnaire

This questionnaire was developed by Chinese researchers[6]. It is made up of a 25 questions which measure four factors: appearance depression (AD), body shape depression (BSD), sexual organ depression (SOD), and gender depression (GD). Each item is rated on a scale of three points where 1 = "do not agree", 2 = "cannot confirm", and 3 = "agree"; the higher the total score, the more obvious the respondent's BID. The Cronbach's α of this scale in present study was 0.883, and the Cronbach's α of appearance, body shape, sexual organ, and gender depression subscales were 0.871, 0.764, 0.760, and 0.654, respectively.

2.2.2. The sociocultural attitudes towards appearance questionnaire

Using the media subscale of the Sociocultural Attitude Toward Appearance Questionnaire-3 (SATAQ-3) developed by Thompson and his colleagues[36, 37], we examined individuals' perceived media social pressure regarding changing their appearance. The questionnaire consists of seven questions, each of which is rated on a five-point scale from 1 ("strongly disagree") to 5 ("strongly agree"). The higher the total score, the greater the perceived media social pressure. It should be noted that in order to be more consistent with the current context and actual daily life of today's Chinese teenagers, expressions in the original scale were adjusted appropriately (for example, including current mediums, i.e., "I want to be more attractive when I feel the pressure from mobile phones, computers, movies/videos, or magazines."). The Cronbach's α of this scale was 0.868 in current study.

2.2.3. The self-esteem scale

The Self-Esteem Scale (SES), developed by Rosenberg, consists of 10 items each rated on a scale of four points, from 1 ("very bad") to 4 ("very good"). The Chinese version of this scale consists of six items scored in a forward direction (i.e., items l, 2, 4, 6, 7, and 8) and four reverse-scored items (i.e., items 3, 5, 9, and 10). The higher the total score, the higher the respondent's level of self-esteem. The scale has been shown to be applicable to a wide range of people, and is widely used to assess self-esteem or self-worth in adolescents[38]. The Cronbach's α of this scale was 0.852 in present study.

2.2.4. The aspirations index scale

The Aspirations Index Scale, developed by Kasser and Ryan (1996)[39], was used to measure the adolescents' personal future goals. The scale comprises 35 items with each one scored on a seven-point scale, from 1 ("fully disagree") to 7 ("fully agree"). The scale contains seven subscales which measure social identity, belonging, appearance, group emotion, self-acceptance, health, and economic success, and the seven factors are further divided into intrinsic and extrinsic future goals. The Cronbach's α of this scale was 0.937 in current study. The Cronbach's α of the seven factors of social identity, belonging, appearance, group emotion, self-acceptance, health, and economic success were 0.864, 0.854, 0.806, 0.866, 0.710, 0.832, and 0.889, respectively. The Cronbach's α of the intrinsic and extrinsic future goals were 0.924 and 0.921, respectively.

2.3. Procedure

A protocol was followed in the study to ensure that data were collected in a similar manner throughout the process. First, direct contact was made with each school and an opportunity was given for the experimenter to clarify any queries regarding the purpose, objectives, timing, or content of this research. After consent to participate was received, a short online meeting was held with each class teacher to determine a convenient testing schedule (i.e., trying to ensure that the tests were all administered simultaneously). With regards to ethics, this study was approved by the ethic committee of the School of Education Science of Guangdong Polytechnic Normal University (Date: 26th, Dec, 2022; No. GPNU-jky1204). All participants were treated in accordance with the American Psychological Association ethics code, including confirming their informed consent and that of their guardians, a confidentiality agreement, and a statement of anonymity. Before the study began, all participants were informed of the process they would follow, and it was stressed that their participation was voluntary and that their data would be kept highly confidential. For the online participants, informed consent form was included as a document at the beginning of the questionnaire, and the following information was conveyed to the participants: "Before filling in the questionnaire, please read the informed consent of this study carefully. Receipt of your responses and data in the questionnaire system means that you have read the informed consent form and agreed to its contents. If you do not wish to take part, you can exit the study immediately." The questionnaire took between 10 and 20 minutes to complete, during which time the principal investigator (PI) was present at all times to address any doubts or questions that may have arisen during the process. For the participants in the offline paper questionnaire survey, the experimenter first issued the informed consent, and the participants signed and confirmed after reading it. After that, they filled in the paper version of the questionnaire issued by the PI. After collecting the paper version of the questionnaire, the PI immediately checked whether there were any omissions. If there were, the participants were asked to fill it out.

2.4. Data analysis

SPSS 26.0 was used to collate and analyze the data. Descriptive statistics were carried out on the four main variables, and the differences of these four main variables in different demographic variables were also analyzed using an independent sample *t*-test, ANOVA. And the correlation between these four variables was

also investigated. Hayes' (2013) SPSS macro program PROCESS was used to test the hypothesis model, and Model 6 was used to test the chain mediation model of media pressure – future goals – self-esteem – BID.

