



Public Health Impact of Social Comparison on Body Image Concerning Cognitive Processing and Disordered Eating: A Systematic Review

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Abstract

A person's experience with body image can be influenced by environment or culture. Exposure to the thin-ideal is likely to decrease body image in women through social comparison; there is the anticipation of a negative public health impact. Recently published (between 2011 to 2021) study reports including mainly randomized controlled trials, clinical trials, and ecological momentary assessments on English-speaking female subjects were reviewed. Analysis of the eligible studies evaluated the consequences of social comparison concerning social media, disordered eating, and cognitive processing. Quantitative and qualitative analyses were conducted with the majority of findings found to have statistically significant data in support of the following: (i) social media platforms provide space for the consumption of unattainable beauty standards based on thin-ideal imagery, (ii) the internalization of the thin-ideal leads to the development of body dissatisfaction, which is a predictor of disordered eating behaviors, (iii) cognitive coping mechanisms are used as protection against the harmful effects that come from social comparison. A concerted effort should be made by eating disorder prevention programs to lessen the cognitive response to thin-ideal stimuli, thereby decreasing body dissatisfaction and reducing the risk of development of disordered eating behaviors in women.

Keywords: Body Image; Thin-Ideal, Social Comparison; Body Dissatisfaction; Disordered Eating; Self-Disclaimer; Media Engagement; Social Media

Introduction

Body image is how an individual perceives themselves to variables such as appearance, weight, and shape [1]. A person's experience with body image falls on a spectrum from positive to negative, with body dissatisfaction being a

facet of negative body image, and body appreciation a facet of positive body image. Where one lies on the spectrum can be influenced by factors like environment or culture. Body dissatisfaction stems from the idea that one's appearance falls short of what is considered ideal. A way in which a negative body image can develop is through social comparison, which

refers to the notion of judging one's idea of success by the accomplishments of other people [2]. This is an instinct that provides drive and esteem to an individual to achieve more in life, however, it also can be a conduit for the development of unhealthy thoughts and behaviors towards oneself.

Participation in social comparison can occur in two distinct ways: upward comparison refers to a feeling of inferiority to another individual, while downward comparison refers to the feeling of being superior [2]. Targets of comparison are recognized as family, friends, acquaintances, or even strangers in both real life and through consumptive media forms such as television, magazines, or social media. Through these outlets, there is exposure to the thin-ideal which is a concept that thinner bodies are valued in society as more attractive than other body types [3]. This message may be internalized and become a desirable aim for those who are more vulnerable to it.

Certain individuals are more prone to participate in upward comparison than others. In terms of personality types, it has been found that neuroticism is correlated with upward comparison, and feelings of envy [2]. Those suffering from depression, among other mental health-related issues are also more vulnerable to engaging in comparisons at the risk of further worsening their condition. The pressure of attempting to achieve that idealized body contributes to damage to mental health and the creation of a negative body image.

Body dissatisfaction is unaffected by age, with an estimated 20-40% of women found to be dissatisfied with their bodies [4]. With the enormous pressure placed on women by society to maintain a specific figure while growing up, in the midst of having children, and while aging, it's no surprise that body dissatisfaction exists at every age. However, there is a significantly higher body appreciation found in older women as opposed to those who are younger, as well as a decrease in the importance of one's physical appearance.

Quittkat et al. (2019) also discovered that those with higher levels of body appreciation consumed fewer media promoting idealized bodies and were, therefore, less affected by it (4). Body-focused social comparisons by women have only been heightened by the presence of social media, particularly due to the staged image of confidence and portrayal of perfection posted by its users. The accessibility of social networking sites gives more opportunities today for users to be exposed to the thin-ideal, and it has been found that social media has been positively correlated with internalization [3]. It provides an environment where social

comparison can easily occur, where both passively scrolling through profiles or newsfeeds, or actively engaging with users can facilitate upward comparisons [2].

With an increase in the body, dissatisfaction comes an increased risk of engaging in disordered eating behaviors to reach that standard of beauty [1]. Disordered eating behaviors are defined as maladaptive eating habits such as food restriction, or participation in bingeing and purging activities [5]. These behaviors are increasing rapidly among young women today. It has also been found that internalization of the thin-ideal continues during recovery from eating disorders and often leads to an increased risk of relapse [6]. Addressing the factors that contribute to thin-ideal internalization is key to preventing the domino effect of body dissatisfaction and the development of disordered eating behaviors that might be a serious and emerging public health concern. This literature review attempts to do that, in an analysis of the idealization of women's bodies, and the effects it has on overall body image.

