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Youth perception of self and ideal self through drawings: association between perception and weight status

Maryam Trebeau Crogman ^{a,b,c,*}

^a Psychology Department, University of California Merced, Merced CA 94340, USA

^b California State University Stanislaus, Psychology Department, Turlock CA, 95382 USA

^c The Institute of Effective Thinking, Riverside CA, 92508, USA

* Corresponding author.

E-mail address: mtrebaucrogman@ucmerced.edu (M.T. Crogman).

Abstract

Context: The body image research literature has addressed how young people perceive their self-image thoroughly. Seldom however were youths asked to draw their current vs. ideal selves, neither has this been explored in comparison to weight differences.

Method: Ninety participants aged 6–17 (mean $11.73 \pm$, SD = 2.84) drew how they perceive themselves (“Me”) and how they might want to look like of they could change their appearance (“Preferred Me”). Participants completed a body figure scale test, and were measured to obtain their BMI percentile.

Results: 180 drawings were analyzed. Results revealed a relation between drawing sizes of height, waist, width and weight status. Characters’ emotions and weight were also associated.

Conclusion: Drawings are a youth friendly tool to gain non-invasive insight into youths’ body image perception and can help capture perceptions attached to body image and weight. The results matter for medical, educational, and psychological professionals working on creating programs and tools to treat or assess youths’ physical and mental challenges related to body image.

Keywords: Psychology, Clinical psychology, Pediatrics

1. Introduction

Over 18% of 6–11 and 21% of 12–19 year-olds in the United States have a body mass index (BMI) that classifies them as overweight (NCHS, 2011; Ogden et al., 2015). Many health-based programs are being developed to address the rise of obesity among youths. However two major meta-analyses articles summarizing these programs revealed that none address youths' perception of their bodies and weights through drawings (Gonzalez-Suarez et al., 2009; Stice et al., 2006). Yet, underlying beliefs about self-image may influence youths' perceptions and representations about their health. This is important to understand, since self-perception is a catalyst for physical and mental health outcomes (Bjornson et al., 2008; Christiansen et al., 2017; Cohane and Pope, 2001; Jones et al., 2007; Markey and Markey, 2005; Ohtahara et al., 1993). Researchers have also pointed out to the fact that self-perception can be changed and improved as a function of physical activity levels. Youths' involvement in physical activities or lack thereof may alter their perception of their body (Burgess et al., 2006; Rinaldo et al., 2016), and possibly how they render an illustration about themselves. In other words, should drawing be a practical tool, researchers may be able to track youths' challenged with their physical perception by designing longitudinal studies in which physical activity involvement would be varied among groups allowing to track drawing changes associated with perception and mental health change. Drawings afford insight into beliefs and perceptions about self, but the few studies that do use drawings traditionally do not ask individuals to draw themselves directly, or to compare their perceived vs. their ideal self, nor do they use these drawings to compare with actual weight status to draw useful associations (Alves Rodrigues and Damas Cruz, 2012; Bellack and Fleming, 1996; Bombi et al., 2007; Broadbent et al., 2009; Catte and Cox, 1999; Chong et al., 2013). As Bell and Bell (2008) argue, the importance is in the processes involved in the drawing of self.

Traditionally, if drawings are used, they serve the purpose to assess moods, social constructs, or mental health. These drawing tasks may include drawing a man, a family, a house and tree, or simply free drawing. The way limbs and other details are drawn is indicative of psychological states (Gantt and Tabone, 2003). From the pictorial representations that emerge, experts draw conclusions about patients' states of mind, mental health, and perceptions of themselves in their environment (Bombi et al., 2007; Broadbent et al., 2009; Catte and Cox, 1999; Chong et al., 2013; Pinto et al., 1997; Prytula and Leigh, 1972; Unruh et al., 1983). Abnormal item sizes, subjects, or environments in drawings have been associated with faulty perceptions and abnormal mental health patterns (Cloud and Perilloux, 2015; Gantt and Tabone, 2003). Lee and Hobson (2006) for example asked children to draw themselves, and found that children with autism unlike children with other disabilities and controls drew atypical pictures of themselves. Chong et al. (2013) asked kids with

cerebral palsy to draw themselves and found that the more severe the symptoms were, the more encapsulated would the children draw themselves within buildings or walls. However, to our knowledge a very limited number of studies have been conducted asking participants to draw themselves, and none has been found asking that question in the context of weight.