3. Results

3.1. Control and testing of common method bias

First, during the item testing stage, measures such as ensuring anonymity, randomizing question order, and implementing forward and backward scoring were employed. Second, during the statistical analysis stage, following Podsakoff et al.'s (2003)[40] approach, an exploratory factor analysis (EFA) was conducted on a composite of four scales: the Sociocultural Attitudes Towards Appearance Questionnaire, the Aspirations Index Scale, the Self-Esteem Scale, the Adolescent Body Image Depression Questionnaire. The unrotated EFA revealed 16 factors with eigenvalues greater than 1. However, the variance explained by the first factor was found to be 17.98%, which is below both Podsakoff and Organ's (1986)[41] critical standard of 50% and the Chinese academic community's adopted standard of 40%[42]. These findings indicate that there is no significant common method bias in this study.

3.2. Detection rate of body image depression (BID) in high school students

According Gao et al (2006)[6], the threshold of the existence of BID when scoring the Adolescent Body Image Depression Questionnaire is 2 points. A total score of greater than 2 points indicates the existence of BID. Moreover, among the four BID factors, as long as the average score of one factor is greater than 2, one is considered to have BID. The overall detection rate of BID in the current study was 57.7%. The detection rate of body shape depression (BSD), appearance depression (AD), gender depression (GD), and sexual organ depression (SOD) was 40.8%, 29.9%, 25.3%, and 1.8%, respectively. It is worth noting that 220 high school students (26.7%) reported having depression in one dimension, 188 (22.8%) had depressions in two dimensions, 60 (7.3%) had depressions in three dimensions, and 8 (1.0%) had depressions in all four dimensions.

3.3. The difference analysis of the main variables in each demographic variable

The demographic variables included in the data analysis were gender, grade, single child status, and household registration location. With regards to the gender variable, all measures with the exception of self-esteem showed significant differences, that is, media social pressure (t = -6.71, $p < 0.001$), aspirations index (t = -5.00, $p < 0.001$), and the total BID score (t = -8.69, $p < 0.001$), with female high school students scoring higher than the boys in all three variables. There were two further interesting results. The first was that, in the four factors of BID, apart from the sexual organ depression which was significantly higher in the male students than in the female students, the male students scored significantly lower than the female students in the other three factors, body shape, gender, and appearance depression. Second, the female students scored significantly higher than the male students on both intrinsic and extrinsic goals in future goals.

In terms of the grade variable, the BID total score (F = 3.40, $p < 0.05$) and the total aspirations index score (F = 4.01, $p < 0.05$) showed significant differences. The results of post-hoc comparisons for the total BID score showed that senior one students' BID was significantly higher than that of senior three students ($p < 0.01$); senior two students' BID was significantly higher than that of senior three ($p < 0.05$); however, there was no significant difference between senior one and senior two students in BID ($p > 0.05$). The results of post-hoc comparisons for the total future goals score showed that the goals of senior three students were significantly higher than those of senior two students ($p < 0.01$), while the differences between the other grades were not significant. Here we also found two interesting results. First, in the four factor scores of BID, except for the significant grade difference in body shape depression (F = 4.00, $p < 0.05$), there was no significant difference among the other factors ($p > 0.05$); Further post-hoc comparisons showed that the body shape

depression of senior one students was significantly higher than that of senior three students ($p < 0.01$), while the body shape depression of senior two students was significantly higher than that of senior three students ($p < 0.05$). Second, in the two factor "future goals" scores, there was not a significant difference in extrinsic goal according to grade ($p > 0.05$), while in contrast there were significant grade differences in intrinsic goals ($p < 0.001$). Further post hoc tests showed that the intrinsic goal scores of senior three students were significantly higher than those of senior one students ($p < 0.05$) and senior two students ($p < 0.001$), and the score of intrinsic goals of senior one students was significantly higher than that of senior two students ($p < 0.01$).

For regarding the only child status and household registration location, none of the scores in either of these variables were significantly different. See **Appendix 1** for details.

3.4. Correlation analysis

Age showed no significant correlation with other variables except for intrinsic goals and media pressure. Self-esteem was negatively correlated with media pressure and BID, and positively correlated with future goals. There was a significant negative correlation between the total score of self-esteem and the four factors of BID, and a significant positive correlation with intrinsic and extrinsic future goals. Media stress was positively correlated with future goals and BID. Media stress was positively correlated with the two sub-dimensions of future goals as well as with the four sub-dimensions of BID. There was a significant positive correlation between future goals and BID. It is worth noting that future goals had a significant positive correlation with the other three BID factor scores with the exception of sexual organ depression. The correlation coefficient and significance among each variable and factor score are shown in **Appendix 2**.