Methods

Using PubMed, scholarly articles were compiled on the topic. A search strategy was utilized in the database to find relevant literature by use of the Boolean operator, "AND". Three different combinations of search terms were used to attain the appropriate information: "Social Media" AND "Body Image", "Thin Ideal" AND "Social Comparison" AND "Body Dissatisfaction". "Social Media" AND "Body Image" yielded a total number of 770 results. Filters were applied to narrow down search results with specific inclusion criteria depicted in Figure 1. The inclusion criteria included a publication date within the last 10 years, spanning the years between 2011 to 2021. In regards to text availability, inclusion criteria were specific for free full text. Articles that did not meet these criteria were excluded. This yielded 166 results, from which one study was chosen for analysis.

Total 301 articles were selected after the first step of exclusion. More filters were applied to limit the inclusion criteria to clinical trials, randomized controlled trials, the human species, the English language, and the female gender. The number of articles based on the second stage of exclusion (meta-analysis, reviews, systematic reviews, and studies that included males) was 202. Duplicated articles (n=22) were also excluded. A total of 77 eligible articles were further subjected to a thorough check for relevancy to the topic; and 67 articles were excluded since those were not directly related to the topic of interest. Finally, 10 scholarly articles were chosen for a detailed study and analysis as shown in the Prisma chart (Figure 1).

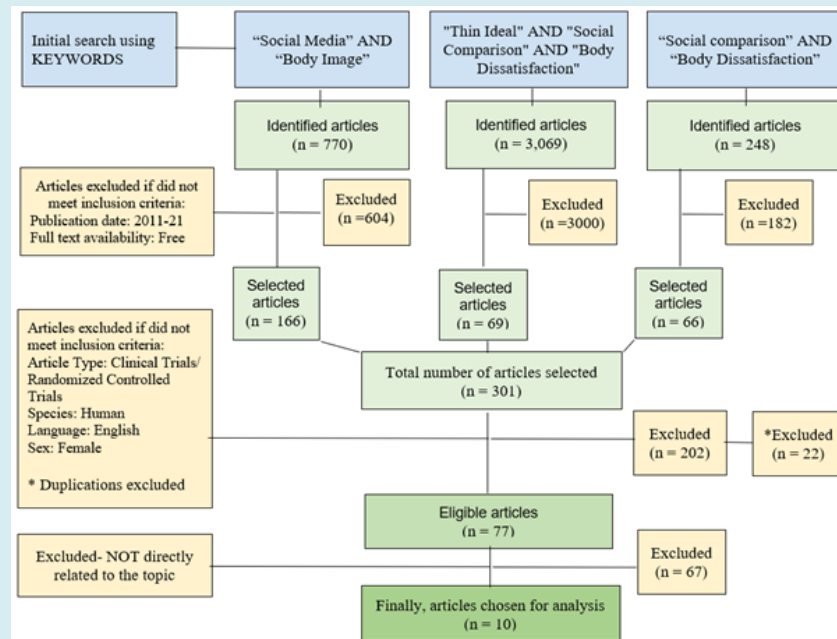


Figure 1: The Prisma chart showing step by step inclusion and exclusion of articles following retrieval using three sets of keywords.

Results

Findings from a few recent studies (published between 2011 to 2021) were compiled for analysis as indicated in Table 1 below, including five randomized controlled trials and two clinical trials; also includes two ecological momentary assessments and one experimental study.

Social Comparison on Social Media

Three studies evaluated exposure to photos posted on social media platforms and their effect on body image [7-9]. In a randomized controlled trial, changes in body image were measured by comparing the result of taking and posting untouched versus retouched selfies in the case of undergraduate females with active Facebook or Instagram accounts [7]. All participants used an iPad with a downloaded app called "You-Cam Now" to take and edit pictures of themselves. The following Visual Analogue Scales (VAS) about body image were measured before and after posting the selfies: feelings of fatness, physical attractiveness, and body size satisfaction. Repeated measures of multivariate ANOVA, univariate ANOVA, and post-hoc t-tests were used in the data analysis in this study. There was found to be an equivalent decrease in feelings of physical attractiveness in both the untouched and retouched conditions ($t(72) = 0.12, p = .90$). The decrease in both the untouched condition ($t(71) = 2.43, p = .02$) and the retouched condition ($t(71) = 2.32, p = .02$) was significantly greater than in the control group. However, feelings of fatness and body size satisfaction showed no

significant changes.