Drawings are a useful and reliable tool to assess youths who often may not be able to express with clarity what they really think of themselves, their circumstances, or their health (Cohane and Pope, 2001; Cohen et al., 2016; Driessnack, 2005). Chong et al. (2013) found that asking children with disabilities to draw themselves helped to understand their self-perceptions. Other studies found associations between the increased size of either drawings of self or illness, and worry about one's physical health (Broadbent et al., 2009; Tiemensma et al., 2012; Prytula and Leigh, 1972; Prytula et al., 1978). Kelley (1984) reported similar findings in the context of abused children who were asked to draw a man, and then themselves. The majority of the children drew their affected body parts disproportionately larger, and these elements were associated with marked concerns and psychological signs of trauma. Kelley (1984) also found that the drawings were a solid indicator of the course of children's mental and physical symptomatology. Over the course of therapy, the abnormally drawn body parts normalized and decreased in size, proportionately to the children's recovery stages. This gives credence to drawing of self as a strategy to tap into youths' perception of themselves with accuracy. Stafstrom et al. (2002) found the drawings by children who were suffering from chronic headaches and migraines to be a useful tool. Typically, children suffering from chronic headaches drew heavy objects weighing on themselves, while children suffering from migraines drew objects piercing through their heads. Physicians, blind to the condition of the young patients, were able to accurately guess the children's illness by simply observing the children's weighty or piercing representations of the symptoms they experienced.

These studies have paved the way for a paradigm shift in medical, health, and psychology research in which, drawings offer additional dimensions for diagnostics and physician-patient communication, with adults and youths (Cheung et al., 2016; Kaptein et al., 2011). Tiemensma et al. (2012) used drawings of self in the medical context with adults. They found that, besides medical indicators of health in Cushing syndrome patients with serious physical deformities, patients' drawings of themselves (or of their "diseased-self"), were good predictors of patients' representations of their evolving body-deforming illnesses and psychological states (Broadbent et al., 2006; Broadbent et al., 2009; Broadbent et al., 2004). Patients accurately depicted their gaining and losing body volume, shape change, and evolving physical condition, both before, during, and after treatment, whether or not they were skilled artists.

In conclusion, the use of drawings, as developed throughout the above cited studies accurately portrayed the effects of illness or physical changes of the body, and

provided increased understanding of youths' and patients' perceived status of body shape, illness and recovery, not only physically but also psychologically. However, no research study did compare *Self* "Me", and *Preferred Self* "Preferred-Me" in the context of weight, nor was this approach used in weight loss interventions despite the current alarming increase of obesity in youth, and the known research showing the psychological symptoms associated with being overweight as a youth. The present study aimed at providing data in this context and providing the framework for new research using this type of predictive tool in ideally long-term longitudinal designs to observe changes and support faulty perception.

2. Hypothesis

There is some evidence that adult participants asked to think of and draw themselves over time were able to draw their 'evolving' Self with some marked differences, and accurately depict their physical changes; also, signs of physical changes in the drawings seemed to be connected to mental states (Tiemensma et al., 2012). Unfortunately, the paucity of research in this context does not allow for hypothesizing either way in youth, neither on the connection between these drawings differences and weight status.

This study explore the hypotheses that 1/ actual weight status will influence the drawing of *Self* and *Preferred-Self* as will be seen in the representations of height, waist, width, and emotions; 2/ differences in sizes (called 'deltas') of height, waist and width between the drawings of *Self* and *Preferred-Self* will be associated also with weight status; and 3/ other factors such as ethnicity, age and gender may have an influence on how these drawings will be composed.

3. Methods

Ninety participants were recruited from public and private middle and high schools, community youth clubs, and a university. The majority of the participants (80.6%) were children and adolescents between 3rd grade and college, from a rural town. The rest of the participants (19.4%) were from a youth center in a larger city and ranged from 3rd grade to high school. Participants were aged 6–17 years old (mean age 11.73, 46.9% were aged 8 to 11, and 42% were aged 12 to 17), with 54 female and 36 male participants. A majority of children were not involved in extra-curricular physical activities. Ethnic composition: 26% Caucasian, 27% Hispanic/Latino, 18% African America/Black, 11% Asian.

All participants were tested individually in a quiet room. They were briefed on the format of the session. Participants were reminded that they could withdraw at any time, and that their work would remain confidential. The sessions were not timed.