3.5. Confirmatory analysis of hypothesis model

To test the relationships between media pressure, future goals (intrinsic and extrinsic), self-esteem, and BID in high school students, we first standardized all four variables. Based on the results of descriptive statistics, difference test results in terms of demographic variables, and correlation analysis results, we also included gender and grade as control variables in the test of the chain mediation model. A total of 5, 000 samples were selected to estimate the 95% confidence interval of mediating effect to analyze the mediating effect of future goals and self-esteem between media pressure and BID. The direct and mediating effect sizes are shown in **Appendix 3**.

In the overall model, media pressure significantly positively predicted future goals ($\beta = 0.30$, $p < 0.001$), and BID ($\beta = 0.41$, $p < 0.001$), but negatively predicted self-esteem ($\beta = -0.21$, $p < 0.001$). Future goals significantly positively predicted self-esteem ($\beta = 0.34$, $p < 0.001$) and BID ($\beta = 0.19$, $p < 0.001$). Self-esteem significantly negatively predicted BID ($\beta = -0.30$, $p < 0.001$). These results indicated that the indirect effect of media stress on BID in high school students was mediated by the chain of future goals and self-esteem. The specific path relationship and path coefficient are shown in **Figure 1**.

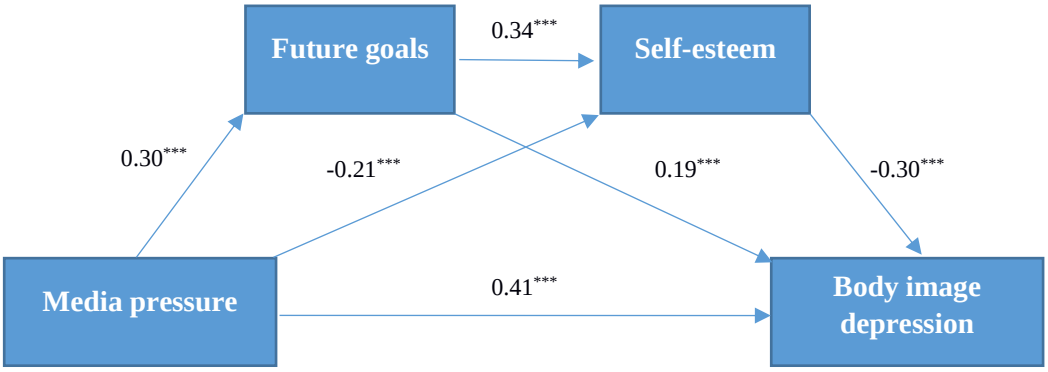

Figure 1. The Overall Model.

Future goals are broken into intrinsic and extrinsic goals, and the chain mediation model was constructed accordingly. Media pressure positively predicted future goals in both extrinsic and intrinsic future goals ($\beta_{extrinsic}$ = 0.36, p < 0.001; $\beta_{intrinsic}$ = 0.17, p < 0.001) and BID (β = 0.41, p < 0.001; β = 0.45, p < 0.001), while it significantly negatively predicted self-esteem (β = -0.18, p < 0.001; β = -0.17, p < 0.001). Future goals were significantly positive predictors of self-esteem ($\beta_{extrinsic}$ = 0.20, p < 0.001; $\beta_{intrinsic}$ = 0.35, p < 0.001) as well as of BID ($\beta_{extrinsic}$ = 0.18, p < 0.001; $\beta_{intrinsic}$ = 0.12, p < 0.001). Self-esteem significantly negatively predicted BID (β = -0.27, p < 0.001; β = -0.28, p < 0.001). This further indicates that the indirect effect of media stress on BID in high school students was completed by the chain mediating effect of future goals and self-esteem, regardless of whether the future goals were intrinsic or extrinsic future goals. The specific path relationship and path coefficient are shown in **Figure 2** and **Figure 3**.

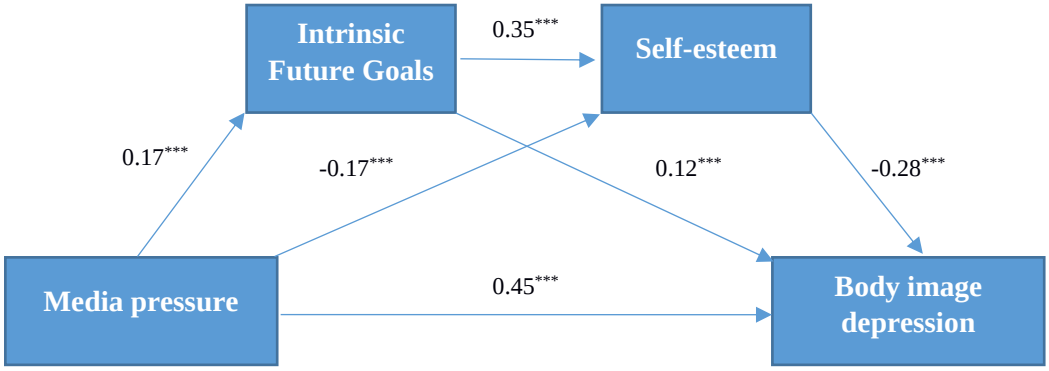

Figure 2. Sub-model: Intrinsic future goals as the first mediating variable.