A randomized controlled trial was also performed where undergraduate females were exposed to thin-ideal images on Instagram and studied how awareness of photo editing techniques via self-disclaimer captions impacted their body image in terms of body satisfaction and likelihood to compare one's body to another's [8]. Three types of labels were tested: a generic label stating that the photo had been manipulated, a specific label that detailed how the photo had been manipulated, and a warning label that informed the viewer about the risks of comparison with the idealized body in the image. Images with no captions underneath served as the control condition. A Body Image State Scale (BISS) was used to identify indications of body dissatisfaction, while a Photo Manipulation Scale was used to evaluate the extent of photo editing on social media by participants. Mixed ANOVA computing results of BISS demonstrated statistically significant decreases over time in regards to body satisfaction post-exposure regardless of experimental condition, $F(1, 307) = 4.51, p = 0.034$, partial $\eta^2 = .02$. There was also found to be a statistically significant decrease in the likelihood of comparison of body weight and shape with others post-exposure, $F(1, 307) = 53.50, p < .001$, partial $\eta^2 = .15$ in the above study. A regression analysis was conducted based on the Photo Manipulation Scale to evaluate whether the photo editing habits of participants affected the body image outcomes after exposure to the thin images with self-disclaimer captions. While editing techniques were not found to be

predictors of decreased body image, it was found that participants with high levels of photo manipulation were

less likely to compare body weight and shape with others [8].

Level of Evidence	Study Design	Study Population	Therapy of Exposure	Outcome/Results	Reference
1	RCT	Females demonstrating high avoidance and low avoidance coping strategies	High avoidance and low avoidance groups were shown thin and oversized bodies and observed for attentional bias	High avoidance groups are more affected by oversized body stimuli and demonstrate a compensatory attentional bias towards the thin-ideal	[14]
1	RCT	Undergraduate females	Effect of exposure to thin-ideal photos with self-disclaimer captions on body image	There was an increase in body dissatisfaction with no self-disclaimer captions having no effect on body image	[8]
1	RCT	Females with varying levels of physical appearance perfectionism	Three scales of measurement evaluated cognitive coping strategy and effect on body image post-exposure to thin-ideal imagery	Participants with medium or high-level perfectionism demonstrated higher levels of body dissatisfaction and maladaptive coping strategies post-exposure to the thin-ideal	[13]
1	RCT	Undergraduate females	Changes in body image were measured before and after taking and posting untouched versus retouched selfies	There was found to be an equivalent decrease in feelings of physical attractiveness in both the untouched and retouched conditions	[7]
1	RCT	Females with body dissatisfaction	fMRI scans were taken while participants of the program viewed images of either thin or average-sized women and brain activity were measured	A decrease in body dissatisfaction was correlated with a decrease in activity in the caudate of the brain, which is implicated in reward valuation	[16]
1	Clinical Trial	Females with body dissatisfaction	Participation in an eating disorder prevention program to identify risk factors for subthreshold and threshold eating disorders	Thin-ideal exposure results in body dissatisfaction and increases the risk for bingeing and purging behaviors	[10]
1	Clinical Trial	Females in good health or with mental illness	Physiologic responses were measured after exposure to thin imagery elicited ERD	There was found to be no correlation between ERD and physiological changes in heart rate or salivary cortisol	[15]
3	EMA	Undergraduate females	Questionnaire-based comparison of bodies, eating habits, and exercise habits with other women in daily life	Upward comparisons were more common and more likely to occur with strangers or acquaintances	[11]
3	EMA	Females with high or low body dissatisfaction and eating pathologies	Diary entries were recorded at random and questions were asked regarding the appearance-focused social comparison	Woman with eating pathologies is more at risk for dangerous thoughts and compensatory behavior following upward comparison	[12]
0	Experimental study	Undergraduate females	Body dissatisfaction was measured after participation in ASME	There was an increase in body dissatisfaction in ASME with attractive peers, but not in family members	[9]

Table 1: Summary analysis of major outcomes derived from studies performed on different study populations showing varying levels of evidence.

EMA: Ecological Momentary Assessment; RCT: Randomized Controlled Trial; ASME: Active Social Media Engagement; ERD: emotional regulation difficulties; fMRI : Functional magnetic resonance imaging; Level of evidence 1: randomized controlled trials; 3: Individual case-control studies; 0: an experimental study.

