

A Review of the Body Image Dissatisfaction Detection from Social Media

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Abstract — Body image dissatisfaction is an issue that has been discussed in contemporary society for years. With the advancement of technology, social media plays a key role in impacting an individual's body image, resulting in a change in behaviour and mental health. This is due to the rise of influencers and celebrities on social media defining the ideal body image which had widespread in the platform, leading to unrealistic societal standards, and causing body image dissatisfaction among individuals. This paper aimed to gather the methodologies, types of analysis and research gaps from previous research works regarding body image dissatisfaction on social media. Notably, questionnaires, research methods and machine learning techniques were utilised to identify the patterns of body image dissatisfaction in the past. It is also found that the media had created a societal beauty standard as a norm which impacted many individuals. Education level is also highlighted as they may not be easily influenced by social media. With that, various research gaps were identified for further research including a wider age range, muscular/athletic internalisations of females, and the association of engagement behaviours on social media with body image dissatisfaction. The lack of machine learning techniques stated in past studies also highlighted which could be useful for future research.

Keywords — body image dissatisfaction, social media, adults, analytics, machine learning

I. INTRODUCTION

Body image represents the feelings of an individual about their physical appearance. This includes perceptual aspects (perception of body shape), behavioural aspects (weight-control behaviours and social grooming), and cognitive aspects which include attitudes and emotions towards their body shape. The negative perception of an individual's body is known as body image dissatisfaction.

The issue of body image dissatisfaction has been going on for decades, impacting both males and females in contemporary society. Fig 1. shows the sociocultural models on body image dissatisfaction development such as the tripartite influence model provided a structure of the influences on the issue, leading to the aftermath of this calamity (Vuong et al., 2021).

Based on the model, the three main influences of body image dissatisfaction are peers, family and media. These may lead to eating disorders resulting in mediational mechanisms such as appearance comparisons and ideal body internalisation (thin-ideal internalisation and muscular-ideal

internalisation). Individuals spend their free time and express themselves on Social media platforms such as Instagram, TikTok, and Facebook. In addition, these platforms play an integral role in making adults have self-beliefs about their appearance. The rise of influencers and celebrities on social media has led to different beauty influences promoting their beliefs in "positive body image", which sets unrealistic societal beauty standards.

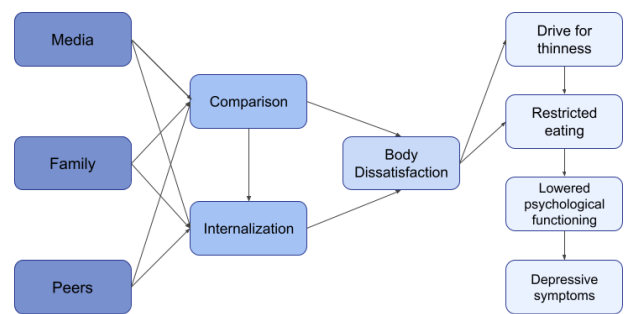


Fig. 1: Tripartite Influence Model (Vuong et al., 2021).

Social media engagement behaviour such as comments, likes, and shares make individuals to be obsessed with the way they present themselves on social media to receive more recognition to confirm societal beauty standards. Consistent engagement also heightened the body image dissatisfaction level as the exposure to ideal appearance is frequent. This affects individuals to use photo editors and filters to make themselves look flawless in their appearance and image. An individual may also undergo plastic surgery, unsafe weight loss behaviour, inappropriate use of weight management items such as slimming pills or steroids, and many more dangerous procedures to fit society's beauty standards. Further, these standards may create societal issues such as physical bullying, and cyberbullying, mental health issues such as depression, poor self-esteem, anxiety, and eating disorders such as anorexia nervosa and bulimia (Brazier, 2020), which all can be fatal. This creates a significant to identify body dissatisfaction among adults as the main consequence of this issue is life-threatening. With that, previous research studies were evaluated on the methodologies followed and further understood their analysis and results along with the research gaps.