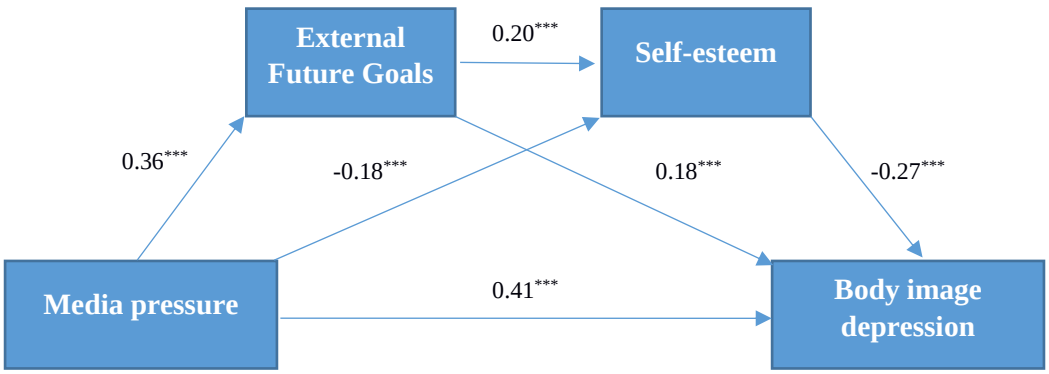

Figure 3. Sub-model: Extrinsic future goals as the first mediating variable.

4. Discussion

4.1. Basic situation of body image depression (BID) of high school students

In this study, the detection rate of BID was relatively high (57.7%), which was higher than the 25% reported by Tian (2017)[43] among junior high school students. It is also higher than the 34.3% of college student noted by Chang et al (2013)[8]. Participants in the abovementioned studies were not specifically noted as being high school students, and the total number of participants in these studies were quite different to the sample used in the present study, which was not large enough to perform in-depth horizontal comparisons. However, with the rapid development of technology, today's high school students have more and more opportunities and frequency to access mobile phones, computers and, other media, so they are more susceptible to the influence of body image information, making involuntarily social comparison, which can then induce more intense BID. The results of this study showed that, noted from high to low, the detection rate was: body shape depression (BSD), appearance depression (AD), gender depression (GD), and sex organ depression (SOD). This is generally consistent with the conclusions of previous research on junior high school students[43], which reflected the relative continuity of psychological development of middle school students.

4.2. Correlation between body image depression and other variables

The results of this study show that BID is significantly positively correlated with media stress, which is consistent with the findings of previous study which has shown that the social media internalization of college students is significantly positively correlated with physical anxiety[21]. Surveys of adolescents have also shown that adolescents' use of highly visual social media, such as Instagram or Snapchat, are significantly positively correlated with body image concerns[22, 44]. The present study showed a significant negative correlation between BID and self-esteem, which is consistent with the conclusions of a large body of existing studies[6, 32, 45]. As the body is a part of the self, the self-assessment of the body is an important part of one's self-concept, and perceived dissatisfaction of one's body will damage the integrity of their self-concept. At the same time, self-esteem does not only fixate completely on the body alone. Sufficiency in other areas of self-esteem can compensate for a lack of physical self-esteem. It is worth mentioning that among the four kinds of body image depression measured in the current study, appearance depression (AD) had the strongest negative correlation with self-esteem. This result is in line with the fact that adolescents and college students pay more attention to "facial beauty"[46]. Of particular interest is the fact that the results of this study also showed that BID was significantly positively correlated with future goals in that it was relative to intrinsic future goals ($r = 0.14$, $p < 0.01$), and that the correlation coefficient between BID and extrinsic future goals was greater ($r = 0.32$, $p < 0.01$). Although no current research has looked at the correlation between BID and achievement motivation, the fact that high school students' BID is associated with higher extrinsic future goals further confirms the proposed concepts of social comparison theory[4].

4.3. Mediating effect of future goals between media stress and body image depression

Stress coping theory states that individuals conduct cognitive assessment and coping in the face of stress [25]. When adolescents are faced with the pressures of social media, they may make cognitive effort, both positive and negative. In the negative direction, adolescents make social comparisons and internalize pressures based on the current trends they view; in the positive direction, however, they build up expectations for and motivation to achieve their future goals, such as increasing their willingness to exercise and developing a physical exercise program[20, 47], or compensating for their dissatisfaction in their body image by achieving success in other aspects. Nevertheless, given the wide gap between cognition and behavior, the ideal-reality gap in adolescents often leads to more stress and depression, especially for those who set unrealistic goals. It is worth mentioning that after we divided future goals into intrinsic and extrinsic goals, we tested the parallel

mediating effects of both intrinsic and extrinsic future goals between media pressure and BID. The results showed that the mediating effect of extrinsic future goals held true, but the mediating effect of intrinsic future goals did not (see **supplementary material** for details). According to the specific items of the extrinsic future goals scale, most of these goals involved money, fame, and beauty, which are ambitious and unrealistic for high school students, as well as being difficult to achieve in a short period of time. This gap between an ideal and reality will undoubtedly further amplify the media pressure perceived by high school students and further enhance their body image depression. In conclusion, the mediating path of media pressure – future goals – body image depression presented by the results of this study is credible. In the future, the subtle effects of variables such as goal execution or ideal-reality difference in adolescents in this mediation pathway should be investigated further.