The study was approved by the University of California Merced Institutional Review Board and by the review boards or relevant authorities at all participant youth centers. Parents signed informed consent forms, and all participants signed consent or assent (if minor) forms adapted to their reading level.

Participants were asked to complete drawings of themselves, followed by completing a body image self-report. Anthropometric measures (Nihiser et al., 2007; Rinaldo et al., 2016): participants' height (in inches), weight (in pounds), and BMI were measured using the American Weigh Amw-330 hrs BMI Fitness Scale With Height Wand 330 X. The scale uses a combination of height and weight according to standard BMI formulas ($BMI = \text{weight}/\text{height}$). Participants were also asked to lie down on a mat (Center For Disease Control, n.d), and their waist size was measured (in inches) with a standard inch tape measurer at the umbilicus position and the superior iliac crest. Each participant received a small gift at the end of the session.

To complete their two drawing assignments (Figs. 1 and 2), participants received a pen, 24 colored pencils, and sheets of white paper with instructions. The instructions for Drawing 1 (*Self* called "Me") read, "Please draw yourself from head to toe." The



Fig. 1. Drawing of "Me" with instructions: "Please draw yourself from head to toe. We are not interested in your drawing ability — a simple sketch is fine."



Fig. 2. Drawing of “Preferred Me” with instructions: “Please draw yourself from head to toe. We are not interested in your drawing ability – a simple sketch is fine.”

instructions for Drawing 2 (*Preferred Self* called “Preferred Me”) read, “Please draw what you would like to look like right now.” Two other drawing tasks were given between “Me” and “Preferred Me” as distractors: “Me and best friend,” which read “Please draw yourself and your best friend” (Bombi et al., 2007), and “Me picking an apple from a tree” which read “Please draw yourself picking an apple from a tree” (Gantt and Tabone, 2003). Analyses of these two distractor drawings were conducted but not included given that they were not relevant to our present questions. Finally, the following statement followed each drawing instructions: “We are not interested in your drawing ability - a simple sketch is fine.” Participants were left alone and instructed to put their drawings into a box when finished to maximize their sense of privacy.

The Contour Figure Rating Scale (Fig. 3) consists of nine silhouettes organized from underweight (#1) to obese (#9). Participants are asked to choose the body type that best fits their perception of their own body shape. This figure scale was validated for ages 10 to 19 (Adami et al., 2012; Duncan et al., 2005; Thompson et al., 1990). This test was used to verify that participants had an accurate perception of

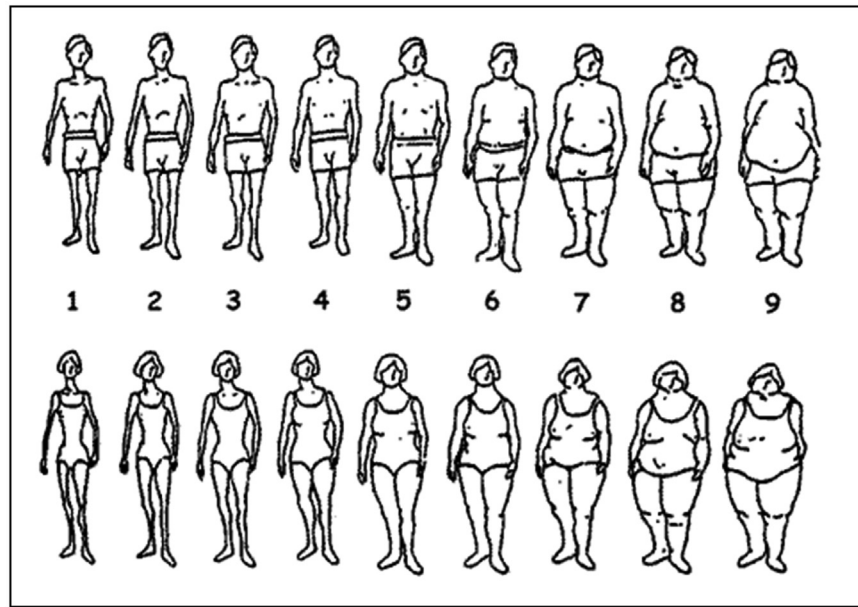


Fig. 3. Contour figure scale with which participants chose their body type.

themselves and allow for contrasting between that perception and pictorial representations.