An experimental study was performed on the relationship between peers on social media and its effects on body image [9]. VAS was used to measure body dissatisfaction of female undergraduate students before and after participating in "Active Social Media Engagement" (ASME). This consisted of participants commenting on photos of either an attractive female peer or a family member across Facebook and Instagram. Mixed ANOVAs were used to compare scores pre- and post-exposure to social media interaction by participants, and follow-up t-tests found that there was a statistically significant increase in body dissatisfaction in the condition involving ASME with attractive friends, $t(55) = 3.33$, $p = .002$. However, there was no statistical significance involved in the condition involving ASME with family members, most commonly identified as cousins $t(61) = 0.77$, $p = .438$.

Social Comparison and Eating Disorders

Few recent studies were reviewed that investigated social comparison concerning the development of eating disorders [10-12]. Data was compiled during a clinical trial from women with body dissatisfaction to find risk factors associated with the development of DSM-5 eating disorders and subthreshold eating disorders, which do not meet the diagnostic criteria of eating disorders [10]. Subthreshold Bulimia Nervosa (sBN), Bulimia Nervosa (BN), subthreshold Binge Eating Disorder (sBED), Binge Eating Disorder (BED), subthreshold Purging Disorder (sPD), and Purging Disorder (PD) were amongst other eating disorders studied. Female high school and college students were recruited and assigned to partake in trials, one of which was the Body Project eating disorder prevention program. Multiple scales were used in the process of measuring risk factors, with some having more correlations with changes in body image such as The Ideal-Body Stereotype Scale, which was used to evaluate the level of internalization of the thin-ideal. The Thinness Expectancy Scale evaluated the benefits of thinness, and a scale assessing Denial of Thin-Ideal Costs, as well as the Body Dissatisfaction Scale were also used.

Results based on Cox Univariate Regression Model analysis showed statistically significant differences among participants in the Body Project prevention program in comparison to the control [10]. An increase in thin-ideal internalization, thinness expectancy, and body dissatisfaction proved to be predictors of future onset of sBN/BN, sBED/BED, and sPD/PD. Similarly, denial of costs of pursuing the thin-ideal predicted onset of sBN/BN and sPD/PD. Multivariate models of analysis were also conducted and demonstrated that an increase in thin-ideal internalization (HR = 1.36, 95% CI [1.05, 1.75], $p = .0184$) and body dissatisfaction (HR = 1.71, 95% CI [1.31, 2.23], $p < .0001$) were predictors of onset of sBED/BED. Similarly, increased body dissatisfaction (HR = 1.63, 95% CI [1.21, 2.18], $p = .0012$) was shown to be a

predictor of sPD/PD onset.

An ecological momentary assessment, which allows for collecting real-time questionnaire data in a subject's natural environment, was conducted by Fitzsimmons-Craft (2017), and compared the upward and downward comparisons in undergraduate females in the context of how they view bodies, eating habits, and exercise traits of other women [11]. The goal was to analyze how these findings predict body dissatisfaction among its participants. Over a two-week period, participants answered questions three times per day and were asked questions about frequency of social comparison, upward versus downward comparison, and thoughts of disordered eating.

Body dissatisfaction was measured using VAS, and results demonstrated that there was a correlation between both upward body and eating comparisons and an increase in body dissatisfaction ($ps < .001$) [11]. Results of the McNemar tests showed that among the three types of comparisons, exercise comparison was significantly more likely to be considered upward than body or eating comparisons, with the quantity of exercise the most common reason for feeling worse than their subject of comparison ($\chi^2(1, N = 1,625) = 39.64$, $d = .32$, $p < .001$). In terms of proximity to targets of comparison, upward exercise comparisons were found to be more often made with strangers ($p = .016$), while downward exercise comparisons were more likely to be made with close friends ($p = .010$). Regarding body comparisons, they were found more likely to be made with strangers, with downward body comparisons more likely to be made about shape ($\chi^2(1, N = 3,394) = 36.29$, $d = .21$, $p < .001$). Finally, eating comparisons were more likely to be made with close friends, although it was more common for upward eating comparisons to be made with acquaintances ($p = .002$) due to the amount of food they consumed ($\chi^2(1, N = 1,924) = 6.07$, $d = .11$, $p = .014$) or how fast they were eating ($\chi^2(1, N = 1,924) = 21.31$, $d = .21$, $p < .001$).