4.4. Mediating effect of self-esteem on the relationship between media stress and body image depression

Proactive use of social media promotes self-esteem and vice versa[31]. Social pressures, media information, and media internalization are all negatively correlated with self-esteem[32]. Meanwhile, self-esteem was negatively correlated with BID[6, 48]. The results of this study show that self-esteem plays a mediating role between media pressure and BID. That is, the greater the perceived media pressure of high school students, the more their self-esteem is threatened and affected, which leads to an increase in BID. Although previous study has shown that BID can affect the pressure college students feel regarding love and relationships by affecting their level of self-esteem[13], we believe that, as self-esteem is an upper concept, its damage will spread to the lower concept of body self-esteem and thereby produce BID.

4.5. Chain mediating effect of future goals and self-esteem on the relationship between media stress and body image depression

Extrinsic future goals have been shown to be associated with lower vitality, lower self-actualization, and more physical symptoms; in contrast, intrinsic future goals are associated with self-acceptance, belonging, physical health, well-being, and less pain[39]. Although these variables were not examined specifically in this study, the differently-sized correlation coefficients of intrinsic and extrinsic future goals and self-esteem can also be taken as indications of support. However, our study showed that both intrinsic and extrinsic future goals were positively correlated with self-esteem in high school students. In the path analysis, both types of future goals positively predicted self-esteem, but extrinsic future goals had less predictive power. Media pressure prompts high school students to focus on the future in order to change their current situation, and the setting of future goals promotes their level of self-esteem, which in turn reduces their BID. In this way, future goals and self-esteem can be seen as protective factors. Although media pressure can cause individuals to pay too much and negative attention to their body image information, and forget or ignore some positive information, resulting in BID or strengthening BID, if the setting of future goals can improve high school students' level of self-esteem, it can to some extent alleviate their BID. Therefore, it is important to pay attention to students' future goals in education contexts and practice in two ways. First, high school students should be encouraged to focus not on the present but on their future, which can be changed, when experiencing pressure from media. Second, once a student has set a goal, it is important that it is implemented and completed step by step, which will strengthen their self-esteem, self-efficacy, and sense of accomplishment through the process of achieving that goal. In doing so, adolescents then will grow towards eliminating their BID and move towards a more promising life.

4.6. Potential differences in mediation models across cultural contexts

The present study examines the impact of social media stress on body image depression among Chinese adolescents, while also investigating the mediating effects of future goals and self-esteem on this relationship. Previous research conducted with Western adolescents has yielded several similar findings, indicating cross-cultural consistency between Eastern and Western societies. Specifically, it is evident that social media pressure negatively affects teenagers' psychological well-being and behavior[49-51]. Moreover, self-esteem plays a significant role in the relationship between social media pressure and negative body image awareness [32, 52]. However, no Western scholars have been identified who have examined the impact of future goals on, or the combined influence of future goals and self-esteem on the relationship between social media pressure and adolescents' negative awareness of body image.

It is noteworthy that future goals and self-esteem are two psychological attributes deeply rooted in Chinese teenagers, influenced by strong traditional cultural and social norms. Regarding future goals, Chinese adolescents are instilled with the belief from an early age that they should strive for academic success as a foundation to extend their achievements beyond academia. For instance, the Song Dynasty poet Wang Zhu once proclaimed that "万般皆下品，唯有读书高(*all things pale in comparison to learning*)," while "**《论语》(*The Analects of Confucius*)**" also recorded the renowned saying "学而优则仕(*The acquisition of knowledge cultivates competent officials*)." Concerning self-esteem, regardless of growing up in privileged or challenging circumstances, Chinese teenagers are taught from an early stage to cultivate independence, self-reliance, and confidence. As stated in the **《易经》(*The Book of Changes*)**, "天行健，君子以自强不息(*As heaven maintains vigor through movements, a gentleman should constantly strive for self-perfection*)". Therefore, while it is indeed true that the media social pressure can exert a detrimental influence on Chinese teenagers' body image awareness, this negative impact is likely to be more readily counteracted or even dispelled in light of cultural values and societal norms. Ultimately, this aligns with the expectations set forth by both the "stress coping theory" and the "self-determination theory". However, extensive research needs to be conducted to ascertain whether this approach holds true within a non-Chinese cultural context. Meanwhile, Chinese culture emphasizes that "身体发肤，受之父母，不敢毁伤，孝之始也(*My skin and hair are given by my parents and cannot get any scratches. This is the beginning of filial conducts*)." That is to say, whether our bodies are tall or short, fat or thin, our looks are beautiful or not beautiful enough, we all need to accept and love our bodies and looks. Could this cultural belief have an impact on the formation of social media pressure about appearance? Do Chinese and non-Chinese teens react differently to social media pressure about appearance? Do Chinese and non-Chinese teens even have a different psychological structure on social media pressure about appearance? All these questions need to be answered through cross-cultural empirical research. From this point of view, this study provides a starting point for cross-cultural comparison.