The KIDSCREEN-27 is a quality of life measure for children and adolescents (Ravens-Sieberer et al., 2007). This questionnaire assesses dimensions of children well-being such as activity level, family life, fun and others. For the purpose of this study we focused on 3 questions concerning activity and energy levels as perceived by the participants. A composite ‘perceived and reported Level of Fitness’ was created based on these three questions for each participant.

4. Analysis

Drawings, body measures, and questionnaires provided the basis for the present analyses. Children’s height, weight, age, and gender were plugged into the CDC calculator for children’s BMI (Center For Disease Control, n.d), to calculate youth-appropriate BMI percentiles.

All drawings were scanned and uploaded using NIH Image-J software (Rasband, 2012). Multiple size measures for each drawing were scaled in pixels (e.g. height, width, waist, etc.). The size changes in height, waist, and width between “Me” and “Preferred-Me” were computed and called “delta”, a ratio which was conceived as follows: $((\text{Preferred Me}/\text{Me} - 1)/100)$. This tested whether deltas differences in height, waist, and width sizes between the two drawings were associated with BMI statuses.

Emotions in the drawings were coded by independent research assistants as “Negative”, “Positive”, “Neutral”, “no expression/no face drawn”, “Ambiguous”.

Weight was scored as well ranging from “Normal”, “Overweight”, “Underweight”, and “NA” for stick figures, distorted body shapes and ambiguous shapes. Notes were added in case of ambiguity and discussed amongst scorers during consensus meetings. Four independent research assistants coded drawings separately. Interrater reliability was assessed between coders using κ scores. When κ was less than 0.7, the drawings were re-scored until consensus was reached.

Data analyses were performed using IBM SPSS Statistics, version 22.0 (IBM Corporation, Chicago, IL). Analyses focused on the associations between the drawings’ measures (height, waist, and width), drawings’ facial emotions, weight, age, puberty, and gender. The main statistical tests used were ANOVAs, t-tests, correlations, and linear regressions. The level of significance was set at $p < .05$. Outliers were screened using boxplots and scatter plots.

5. Results

Ninety participants completed the drawings, questionnaires, and physical measures. Participants were first assessed on the accuracy of their perception of their body image and weight. [Table 1](#) shows the association between weight, mean of BMI, and contour figures chosen. Results show that thinner participants chose the thinner figures while heavier participants chose heavier-looking figures in both the actual weight and BMI analyses; therefore self-perceptions were quite accurate across the sample.

A paired sample t-test was performed to verify if the sizes of the “Me” drawings were generally different from the “Preferred Me” drawings’ sizes. Results show that the drawings were not statistically different in size for the three measures computed:

Table 1. Correspondence between contour figures, weight, and BMI.

Figure	N	Mean weight	SD	N	Mean BMI	SD
1	3	52.93	3	3	8.3	12.7
2	9	80.27	19.71	8	39	35.16
3	22	141.62	210.19	21	41.28	27.12
4	30	112.54	31.82	27	71.57	23.29
5	17	130.58	38.69	17	80.94	19.95
6	5	130.44	18.79	5	81.8	18.24
TOTAL	86	119.13	109.95	81	60.75	31.18

Figure scale: 1 = Underweight (BMI percentile between 0-5), to 6 = Overweight (BMI above 85). Weight is measures in pounds (lb), BMI is measured according to an algorithm from the CDC’s Division of Nutrition, Physical Activity, and Obesity BMI Percentile Calculator for Child and Teen.

for “Me” height ($M = 189.55$, $SD = 1389.92$), $t(87) = 1.279$, $p < .204$; “Me” waist ($M = 27.12$, $SD = 147.31$), marginal significance $t(86) = 1.117$, $p < .090$; and “Me” width ($M = 4.61$, $SD = 453.99$), marginal significance $t(86) = .095$, $p < .925$.

ANOVA statistics were conducted based on activity levels and drawings measures: deltas were not significantly affected by the activity index, safe for Height in the “Preferred-Me” drawing. Looking at a t-test to assess difference between the most and least active participants revealed more interesting results: drawn height, waist and width were always smaller in the least active participants (safe for Preferred-Me waist), however none of these differences were significantly different between the two groups for height of “Me” $t(83) = -1.059$, $p = .293$; for height of “Preferred-Me” $t(84) = -1.007$, $p = .285$; for width of “Me” $t(83) = -1.351$, $p = .180$; for width of “Preferred-Me” $t(83) = -.440$, $p = .661$; for waist of “Me” $t(83) = .422$, $p = .674$; for waist of “Preferred-Me” $t(83) = -.584$, $p = .561$. The same was analyzed with deltas changes (for delta width $t(83) = -.369$, $p = .713$; for delta waist $t(83) = .070$, $p = .944$; for delta height $t(83) = .794$, $p = .430$). The biggest delta changes were for the least active group for waist & height, but here too no statistically significant differences were found between the least and most active participants.