While the focus of the study by Fitzsimmons-Craft (2017) was specific to the nature of social comparison among women, Leahey TM, et al. [12] in an ecological momentary assessment, identified in particular how women with eating pathologies and body dissatisfaction were affected by social comparison [11-12]. The women were split into three groups: those with eating pathologies and high body dissatisfaction (EPHB), those without eating pathologies, but with high body dissatisfaction (HB), and those with low body dissatisfaction (LB). Participants completed diary entries at random times over a five-day period, where questions were asked regarding appearance-focused social comparison and compensatory behaviors such as restrictive dieting or exercise, while the State Self-Esteem Scale was used as a measure of body satisfaction.

Hierarchical linear modeling and Bernoulli models were used for analysis of the collected data, and it was found that EPHB women as well as HB women were both more likely to make upward comparisons regarding appearance than LB women ($\gamma_{02} = 1.00$, $SE = .19$, $t = 5.30$, $p < .001$; $\gamma_{01} = 0.60$, $SE = .22$, $t = 2.72$, $p = .008$) [12]. However, there was no statistical significance found in terms of the likelihood of EPHB women participating in body-focused comparisons more than HB women, and similarly, there was no statistical significance found in terms of the likelihood of HB women to make appearance comparisons more than LB women ($\gamma_{02} = .28$, $SE = .21$, $t = 1.38$, $p = .17$; $\gamma_{01} = .21$, $SE = .21$, $t = 1.00$, $p = .32$). In relating levels of body dissatisfaction with specific variables, it was found that following upward comparisons, all of the women had increases in guilt and thoughts of dieting, as well as decreases in both appearance esteem and social esteem. However, EPHB women were found to participate in more dangerous compensatory behaviors such as vomiting or using laxatives following upward comparisons.

Cognitive Processing of Social Comparison

Four studies assessed the physiological response of the body in response to exposure to images of idealized bodies. Two of those studies explored the coping strategies used by females to protect their body image. Psychology undergraduate females were recruited for a randomized controlled trial in a study to explore the effects on body image of perfectionism as a personality type, as well as adaptive and maladaptive cognitive processing of social comparison with idealized bodies [13]. Participants in the experimental group were shown images of attractive thin women, while those in the control were shown images of landscapes. Three methods of measurement were utilized, one being The Physical Appearance Perfectionism Scale (PAPS), composed of a “worry about imperfection” subscale to measure how high the personality trait scored. In regards to body image, the two VAS that was used before and after exposure to thin-ideal images were feelings of both appearance and weight dissatisfaction. Finally, a Cognitive Emotion Regulation Questionnaire (CERQ) was also administered to assess the stress response after social comparison, with four CERQ subscales of coping strategies used: “rumination, catastrophizing, acceptance, and positive refocusing” [13].

In the above study, McComb & Mills (2021) employed mixed ANOVA, as well as ANCOVA tools to compute intercorrelations between the three scales of measurement, and significant correlations were then evaluated by regression analysis and simple slopes [13]. The results after exposure to thin-ideal imagery were statistically significant for increases in the experimental condition in appearance dissatisfaction in those with medium or high levels of physical appearance perfectionism compared to those with low levels. There

were found to be similar statistically significant increases in weight dissatisfaction post-exposure in those with high and medium levels of physical appearance perfectionism compared to those with low levels. Both VAS demonstrated no significant changes in the control condition. Further, physical appearance perfectionism was found to be directly related to appearance dissatisfaction and weight dissatisfaction, and also indirectly related to both VAS through significant effects of rumination and catastrophizing, though not significantly related through effects of acceptance or positive refocusing.

Another research group from Korea also studied using similar coping strategies, with a particular focus on the avoidance coping strategies of female undergraduate students by performing a randomized controlled trial, dividing them into two groups: High Avoidance, and Low Avoidance [14]. These groups were then exposed to the thin body versus oversized body pictures while their eye movements were tracked using the Korean Body Image Coping Strategies Inventory (K-BICSI), which recorded the amount of time spent looking at the stimuli to identify attentional bias towards one or the other.

Repeated measure ANOVA demonstrated that in regards to exposure to thin body stimuli, there were no statistically significant differences between the High Avoidance and Low Avoidance groups [$F(1, 25)=5.977$, $p<0.05$; $F(2, 50)=4.817$, $p<0.05$], in that there was a long time spent by both groups looking at pictures of thin bodies than fat bodies (14). However, in regards to exposure to oversized body stimuli, there was a statistically significant difference between the High and Low Avoidance groups [$F(2, 52)=7.275$, $p<0.01$; $F(2, 52)=4.191$, $p<0.05$], with the High Avoidance group demonstrating attentional bias by spending a significantly longer time looking at pictures of thin bodies.