4.7. Limitations and prospects

First, according to the ecosystem theory, the occurrence and development of psychological attributes are influenced by the simultaneous impact of family, school, community, and social factors. However, this study only investigates the influence of social media pressure on middle high school students' body image depression, which is clearly insufficient. Therefore, future research should be conducted from various perspectives such as parenting styles, teacher-student relationships, and peer friendships in order to provide a comprehensive understanding of adolescents' body image depression (BID).

Second, this study is a cross-sectional study, and we hope that future studies consider using a longitudinal method to verify the results of this study. In particular, it is crucial to validate the mediating effects identified

in this study through a longitudinal tracking study design. Simultaneously, we also need to explore the developmental relationship between media social pressure, future goals, self-esteem, and BID using a longitudinal tracking design. Specifically, we are in need of determining whether cognitive development (e.g., future goals) influences emotional responses (such as media social pressure and BID), or if emotional responses influence cognitive development? Conducting such a follow-up study would be intriguing and meaningful due to recent research on Chinese adolescents that only demonstrated a unidirectional association between cognitive development and negative emotional responses; specifically, depression at time 1 affected cognitive development at time 2[53].

Third, the subjects in this study are limited to Guangdong and Yunnan Province, which compromises the sample's representativeness and the generalizability of the conclusions. Given the vast territory of China with numerous provinces exhibiting significant disparities in economic development, social norms, customs, and culture, future studies should expand the coverage of sampling to include a wider range of provinces, encompassing diverse socioeconomic statuses, and sub-cultural backgrounds.

5. Conclusions and implications

5.1. Conclusions

The perceived media pressure of high school students positively predicted future goals and body image depression (BID), and negatively predicted self-esteem. Future goals positively predicted self-esteem and BID. Self-esteem was a negative predictor of BID. High school students' future goals and level of self-esteem played a chain mediating role between their perceived media stress and BID.

5.2. Implications

First, from the perspective of the family, it is advisable for parents to guide their children's attention towards short-term or long-term goals (particularly intrinsic goals). The reason lies in the fact that, when compared to a relatively stable, unchanging body image, teenagers may find it more feasible to pursue and achieve practical intrinsic or extrinsic goals, which can provide a greater sense of accomplishment and thus counterbalance the adverse effects of BID. Additionally, parents can engage in various physical exercises and outdoor activities alongside their children while transferring the concept that "physical health is paramount".

Second, from the perspective of the school, considering the critical period of identity development in adolescents and the findings of this study that "self-esteem negatively predicts BID," it is advisable for teachers and administrators to foster student engagement in diverse practical activities to explore, comprehend, enrich, and establish their self-identity. Ultimately, these efforts will counteract the adverse effects of BID.

Third, from the perspective of social media, in addition to promoting the "beauty of body image," we can also highlight exemplary qualities and actions that embody the "beauty of youth soul," such as altruistic acts performed by teenagers who willingly assist others, role models who strive for personal growth, and innovative and creative ideas generated by young minds. By doing so, we can effectively redirect teenagers' attention towards positive aspects, thereby inspiring them to create their life miracles and minimizing concerns related to BID.

Author contributions

Conceptualization, XY; methodology, XY, TX, GC, ZH, XL, and HL; software, XY; validation, XY, TX, GC, ZH, and XL; formal analysis, XY; investigation, XY; resources, XY; data curation, TX, GC, ZH, XL, and HL; writing—original draft preparation, XY; writing—review and editing, XY; visualization, TX; supervision, GC, ZH, and XL; project administration, XY; funding acquisition, XY.

All authors have read and agreed to the published version of the manuscript.

Compliance with ethical standards

The procedures involving human participants recommended by the institution and/or the National Research Council were strictly adhered to in this study. This study obtained approval from the Ethics Review Committee of School of Education Science at Guangdong Polytechnic Normal University (No. GPNU-jky1204). Informed consent was obtained from all participants, and their responses will be kept confidential.

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Conflict of interest

The authors declare no conflict of interest.

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Appendix 1. Difference analysis on demographic variables of body image depression, future goals, self-esteem, and media pressure in high school students.