In this paper, the next section highlights the methodologies used by numerous scholars regarding body image

dissatisfaction, from questionnaires, research methods and machine learning techniques. The following section attempts to discuss the social media impacts on body image dissatisfaction and the final section highlights the research gaps identified on this topic for further improvement.

II. METHODOLOGIES USED

A. Questionnaires

This is one of the prominent methods used to gather data using the Likert scale where 1 = strongly disagree to 5 = strongly agree. [1] selected participants to take part in a long-term study regarding body dissatisfaction and the well-being of adolescents over a year. The participants were adolescents from a co-educational high school where the participants were selected between the ages of 11 to 17, male and female, and underweight to overweight. In addition, the majority of the participants were from New Zealand, Australia, Asia, Europe and others. The frequency of social media usage such as Instagram and Snapchat on a scale of 1 = never to 5 = always related to appearances was gathered and found usage of social media was high (Vuong et al., 2021).

The frequent usage of these social media applications influences the perception of body image and styles such as thin, muscular, overweight, and round. However, according to Jiotso et al. (2021), body image perceptions are formed due to comparison and societal standards towards body image where emphasis on losing weight or bulking up is the norm of being attractive. Thus, negativity and dissatisfaction towards certain types of body image would affect the self-esteem of a person.

Internalization towards a thin-ideal and muscular-ideal body image using 1 = definitely disagree to 5 = definitely agree was collected on the Sociocultural Attitudes Towards Appearance-4 Scale (SATAQ-4). The average score was calculated and a higher score was skewed towards a stronger thin-ideal internalisation. On the other hand, a higher score leaned towards a stronger feeling of having a muscular body using the same scaling method. Data was also collected on body dissatisfaction with the scaling of 1 = never to 5 = always using the Body Esteem Scale for Adolescents and Adults (BESAA). Statements such as "I am ashamed of my appearance" and positive statements such as "I love my appearance in pictures" were reverse scored. The results showed that participants had greater body dissatisfaction (Vuong et al., 2021).

Another study done by Aparicio-Martinez et al. (2019) also used the same methodology; however, the participants were female college students from the age group of 18 to 25 years old. Anthropometric and demographic data were also left out as the study was towards individuals and socio-cultural factors. Body dissatisfaction data were asked with a scale of 1 = never to 7 = always using the statement "Have you been worried about your body shape that you feel the need to diet?".

Appearance evaluation regarding a person's perception of self and stereotypes was captured using the statement "The majority of people would regard me as good looking" on a scale of 1 = disagree to 5 = agree via the Multidimensional Body-Self Relations Questionnaire-Appearance Scales (MBSRQ). Lower scores were interpreted as low self-perception and also stereotypes. Self-esteem was also studied and assessed with ten sets of questions which provided information regarding the levels of the esteem of an

individual. Each question got a scale of 4 points where 1 = disagree and 4 = agree where a lower score means lower self-esteem.

Another study done by Ren et al. (2022) on the core risk factors associated with eating behaviours and emotion regulation also utilised the same methodology. Although the study did not have a direct impact on body image dissatisfaction, the measures used were related to body image dissatisfaction. The participants were first and second-year female undergraduate students from 18 to 23 years old. In terms of measures, the body mass index (BMI) was recorded as well. Body image dissatisfaction was measured using Eating Disorder Inventory (EDI-BD) on a 6-point scale from 1 = never to 6 always, using the statement "I think that my thighs are too large". Body image inflexibility was also assessed using the Body Image Acceptance and Action Questionnaire (C-BI-AAQ), using the statement "Worrying about my weight makes it difficult for me to live a life that I value" from a 7-point scale from 1 as never true to 7 as always true.