It could be expected that boys and girls may represent themselves differently and that these perception would affect the drawings. Qualitative observations of the drawings revealed that both boys and girls represented physical changes. The characteristic results were interesting as boys transformed themselves in the form of athletes or super heroes, with more muscles and stronger pauses; while girls represented themselves with more mature/curvy figures, with long hair and wide lashes. Means and ANOVA analyses showed however that girls had a larger change than boys particularly in height ($M = 14.92$, $SD = 128.06$) & width ($M = 6.55$, $SD = 59.50$), while boys changed more especially in waist size ($M = 23.40$, $SD = 158.50$). Yet, mean changes between the two groups were still not statistically different for width ($F(1,87) = .944$, $p = .334$), for waist ($F(1,87) = 1.317$, $p = .254$), for height ($F(1,87) = 1.460$, $p = .230$). Thus, there was less difference in size change between pre-post drawings, than there were in the type or representation of the characters drawn.

A Pearson correlation coefficient was calculated to assess the relationship between BMI and weight, with height, waist, and width drawing measures. A statistically significant correlation was found between weight and height of Me ($r(89) = .249$, $p = .020$); weight and waist of Me ($r(87) = .222$, $p = .038$); and weight and width of Preferred Me ($r(87) = .246$, $p = .022$). This result indicates that participants were successful in drawing themselves in the present when it comes to height and waist ratios, while they were better at pictorially representing themselves in their width’s Preferred-Me drawing. These findings confirm prior results showing a connection

between self-image and weight status (Tiemensma et al., 2012), it indicates that there is a relation between the way participants drew themselves and the way they are physically, although it appears that this relation depends on the type of drawings requested (present self (Me) versus ‘dreamed’ or imagined self (Preferred-Me)).

Chi-square analyses were conducted to assess the relations between the representations of emotion in Me and Preferred-Me drawings and participants’ weight status (BMI scores classified as *normal weight* and *overweight*). There was no statistically significant association between facial emotion and weight status in the drawing of Me: $\chi^2 = 3.830$, $p = .429$. Normal and overweight participants equally drew positive and neutral expressions. There was no statistically significant association between facial emotion and weight status in the drawing of Preferred Me: $\chi^2 = 6.255$, $p = .282$. Normal and overweight participants equally drew positive emotion expressions. However 3 overweight versus one normal weight participants drew a negative facial emotion.

The influence of ethnicity was assessed on the way participants drew themselves to take into account possible cultural differences in perceptions of weight and body image. An ANOVA was conducted showing a significant effect of ethnicity on the drawing of the height of Me $F(3,75) = 4.477$, $p = .006$. An independent t-test showed that height in both Me and Ideal Me were significantly different between ethnicities: Height of Me $t(80) = -2.54$, $p = .037$, Height of Ideal Me $t(82) = 1.513$, $p = .055$. In the “Me” drawing, the African American group had the tallest heights drawn ($M = 2513.13$), followed by Asians ($M = 1934.82$), Caucasians ($M = 1926.64$), and Hispanics ($M = 1719.63$). In the “Preferred Me” Asians were the tallest ($M = 1975.21$), followed by African Americans/Blacks ($M = 1848.59$), Caucasians ($M = 1707.19$), and Hispanics ($M = 1306.76$).

Looking at how ethnicity affects the question of drawing emotion in the face, a Chi-square was computed between emotion in the drawings and ethnicity. Results show that there is no statistically significant association between emotion in the drawings of Me and ethnicity $\chi^2 = 15.079$, $p = .237$. Concerning this relation in the Preferred-Me drawing, results indicate the same $\chi^2 = 10.487$, $p = .788$. Looking at simple frequencies nonetheless, Caucasians drew more positive faces overall than any other group for both Me, and Preferred Me drawings.