Cognitive processing of social comparison was assessed during a clinical trial in Europe evaluating emotional regulation difficulties (ERD) in women exposed to a stressor in the form of thin ideals [15] (Humble et al 2018). The purpose of the study was to determine whether the autonomic nervous system could be activated by the emotional response yielded from exposure to thin imagery. Young women either in good health, or suffering from mental illness in the form of depression, anxiety, somatoform disorder, anorexia nervosa, or bulimia nervosa were recruited for the study. They were separated into an experimental group that was given a fashion magazine and asked to imagine thin-ideals and a control group that was given a nature magazine and asked to imagine landscapes.

Two physiologic measures, heart rate variability (HRV) and salivary cortisol, were recorded and represented the parasympathetic response as participants were experiencing

a vivid imagination of the thin-ideal they were exposed to [15]. A Difficulties in Emotion Regulation Scale (DERS) was used to self-report ERD, and linear models were used to compute the resulting data. There was found to be no statistically significant correlation between ERD and baseline high frequency HRV ($F(1,219) = 1.240, p = .267/.809$), or baseline salivary cortisol levels ($F(1,246) = .455, p = .501/.809$).

Cognitive processing was also explored by Stice E, et al. (2015) [16] who performed a study where they recruited female adolescents with body dissatisfaction to participate in an eating disorder prevention program called the Body Project, which was previously mentioned in a discussion of the clinical trial carried out by the same group, to identify risk factors associated with the development of DSM-5 eating disorders [10,16]. The Ideal-Body Stereotype Scale was similarly used in this randomized controlled trial, along with The Satisfaction and Dissatisfaction with Body Parts Scale, and fMRI scans were taken to test whether, upon completion of the program, exposure to thin imagery would result in a lesser blood oxygen level dependent (BOLD) activation in brain regions associated with reward [16].

fMRI scans were taken while participants of the program viewed images of either thin or average-sized women, and the results were computed by ANOVA and regression analysis where it was found that there was a statistically significant positive correlation between a decrease in body dissatisfaction, and a decrease in activity in the caudate of the brain, which is implicated in reward valuation [16].

Discussion

Concerning the principal focus of the scholarly articles that were analyzed, the main themes discussed were those of social comparison in the setting of social media, how social comparison can lead to the onset of disordered eating, and the cognitive processes that occur upon exposure to the thin-ideal. Concerning the setting of social media, women who posted selfies were found to feel less physically attractive compared to the control group regardless of the ability to retouch their photos [7]. This finding was in agreement with the hypothesis and demonstrated that despite the desire to present an ideal version of oneself to the public on social media, photo editing does not prevent feelings of dissatisfaction, perhaps because the act of editing by women highlights their flaws. Feelings of fatness and body size satisfaction were not affected by posting selfies, which could be attributed to the fact that selfies only show the face, as opposed to the rest of the body. The study was limited by age range, and future research can show the effects on body image posting selfies has on older women versus younger women, and also the effects that result from posting their whole body. It would also be interesting to see if specific

personality types are more affected by the negative effects of posting on social media sites.

The relationship between women and their peers on social media also was supportive of the hypothesis that social comparison does decrease body image [9]. The results demonstrated that it is not just exposure to Instagram models or celebrities that leads to upward comparison, but even peers considered attractive by the participants. ASME also showed the difference between family and friends on social media sites, perhaps indicating an underlying sense of competition with attractive peers that is less often to occur with family members. Future studies can delve further into what drives social comparison with peers, and the nature of social comparison among relatives. Having participants comment on the social media of peers they considered attractive could be considered a limitation of the study, as well as the finding that participants who were in the group that commented on peers' social media had a lower baseline body image score in comparison to those in the group commenting on family members' social media.

Two ecological momentary assessments were conducted to evaluate the effects of upward and downward comparison on females. The results of the effort by Fitzsimmons-Craft (2017) in assessing upward and downward comparisons with strangers and close friends align with the hypothesis, that negative feelings about oneself are due to an inability to reach the expected standard of eating, exercise, and appearance based on the thin-ideal [11]. Upward exercise comparisons are most common, and more likely to be made with strangers, perhaps because it may be easier to idealize an individual from a distance, as opposed to someone with whom a direct relationship is shared. This may provide insight as to why upward body comparisons are also more often made with strangers, and upward eating comparisons are more often made with acquaintances as well.