Collecting data from the respondents is advantageous as it gives a clear response. Respondents within the age range of 18 to 25 are very significant as they are mentally strong and mature compared to individuals from the age range of 11 to 17. It would also be better to have respondents as students working professionals and others with various experiences would give a variety and reliable data for analysis. In addition, senior citizens would not be influenced as they may already have their perception towards life and would be using social media more responsibly as they tend to be more psychologically mature.

B. Machine Learning

Machine learning models provide a solution by identifying the patterns of the data and producing a predictive model for the problem, including body image dissatisfaction. Machine learning models are used to test the hypotheses of various research and make inferences regarding the dataset, also maximising the accuracy of the prediction and validation of the dataset. Model parsimony is emphasised in machine learning as well as it identifies the right number of predictors to explain the model well. The importance of cross-validation is highlighted in machine learning as the data splitter into training and testing to avoid overfitting issues (Gupta, 2021).

Based on a study done by Fardouly et al. (2022), a supervised machine learning technique was used for the prediction of eating disorder status and identifying the relevant predictors for the issue. Machine learning models detect risk as screening can be provided to the individuals once the data is created and helps to identify those who are not attentive to the issue and/or those who may not seek help. This methodology also helps to understand the issue being prevalent within the population.

Although there are no previous studies that directly use machine learning models on body image dissatisfaction prediction, the studies on eating disorders have used machine learning models to understand further. According to Ren et al. (2022), the decision tree model was used to explore the core risk factors associated with eating behaviours and emotion regulation. Data were pre-processed on dealing with missing values via imputation with predictions from regression and

balancing data using the synthetic minority oversampling technique (SMOTE).

As this concept has some novelty in the application of machine learning techniques, no significant literature could be obtained. Further, though the matter significantly affects the younger generation in this regard, applying or proposing a suitable machine learning technique to detect body image dissatisfaction would be a significant contribution to offer various benefits, especially helping people to get rid of stress and feel confident to lead a happy life. However, Table 1 shows the details of the study and evaluation measures of the models built on eating disorder.

TABLE I. MODEL AND EVALUATION MEASURES - MACHINE LEARNING ALGORITHM

Author & Year	Data	Methodology	Evaluation Measures
Fardouly, J., Crosby, R. D., Sukunese n, S. (2022)	Social media behaviours, clinical data, and online environmental data were collected via survey.	Research was done to investigate the potential and limitations of machine learning algorithms as compared to traditional analytical practice on detecting eating disorder. The predictor variables were segregated into different categories from survey, social media data and clinical data on the implication of detection.	The implication on the detection of eating disorders via different methods were evaluated in a table to further identify each aspect from sample, predictor variables, best performing machine learning approach and so on. Other segments such as the overall implication on early intervention and treatment, limitations, practical and ethical considerations on machine learning algorithms were further evaluated.
Ren, Y., Lu, C., Yang, H., Ma, Q., Barnhart, W., Zhou, J., He, J. (2022)	Questionnaires such as Kessler Psychological Distress Scale (K10) for psychological distress, Body Image Acceptance and Action Questionnaire short form (C-BI-AAQ-5) for body image inflexibility, and Eating Disorder Inventory (EDI-BD) for body image dissatisfaction.	The Decision Tree algorithm was utilized for this research to investigate the relationship between the factors: body image inflexibility, psychological distress and body image dissatisfaction. Preprocessing such as dealing with missing values using SMOTE technique, splitting the data into testing and training data with a ratio of 7:3 and balancing the data were done as well.	The Decision Tree model was evaluated by its sensitivity and specificity. The model showed 88% sensitivity and 85% of specificity with a sufficiency of samples for a stable model.

III. SOCIAL MEDIA IMPACTS ON BODY IMAGE DISSATISFACTION

Many factors could impact an individual's body image dissatisfaction, among which one of the main factors is the appearance-ideal internalization that drives thinness and muscularity for both men and women. The impact of social media drove the societal ideal's internalization of physical

beauty and attractiveness, which led to body image dissatisfaction when individuals were unable to achieve these standards.