Variables	Body shape depression *M*(*SD*)	Gender depression *M*(*SD*)	Sexual organ depression *M*(*SD*)	Appearance depression *M*(*SD*)	Extrinsic future goals *M*(*SD*)	Intrinsic future goals *M*(*SD*)	Self-esteem *M*(*SD*)	Media pressure *M*(*SD*)	Aspirations index *M*(*SD*)	Body image depression *M*(*SD*)
Gender										
Male	14.62(3.66)	6.92(1.65)	5.20(1.56)	14.67(4.39)	58.43(19.23)	108.91(21.02)	28.34(4.91)	20.29(5.89)	167.34(34.93)	41.40(8.61)
females	16.59(4.04)	7.73(1.96)	4.88(1.43)	17.58(4.70)	63.57(15.77)	114.69(16.15)	28.83(4.96)	23.01(5.76)	178.26(26.43)	46.78(9.13)
T-value	-7.35***	-6.45***	3.04**	-9.15***	-4.15***	-4.38***	-1.42	-6.71***	-5.00***	-8.69***
Grade										
Senior one[1]	15.88(4.06)	7.34(1.91)	5.09(1.57)	16.39(4.89)	61.35(18.39)	112.44(18.75)	28.76(4.97)	21.41(6.26)	173.79(31.45)	44.70(9.38)
Senior two[2]	15.68(3.86)	7.36(1.77)	5.00(1.39)	16.36(4.68)	60.68(17.82)	108.35(19.66)	28.35(5.11)	22.39(5.07)	169.04(33.02)	44.40(9.16)
Senior three[3]	14.68(3.84)	7.38(1.87)	4.81(1.38)	15.25(4.40)	61.52(13.07)	117.63(15.22)	28.42(4.39)	22.03(6.25)	179.15(23.60)	42.11(8.86)
F-value	4.00*	0.02	1.53	2.57	0.13	9.18***	0.63	2.16	4.01*	3.40*
Post hoc	1 > 3**; 2 > 3*					1 > 2**; 1 < 3*; 2 < 3***			2 < 3**	1 > 3**; 2 > 3*
Only child										
Yes	15.61(3.93)	7.28(1.94)	5.05(1.48)	16.06(4.99)	61.51(19.40)	112.53(20.24)	28.62(5.2)	21.75(5.94)	174.04(34.89)	44.00(9.14)
No	15.70(4.02)	7.38(1.84)	5.02(1.51)	16.30(4.71)	61.08(16.97)	111.82(18.24)	28.60(4.84)	21.75(5.99)	172.90(29.67)	44.39(9.34)
T-value	-0.27	-0.66	0.84	-0.63	0.77	0.48	0.06	-0.01	0.43	-0.54
Household										
Rural area	15.73(3.95)	7.40(1.86)	5.07(1.55)	16.03(4.86)	60.40(17.87)	111.10(19.68)	28.55(4.73)	21.54(5.88)	171.50(31.97)	44.23(9.39)
City or town	15.63(4.04)	7.31(1.88)	4.98(1.44)	16.44(4.69)	62.02(17.36)	112.97(17.76)	28.67(5.14)	21.97(6.07)	174.99(30.14)	44.36(9.18)
T-value	0.36	0.70	0.85	-1.24	-1.33	-1.43	-0.34	-1.03	-1.61	-0.20

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

Appendix 2. Correlation analysis of body image depression, future goals, self-esteem, and media pressure in high school students.

	M ± *SD*	1	2	3	4	5	6	7	8	9	10	11
1 Age	15.87 ± 0.98	1										
2 Body shape depression	15.68 ± 4.00	-0.07	1									
3 Gender depression	7.35 ± 1.87	< 0.01	0.28**	1								
4 Sex organ depression	5.03 ± 1.50	-0.06	0.22**	0.32**	1							
5 Appearance depression	16.23 ± 4.78	-0.05	0.57**	0.38**	0.32**	1						
6 Extrinsic future goals	61.19 ± 17.63	0.03	0.22**	0.20**	0.11**	0.34**	1					
7 Intrinsic future goals	112.01 ±18.78	0.07*	0.14**	0.10**	-0.09**	0.16**	0.46**	1				
8 Self-esteem	28.61 ± 4.94	< 0.001	-0.18**	-0.19**	-0.20**	-0.24**	0.14**	0.32**	1			
9 Media pressure	21.75 ± 5.97	0.07*	0.45**	0.25**	0.11**	0.53**	0.37**	0.20**	-0.10**	1		
10 Aspirations index	173.20 ± 31.12	0.06	0.20**	0.17**	0.01	0.29**	0.84**	0.86**	0.27**	0.33**	1	
11 Body image depression	44.29 ± 9.28	-0.07	0.82**	0.57**	0.48**	0.89**	0.32**	0.14**	-0.27**	0.54**	0.27**	1

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

Appendix 3. Path and effect of media pressure on body image depression of high school students.