The strict protocol of the ecological momentary assessment could be considered a limitation of the study, with questions being asked at specific times during each day as opposed to the protocol seen in the ecological momentary assessment that called for stratified random sampling which allowed for questions to be asked at random to account for more appearance-focused comparisons [11-12]. Selection bias could have been a limiting factor as well, not only in the case of the study by Fitzsimmons-Craft (2017) but for all of the studies analyzed thus far, because while they focused specifically on the female relationship with body image, the perspectives and cognitive responses of men could give insight into the similarities and differences between the psychological and physiological processes of men and women in the setting of social comparison [11]. While typically body comparisons are the focus of eating disorder prevention

programs, this data may prove useful in broadening targeted efforts of preventative programs towards eating and exercise comparisons as well.

The results of the ecological momentary assessment by Leahey et al. (2011) support the idea that social comparison can have negative effects on body image, and goes further with its findings that upward comparisons are more dangerous to women with eating pathologies [12]. This can be attributed to a heightened sense of awareness of body-focused comparisons that are had by females with disordered eating habits. It is also worth noting how both EPHB and HB women engaging in higher amounts of upward comparisons than LB women demonstrate that women with high body dissatisfaction cognitively process body-related stimuli in a similar fashion, regardless of the presence of eating pathology.

While stratified random sampling procedures have their benefits, the methodology also has its shortcomings in that having participants write about recent experiences with social comparison instead of experiences that took place at the moment itself increases the potential for recall bias [12]. Another limitation of this study can also be applied to the ecological momentary assessment, in that the nature of these studies relies on self-reported questionnaires [11-12]. However, the use of ecological momentary assessments allows for less recall bias to be present than seen in cases of cross-sectional studies. Future planning in regards to the structure and strategy of preventative eating disorder programs can build on these observations.

Two studies analyzed the effectiveness of preventative eating disorder programs and had participants partake in the Body Project. The data provided in the clinical research supports the idea that subscribing to the thin-ideal results in body dissatisfaction, and further, it increases the risk specifically for bingeing and purging behaviors within the spectrum of disordered eating [10]. There was significant overlap between predictors of sBN/BN, sBED/BED, and SPD/PD, with risk factors between the subthreshold and threshold eating disorders being similar. Both univariate and multivariate models of regression analysis highlighted body dissatisfaction as the common risk factor for all of the tested bingeing and purging disorders. The study was limited to the specific risk factors targeted by the program, and analysis of other factors such as negative affect or functional impairment could contribute towards research aimed at the prevention of a larger spectrum of eating disorders.

The results of the randomized controlled trial by Stice E, et al. [16] gave merit to the hypothesis that exposure to the thin-ideal lowers body image in women given the finding that a decrease in body dissatisfaction was found to be directly

correlated with decreased significance cognitively placed on thin imagery [16]. The study demonstrated the positive effects of actively participating in a devaluation of the thin-ideal, proving the efforts of the Body Project to be successful. Regarding study limitations, a small sample size was used, which could have contributed to lessening the accuracy of the results. In regards to future implications of participation in the Body Project, examining the cognitive processing associated with multiple risk factors could provide more insight into how prevention programs can be used to more efficiently prevent the onset of eating disorders. The success of the program in decreasing body dissatisfaction through devaluation of the thin-ideal should increase the implementation of its principles that could prove beneficial for use in further research and practices.

Investigating the cognitive and physiologic responses following exposure to the thin-ideal was a major trend found in an analysis of the aforementioned studies. Regarding the coping mechanisms associated with exposure to thin-ideal, findings were in agreement with the hypothesis and went further in its exploration of how perfectionism attributes to a more pronounced decrease in body image and inclination towards maladaptive coping responses [13]. Females with this personality type are more affected by rumination or constant thoughts of their feelings of inferiority, and catastrophizing about weight and appearance.

Significantly, neither of the adaptive coping strategies of acceptance nor positive refocusing were found to be employed by participants [13]. Engaging in these coping strategies could prove beneficial in preventing a decrease in body image, and future research can be done on the effect of adaptive coping strategies during social comparison. Interventions can also target the engagement of negative coping mechanisms, and aim to lessen these responses to reduce their harmful consequences. In terms of limitations, the use of CERQ to measure social comparison was unique to the context of this study, and more research would be needed to substantiate its use as appropriate. It would be interesting to study other personality types and their relationship with idealized bodies as well, as previously pointed out regarding the effects on body image of posting selfies on social media [7].