Adolescents tend to be more vulnerable to body image dissatisfaction as they were much more concerned about their physical appearance and were vulnerable when it comes to appearance comparison. During mid-adolescence, they may have experienced a decline in their body esteem, including less satisfaction with their appearance and weight. The prevailing issue of body image dissatisfaction had driven adolescents to engage in unsafe body-change measures such as restrictive dieting plans, weight loss pills, and so on.

A study by Vuong et al. (2021) found evidence that appearance-related social media usage had a significant association with body image dissatisfaction for both males and females. Both thin and muscular-ideal internalization was strongly and positively correlated with body image dissatisfaction. Due to the unhealthy ideals of 'muscular' and 'slim' on social media, those who affirmed these ideals had created a strong sense of dissatisfaction about their bodies. As for females, thin-ideal internalization was the only variable that was positively associated with body image dissatisfaction, however, it did not moderate the relationship between the usage of social media and body image dissatisfaction. As for males, thin-ideal internalization was the only variable that was strongly associated with body image dissatisfaction, whereas it was muscular-ideal internalization that moderated the relationship between the usage of social media and body image dissatisfaction.

Notably, males were more affected by fitness inspiration posts on social media which supported the correlation between muscular-ideal internalization and body image dissatisfaction compared to thin-ideal internalization. However, the two-way interaction (muscular and thin-ideal internalization), and three-way interaction (social media, muscular and thin-ideal internalization) were all non-significant for males and females. The study required further improvements with more information regarding social engagement and behavioural impacts on body image dissatisfaction, which has been discussed in the next chapter on the research gaps.

In addition, the influences that formed society's perception regarding body image could cause individuals that were not affected by the influences to change their perception of body image due to comments by people who were normalizing the perception of body image. According to Salazar (2017), adolescents' body image was the level of satisfaction with an individual's appearance and physical shape. Individuals used to get influenced by the norm of body image due to societal influences via negative comments such as "obese" or "horrendous looking". Such comments could negatively affect the individual's perception of their body image which in turn led to long-term self-esteem problems.

This also acted as cyberbullying, which had wide-ranging effects from mental health issues such as anxiety and depression to suicidal impacts. Also, cyberbullying could be more harmful than real-world bullying as it could happen anytime, anywhere and in any digital form, ranging from text messages, comments, posts, images, and videos. The strong power of social media is that any news can be spread fast and become viral in a short time, including negative comments. This created fewer opportunities for these individuals to defend themselves as the users who left these negative

comments could be anonymous and made it difficult to report to authorities on this issue (Gordon, 2020).

Today, people have become more social media-dwelling entities with the advancement of technology (Cipolletta et al., 2020). Therefore, the probability of cyberbullying is high and unavoidable as more people use social media, and the cases may likely increase. Aside from cyberbullying, Cipolletta et al. (2020) also stated that people use social media applications such as Instagram for self-acceptance and interpersonal desire rather than the application itself. Individuals tend to focus on receiving positive feedback or like on their pictures rather than the benefits and advantages of Instagram itself. A mentality like this can, however, backfire as not receiving positive feedback or likes could affect a person's mental health. When there is no positive feedback or likes may make people think "Am I not attractive enough?" or "Is there anything wrong with my appearance?" hence, affecting a person's perception and self-esteem regarding body image.

To further discuss the issue of social media and its association with body image dissatisfaction, Caddel (2018) stated that due to the astonishing number of pictures posted on social media, users were exposed to "unrealistic beauty ideals" which were also treated as the norm. For example, Korean celebrities had strict requirements towards having a nice body like slim for women or slim or muscular for guys. The appearance of celebrities on social media used to get praised and wished for as it unconsciously created a beauty or body image standard that affected people's perceptions. When individuals were given the perception of what beauty was, they started to internalize themselves and have multiple body image constructs, which is one of the major causes of eating disorders. By having thin or muscular self-internalization, they would also tend to look for methods to slim down by looking up diet plans or requirements from people who managed to achieve the "ideal body" to follow and practice.