We investigated the interesting question of size change ratios between the drawings of Me and of Preferred Me, and weight status. Perhaps given the individuals’ weight status, their drawings’ sizes could be different depending on being instructed to draw self versus preferred self. To that end, a correlation was used to assess the relationship between BMI and weight with each of three deltas (or size change between Me and Preferred Me on height, waist, and width). No significant correlations were found between weight, BMI, and the difference ratio between Me and Preferred Me height, waist, and width: for the height delta $r(82) = -.129$, $p = .248$; for the

waist delta $r(82) = -.117, p = .297$; and for the width delta $r(82) = .013, p = .905$. A paired sample t-test was also conducted to confirm that the means between the three deltas in relation to BMI were not different and the results were equally non-significant (for BMI and height: $t(81) = -.301, p = .765$; for BMI and waist: $t(81) = -.507, p = .613$; for BMI and width: $t(81) = -.250, p = .803$).

Each delta was regressed on a number of variables such as actual height, weight and waist measures, BMI, age, and gender. Statistical significance was found only with the changes in height. Mainly, real weight $p = .015$, waist size $p = .012$, and age $p = .013$ predicted the changes in the height from “Me” to “Preferred Me” $F(5,73) = 3.184, p = .012, R^2 = .179$.

6. Discussion

The aim of this study was to explore if weight status in youth influenced their drawing representations of self and preferred self. The study also investigated the possibility that the size changes between drawing self and drawing ideal self could be influenced by weight status. For example, a heavier female participant may want to draw their ideal self thinner, or a thinner male participant may want to draw their preferred self larger or with more muscles. Other possible associations tested were the connections between weight and emotions in the two drawings of self, as well as influences of gender and ethnicity in the drawings of self and the changes between self and preferred-self drawings.

Participants were first tested on their awareness of their body image or perceived weight status. Mean comparisons showed that they tended to choose body figures that accurately corresponded to their weight status (Table 1). Consequently, participants overall were aware of their body image and thus were expected to draw themselves similarly to their weight status. Indeed, previous research did show that individuals choose contour figures (Thompson et al., 1990), and draw their self (Tiemensma et al., 2012) accurately compared to their actual body size. Gender differences were also evaluated to determine its influence on perception and drawings. Though differences were observed on characters types such as boys drawing more masculine super hero/athletes images, and girls drawing more mature female attributes, statistical analyses revealed no gender differences in the size changes observed between me/preferred me drawings.

The 180 drawings were measured for sizes of height, waist, and width. Additionally, each pair of me/preferred-me drawings were compared by computing a delta giving a size difference score between the two for each participant. Drawings were also assessed on whether facial emotions were negative, positive or neutral. Analyses of the drawings sizes revealed no significant differences of size between Self and Preferred-Self all groups combined. However, sizes differences became more salient

when ethnicity was introduced as a covariate. This may indicate that participants did not necessarily consider or project their present Self as much different than their Preferred-self, or that as a whole there were as many changes as lack thereof across the entire sample. However, culture may have played a role in the changes in distinct patterns when ethnic groups are compared. For example, Blacks drew themselves the tallest and Hispanics the shortest in the “Me” drawing; while Asians drew themselves the tallest and Hispanics the shortest in the “Preferred-Me” drawing. Thus as a whole the sample’s lack of striking “Me”-“Preferred-Me” changes may possibly speak to either 1/ participants’ healthy view of themselves and not wanting to be necessarily changing their body; 2/ a general malaise in the youth with depicting their body image, 3/ a difficulty to draw, 4/ intentionally not wanting to show a large difference because of possible social desirability effect (i.e. some drawings were declaring “I am beautiful as I am”), or 5/ a phase of youth-typical redefinition of self not automatically transferred to the art media. However, the ethnic differences may illustrate desires, and perceptions compared to members of other groups that need more investigation.

Note that younger children tended to represent themselves radically differently (i.e. superheroes). Future studies are recommended to parse out these different factors, in the context of weight and body image drawing. For example baselines for drawings skills, mood/anxiety and body satisfaction questionnaires and such could help keep these potential confounding variables constant.

Further, investigation of relations between BMI, and weight revealed significant correlations between BMI, weight and height, waist and width drawn. Height and waist were significantly correlated in the “Me” drawings; while correlations were significant between weight and width for the “Preferred-Me” drawings. This reveals an association between the way participants saw themselves and the way they represented themselves; although it appears that this relation depends on the type of drawings assigned (“Me” versus projected “Preferred-Me”). Consequently, researchers can consider drawings of the body as valuable tools in the context of body image representation.