The level of avoidance coping strategy demonstrated by participants in the study by Cho, et al. showed how oversized bodies elicit a physiological response to a stimulus considered by women to be threatening [14]. Those in the High Avoidance group were more affected by oversized body stimuli they considered to be aversive and responded through compensatory attentional bias towards thin bodies they considered more attractive. This physiologic response supports the hypothesis due to the idea that there

is a negative response to bodies that stray from the socially acceptable thin ideal. The aversive nature towards oversized body stimuli seen among those in the High Avoidance group could be a risk factor in the development of eating disorders.

Small sample size was considered a limitation of the study, also seen previously in the randomized controlled trial conducted by Stice, et al. [16]. In the future, more research can be done on the relationship between avoidance coping strategies and eating disorders. An effort should be made to understand what tools can be used to change the behavior of individuals who demonstrate high avoidance coping strategies to reduce their negative reactions toward oversized bodies and prevent the onset of disordered eating.

Avoidance coping strategies can also be used in support of the hypothesis in the study by McComb, et al. of how awareness of photo editing techniques through self-disclaimer captions impacted body image [8]. The idea that participants were less likely to compare themselves with the bodies of other women after viewing thin-ideal images can be attributed to using avoidance as a protective mechanism from the harmful effects that can come from upward comparison. It was also interesting that women with high photo manipulation techniques similarly were less likely to participate in social comparison, which may come from the knowledge they have of the editing allowing for them to be less impacted by the effect it has on body image.

Given that the study was based on Instagram photos, it was a limitation that the photos were not presented in the general format seen in daily life with likes and comments

underneath them [8]. Because it was found that self-disclaimer captions were not effective in preventing a decrease in body image or likelihood to participate in social comparison, future efforts should be made towards finding new strategies to prevent the dangerous effects that come with exposure to idealized bodies on social media.

Alternatively, to the physiological response seen in the Korean study, the findings of Humbel et al. could not support the hypothesis due to no change demonstrated in physiologic responses upon exposure to the thin-ideal [14,15]. HF-HRV and salivary cortisol were not found to be correlated with the ERD elicited by exposure to thin imagery. Attempting to link the stress response from thin-ideal exposure to the autonomic nervous system has proved ineffective. The emotional response elicited by participants from idealized bodies may have been limited by the lack of a strong enough trigger for the activation of physiologic processes. Future studies should focus on determining the level of intensity of the given stimulus that would be more likely to set off the autonomic system.

Social comparison on body image concerning cognitive processing and disordered eating has a serious public health impact which is considered to be emerging in the recent time. The impact might be many fold in near future since there is a an increasing access and also usage of information on social media, especially by public who do not have adequate awareness of education regarding the harmful effects and those who can easily get biased. The public health impact of the emerging problem of social comparison is presented in Table 2.

Public Health Impact	Recommendation
· Social media platforms provide space for the consumption of unattainable beauty standards based on thin-ideal imagery.	· A concerted effort should be made by eating disorder prevention programs to lessen the cognitive response to thin-ideal stimuli, thereby decreasing body dissatisfaction and reducing the risk of development of disordered eating behaviors in women.
· Exposure to the thin-ideal decreases body image in women through social comparison.	
· The internalization of the thin-ideal leads to the development of body dissatisfaction, which is a predictor of disordered eating behaviors; it's an emerging public health concern.	
· Cognitive coping mechanisms are used as protection against the harmful effects that come from social comparison.	

Table 2: The public health impact of the emerging problem of social comparison.

Regarding the overall study limitations of this literature review, while the majority of articles used for analysis were randomized controlled trials and clinical trials, the qualitative analysis of ecological momentary assessments could be considered a lesser level of clinical evidence used for exploration. However, as stated earlier, their use is stronger in preventing recall bias than traditional cross-

sectional studies. In accordance with the past literature, social comparisons are also activated by situational cues [17]. In a study on adolescents' body image perceptions based on social comparison, it has been reported that a better understanding of enhancement appraisals should be used to guide health promotion efforts on an individual's body image. These factors have not been taken into consideration

in the reviewed studies.

Conclusion

The primary goal of this literature review was to evaluate how social comparison can increase body dissatisfaction in women. After a thorough evaluation of several earlier done studies, the resulting analysis successfully concluded that exposure to the thin-ideal decreases body image in women through social comparison. In regards to social media and body image, there is still much more clinical research to do, however, in terms of clinical findings related to eating disorder prevention programs, there is much to be hopeful for in treatment and prevention strategies against disordered eating in the future.

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