The outbreak of COVID-19 lasted for nearly three years and made people experience social distancing which changed their social behaviour. As the uncertainty of the lockdown during the pandemic had isolated and restricted people from outdoor activities, people's usual routines, emotions, relationships, and mental health was impacted. With an unspecified timeline of the quarantine, social media had replaced social contact, causing a surge in social media usage. The pandemic generated a greater level of distress in individuals, such as the increased risks of mental disorders like depression, anxiety, and stress. It also negatively impacted the perception of body image via frequent exposure to social media (Durette, 2022).

According to a study done by Swami et al. (2021), there was an association between COVID-19-related anxiety and stress with negative body image via increased exposure to thin or athletic ideals in social media. This led to more concerns about weight and physical appearance, which created more body image dissatisfaction among people during this period. In females, COVID anxiety was linked with thin ideals and body image dissatisfaction, whereas the linkage between COVID anxiety with body image dissatisfaction and muscular ideals was found in males. Lifestyle factors such as increased screen time on social media and decreased physical activity were included as well. Further, a relationship between the usage of social media with body image dissatisfaction and low

self-esteem in female adolescents and adults was found (Vall-Roqué et al., 2021).

As the frequency and amount of time spent on social media had significantly increased, Instagram, the top-used social media among the respondents, is positively linked with body image dissatisfaction, thin ideals, and low self-esteem. The number of followers on appearance-focused accounts on Instagram, such as fashion, fitness, and beauty accounts or influencers, was one of the strongest predictors of drive for thinness, which was also linked to body image dissatisfaction in both age groups.

TABLE II. SOCIAL MEDIA IMPACTS ON BODY IMAGE DISSATISFACTION - SUMMARY

Topic	Summary
Impacts on body image through social media	<ul style="list-style-type: none"> Appearance comparison Appearance-ideal internalisation Unrealistic societal beauty ideals
Appearance comparison	Adolescents tend to be more vulnerable to body image dissatisfaction in this aspect and can lead to restrictive diet plans, weight loss pills, and other unsafe body-change measures.
Appearance-ideal internalisation	Usage of appearance-related social media, such as Instagram and TikTok, is significantly associated with body image dissatisfaction for both males and females. Females are more affected by thin-ideal internalisation, whereas males are more affected by fitness inspiration posts.
Unrealistic societal beauty ideals	<p>Social media exposes users to unrealistic beauty ideals, which can become the norm. This creates a beauty or body image standard that affects people's perceptions of it.</p> <ul style="list-style-type: none"> Negative comments such as "obese" or "horrendous looking" by those who normalized these body images will be sent to the users and which in turn led to self-esteem problems. <p>Social media will be used for self-acceptance and interpersonal desire, with individuals focusing on receiving positive feedback or likes on their pictures. However, not receiving positive feedback or likes can negatively affect a person's mental health and perception of body image (Barnes et al., 2020) (Mahon & Harvey, 2021).</p>
Covid-19 pandemic	COVID-19 pandemic also impacted the perception of body image negatively on individuals due to frequent exposure to social media, which led to anxiety and low self-esteem on individual's appearance. The number of followings on appearance-focused accounts on Instagram, such as fashion, fitness, and beauty accounts or influencers, was one of

the strongest predictors of drive for thinness.

IV. RESEARCH GAPS

Based on the research done by Vuong (2021), further research was required to determine the impact of muscular or athletic internalisation on female body image dissatisfaction. Since females in the current era pursued the idea of athletic body types, it became critical to assess muscular and/or athletic internalisation in females in future research. The relationship between the usage of photo-editing apps and body image dissatisfaction in males and females required further investigation. Due to the influence of modern appearance and fashion on social media, both genders could be influenced by an unrealistic ideal, and they adopted the trends to fit societal beauty standards. Also, social media engagement in commenting, liking, and posting self-portraits was required to address the association with body image dissatisfaction. Age was also an influential factor in body image dissatisfaction, as individuals of different ages may have different attitudes toward this issue.