On the question of emotion and weight representation, results were mitigated. No strong associations were found between emotion and BMI status. This could be a result of age, social representation especially in the context of culture, or disconnection between affect and drawn faces, which seems less plausible given that there was no statistically significant association between facial emotion and weight status, between facial emotion and weight status, and that normal and overweight participants equally drew positive and neutral expressions.

Note however that the groups as separated by ethnicity did not significantly differ in their depiction of emotion, however raw data did show that the Caucasian group drew more positive faces overall.

Changes of sizes between the two drawings in relation to weight status were also analyzed by computing a delta change score for every participants' pair of "Me" and "Preferred-Me" drawings. There was no significant correlation between weight or BMI and the three height, waist, width delta ratios. However, real height, waist, and age did predict changes in height between "Me" and "Preferred-Me". Thus weight did not necessarily allow in this context to predict how participants would change their view between the first and second drawing of themselves; that said how tall, wide and old they were provided a tool to predict height change between their two drawings.

Lastly, in this rural sample with ethnically diverse samples, could there be a perception difference (and drawing interpretation difference) between a child raised in an environment where being overweight is the norm and does not subject the individual to negative societal pressures, versus a child raised in an environment where being overweight is considered a serious issue and subjects the individual to bullying, or other types of pressures (Douchis et al., 2001; Fitzgibbon et al., 2000)? Such a factor may completely change the relation weight/emotion in the drawing (Douchis et al., 2001). Results showed a significant association between ethnicity and height, which differed between ethnic groups: again Blacks drew themselves the tallest and Hispanics the shortest in the "Me" drawing; while Asians drew themselves the tallest and Hispanics the shortest in the "Preferred-Me" drawing. There were also significant correlation between ethnicity and height and waist drawn. Further research is needed to explore this question with larger group samples more representative of diverse ethnicities. The sample was mainly Caucasian and Hispanic, which may have limited potential generalization of the results to other groups.

There were some limitations with access to the populations we initially planned to work with. This was in part due to limited resources and staff in the targeted locations. This forced us to reach farther in the region and caused some time and resource constraints. Further, the sample of overweight participants was smaller than anticipated (42% of participants with a BMI 80 and above). A larger group of overweight as well as underweight participants could offer more nuanced results. Such a design could be accomplished in specialized centers or hospitals to study the question with special populations even though this may also introduce bias in the samples tested. In this context, more tailored scales should be used such as the silhouettes of Collins (1991), which may offer children with a better representative picture of their body. As mentioned, a specific attention to cultural effects is important and was not fully available with the current design. Researchers should also pay more attention to age in this context, which seemed to be highly correlated to drawings. This tool may be more adapted to a certain age group and more research is needed to understand at what level this issue is significant.

This study contributes to the fields of psychology, education, and health (particularly programs working with youth with weight health risks) by showing that drawings can be used to assess image of self in the context of weight. Drawings sizes and emotion in connection with weight may be indicative of youths' real perceptions of themselves. No known research has taken that approach to date. Once these dynamics are understood, a more organic, and youth-centered approach could improve the success of the treatments and programs implemented for youths with weight and body image challenges (Smolak, 2004).

Future studies may benefit from larger and more diversified weight samples to assess the strength of the trends observed. A pre-test drawing measure of how participants would draw an overweight and underweight person could have been helpful to appraise baseline perceptions on weight, as well as an assessment of how they think other people may perceive them. Knowing parents' weight could help understand participants' drawings, since parental weight impacts youths' perceptions (Doolen et al., 2009). Finally, subsequent research studies may also use longitudinal designs to explore "Me" and "Preferred Me" size changes across age and/or weight changes in relation to youths' mental health, and perception of self across long term physical change.

7. Conclusion

The present study investigated the application of drawing self as associated with weight in rural community youths. Part of size differences and illustrated characteristics between in drawings were explained by weight status, and ethnicity/culture, but not by gender or age, and weight did not influence emotions in the drawings. These results matter for medical, educational, and psychological circles working with youth which create programs and tools to treat or assess physical and mental challenges related to body image. More research is needed to understand the roles of these factors in youths' self-perception and life quality.

Declarations

Author contribution statement

Maryam Crogman: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

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Competing interest statement

The authors declare no conflict of interest.

Additional information

No additional information is available for this paper.

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