	Effect	Path	Effect size	Bootstrap SE	Bootstrap 95% CI
Total model	Total effect	Media pressure – body image depression	0.50	0.03	0.44–0.56
	Direct effect	Media pressure – body image depression	0.41	0.03	0.35–0.47
	Indirect effect	Media pressure – future goals – body image depression	0.06	0.01	0.03–0.08
		Media pressure – self-esteem – body image depression	0.06	0.01	0.04–0.09
		Media pressure – future goals – self-esteem – body image depression	-0.03	0.01	-0.04–-0.02
	Total mediating effect		0.09	0.02	0.06–0.12
Sub-model 1	Total effect	Media pressure —— body image depression	0.50	0.03	0.44–0.56
(First mediator	Direct effect	Media pressure —— body image depression	0.45	0.03	0.39–0.51
variable:	Indirect effect	Media pressure —— intrinsic goals —— body image depression	0.02	0.01	0.01–0.04
intrinsic goals)		Media pressure —— self-esteem —— body image depression	0.05	0.01	0.03–0.07
		Media pressure ——intrinsic goals—— self-esteem —— body image depression	-0.02	0.004	-0.03–-0.01
	Total mediating effect		0.05	0.01	0.03–0.08
Sub-model 2	Total effect	Media pressure – body image depression	0.50	0.03	0.44–0.56
(First mediator	Direct effect	Media pressure – body image depression	0.41	0.03	0.35–0.46
variable:	Indirect effect	Media pressure – extrinsic goals – body image depression	0.07	0.01	0.04–0.09
extrinsic goals)		Media pressure – self-esteem – body image depression	0.05	0.01	0.03–0.07
		Media pressure —— extrinsic goals – self-esteem – body image depression	-0.02	0.005	-0.03–-0.01
	Total mediating effect		0.10	0.02	0.06–0.13

Supplementary Material

The SPSS macro program PROCESS by Hayes (2013) was used to test the parallel mediating effect of the hypothesized intrinsic and extrinsic goals between media pressure and body image depression (BID). Model 4 was used to test the parallel mediation model under the premise of controlling for demographic variables such as gender, age, grade, only child status, and household registration location. The results showed that media pressure significantly positively predicted BID ($p < 0.001$), intrinsic goals ($p < 0.001$), and extrinsic goals ($p < 0.001$). Intrinsic goals did not significantly predict BID ($p > 0.05$), while extrinsic goals did significantly positively predict BID ($p < 0.001$). Meanwhile, extrinsic goals played a mediating role in the relationship between media pressure and BID (Boot CI = [0.03, 0.08]), while intrinsic goals did not play a mediating role in the relationship between media pressure and BID (Boot CI = [-0.02, 0.005]). The specific regression coefficients and significance are shown in **Figure 4**.

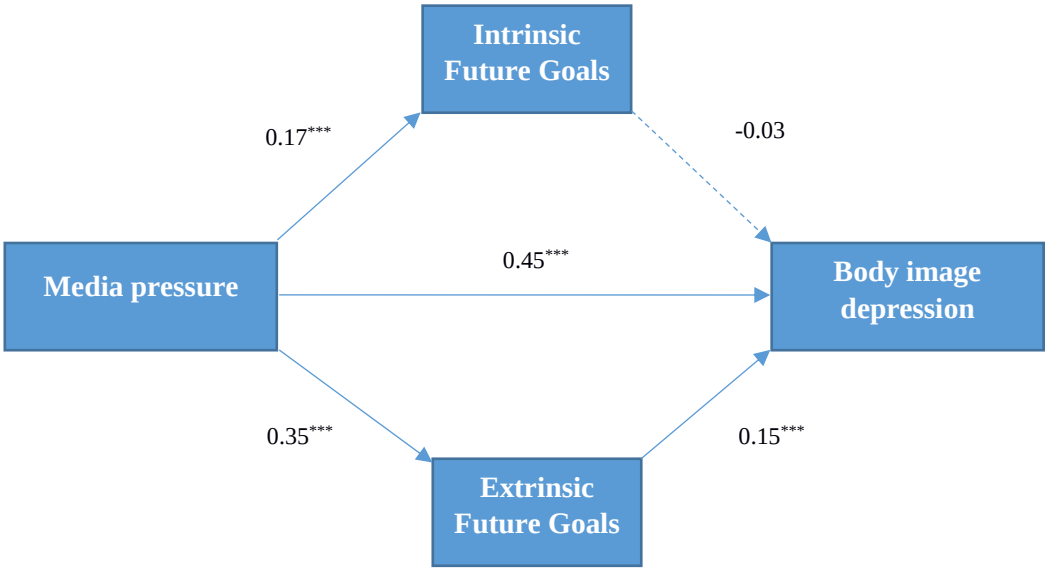

Figure 4. *Parallel Mediation Model of Intrinsic and Extrinsic Goals Between Media Pressure and Body Image Depression*