According to Caddel (2018), questionnaires given out to participants could be interpreted from their perspectives, narrations, and participants may also have their own biases. As a result, their answers were more subjective and skewed toward their beliefs when answering questions. When gathering information using questionnaires, direct feedback was encouraged from people experiencing body image dissatisfaction and its influences; however, by the nature of their opinion and their approach to this matter, this may be someone who already conformed to the beauty standard. In an example, a participant who answered the question was actually in the "slim" category where this was viewed as the standard of beauty; however, the participant felt she was "overweight" even though she was not, and still aspired to have a body like a person who had a "slim" figure. When a participant was already slim yet felt that it was not enough, this could create a very biased answer to the question handed out to them.

Salazar (2017) points out that one limitation of the study was that it was conducted using self-reported survey data, which collected most of the data on the perceptions of children. In addition, the study also applies the cross-sectional method which the data was not gathered over a long period but at a point in time. As social media had age restrictions, not all the participants in the study may have access to platforms as the participants' average age was 12. Although the data was obtained through a questionnaire survey, rather than just relying on the questionnaire, a wider age range was required for future research as the average age limited the study due to age restrictions on social media.

Fardouly et al. (2022) proposed that the machine learning method use a large dataset with diverse participants to ensure that prediction results could be generalised to a broader population to detect the risk of different demographic backgrounds. Also, the accuracy of supervised machine-learning models was only useful when the questionnaire captured the dependent variable. With that, ethical considerations must be addressed as it contained data that may negatively impact an individual's mental health. It was necessary to inform participants and obtain their consent to use their data for predictions on the issue.

V. CONCLUSION & SUMMARY

It is crucial to educate society on body image dissatisfaction and the negative impacts of appearance-related behaviours on social media. Hence, it is essential to detect this issue as soon as possible. In terms of methodology, participants have completed different questionnaires and may select according to what they feel and believe; however, this could also be the reason behind biased answers. Although perceptions and views were formed at a young age which is considered as one of the factors, these could change over time as a person grew older and matured. But from another point of view, it was essential to note that the environment and background could influence an individual regardless of age and mental state as shown in the studies.

Questionnaires such as the Sociocultural Attitudes Towards Appearance-4 Scale (SATAQ-4), Body Esteem Scale for Adolescents and Adults (BESAA), Multidimensional Body-Self Relations Questionnaire-Appearance Scale (MBSRQ) and Body Image Acceptance and Action Questionnaire (C-BI-AAQ) were crucial to be used as the survey methodology. As seen in various studies, there was no mention of machine learning. Although [7] mentioned machine learning models focused on eating disorders towards the implication of body image dissatisfaction. Thus, machine learning was highly recommended for body image dissatisfaction to avoid further negative consequences.

Individuals also blindly followed what society considered the norm and were easily influenced by social standards. When individuals were well-educated, it allowed them to form their views and beliefs towards body image as they had sufficient information to decide on their lifestyle rather than following the influences and trends online by society. Although some individuals did not intend to influence the views and beliefs of others deliberately, however, their words spoken and actions taken may have a significant impact on other people as different people may perceive things differently. From the previous studies, there were a lot of people using social media and pictures were posted online; which created a high probability of influence by unrealistic beauty standards.

Finally, the research gaps are to be focused on a wider age group, further understanding the muscular/athletic internalisation of females, the relationship of social media engagement behaviours with body image dissatisfaction, and the utilisation of machine learning on body image dissatisfaction. Research gaps are imperative for future research in the field of body image to identify the risks associated with individuals who may not seek help or who are unaware of this issue. Therefore, a good implementation of machine learning algorithms to predict body image dissatisfaction would be very much useful for higher benefits of the society.

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