

Case Control Study

Self-worth and psychological adjustment of obese children: An analysis through the Draw-A-Person

Giuseppe Scimeca, Amelia Alborghetti, Antonio Bruno, Giulia Maria Troili, Gianluca Pandolfo,
Maria Rosaria Anna Muscatello, Rocco Antonio Zoccali

Giuseppe Scimeca, Antonio Bruno, Giulia Maria Troili, Gianluca Pandolfo, Maria Rosaria Anna Muscatello, Rocco Antonio Zoccali, Psychiatric Unit, Department of Biomedical, Dental Sciences and Morpho-functional Imaging, University of Messina, 98125 Messina, Italy

Amelia Alborghetti, "Don Carlo Gnocchi" Foundation, 00135 Rome, Italy

Author contributions: Scimeca G designed the study and contributed to the manuscript writing and final revision; Alborghetti A performed the majority of experiments and contributed to the writing of the manuscript; Bruno A performed data analysis and contributed to the writing of the manuscript; Troili GM contributed to the literature search and writing of the manuscript; Pandolfo G performed part of experiments and contributed to the writing of the manuscript; Muscatello MRA contributed to the literature search, manuscript writing, and final revision; Zoccali RA contributed to the study idea, manuscript writing and final revision of the article.

Institutional review board statement: The protocol has been approved by the ethics committee of the University of Messina and by the participating school districts.

Informed consent statement: All subjects and their parents provided informed written consent prior to study enrollment.

Conflict-of-interest statement: All authors have no proprietary, financial, professional or other personal interest of any nature in any product, service or company.

Data sharing statement: No additional data are available.

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Manuscript source: Invited manuscript

Correspondence to: Antonio Bruno, MD, PhD, Psychiatric Unit, Department of Biomedical, Dental Sciences and Morpho-functional Imaging, University of Messina, Via Consolare Valeria n. 1, 98125 Messina, Italy. antonio.bruno@unime.it

Telephone: +39-090-2212092

Fax: +39-090-695136

Received: March 31, 2016

Peer-review started: March 31, 2016

First decision: May 17, 2016

Revised: July 28, 2016

Accepted: August 17, 2016

Article in press: August 19, 2016

Published online: September 22, 2016

Abstract

AIM

To investigate psychopathological correlates of child obesity *via* the Draw-A-Person test (DAP).

METHODS

The participants were 50 children with a mean age of 9.74 years. Body mass index (BMI) was used as a measure of body fat. Children were divided into normal ($n = 17$), overweight ($n = 14$) and obese ($n = 19$). Two qualitative methods of scoring the DAP based on an integrative approach were used to assess self-concept (ESW) and overall level of children's adjustment (EAC). A procedure for judging interpretative skills of clinicians was implemented before they evaluated children's drawings.

RESULTS

As predicted by our hypothesis, BMI was negatively correlated with ESW, $r(50) = -0.29$, $P < 0.05$, but not with EAC, $r(50) = -0.08$, $P = ns$. To evaluate the effect of gender, Pearson correlations were re-computed

regrouping the sample accordingly: BMI and EAC reached a significant negative correlation in female subjects, $r(24) = -0.36, P < 0.05$, and a positive correlation in male subjects, $r(26) = 0.37, P = < 0.05$; negative correlation between BMI and ESW became stronger in females, $r(24) = -0.51, P < 0.01$ but not in males, whose correlation disappeared resulting not-significant, $r(26) = -0.06, P = ns$. No effect of age was found. Results indicate that obesity has a negative correlation exclusively on overall adjustment and self-concept in female children.

CONCLUSION

It was concluded that there is a negative bias toward females that reveals how the stigma of obesity is widespread in Western society.

Key words: Obesity; Draw a person; Draw-A-Person test; Projective techniques; Psychopathology

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Core tip: This study was executed to investigate psychopathological correlates of child obesity *via* the Draw-A-Person test (DAP). A new procedure for using the DAP was suggested. Results indicate that obesity has a negative correlation exclusively on overall adjustment and self-concept in female children. It is consequently concluded that there is a negative bias toward females that reveals how the stigma of obesity is widespread in Western society. The "intuitive reading" of figure drawings can be considered a valid tool of assessment, even though interpreters' skills should always be assessed before executing each single studies in order to guarantee sound methodological praxis.

Scimeca G, Alborghetti A, Bruno A, Troili GM, Pandolfo G, Muscatello MRA, Zoccali RA. Self-worth and psychological adjustment of obese children: An analysis through the Draw-A-Person. *World J Psychiatr* 2016; 6(3): 329-338 Available from: URL: <http://www.wjgnet.com/2220-3206/full/v6/i3/329.htm> DOI: <http://dx.doi.org/10.5498/wjp.v6.i3.329>

INTRODUCTION

Obesity is a serious problem all over the world, both in developing and industrialized countries. It is associated with severe emotional, medical and economical difficulties. According to the World Health Organization (WHO) "in many countries more than half of the adult population is above the overweight threshold, with 20%-30% of adults categorized as clinically obese"^[1]. The increasing prevalence of this disorder has led the WHO to declare obesity a global epidemic^[2]. The prevalence of childhood obesity has doubled over the last three decades^[3], forecasts for the future are not good: Wang *et al*^[4] (2006) have predicted, for the coming years, that almost 50%

of children in North America and 38% of children in the European Union will become overweight. Being obese during adolescence or childhood increases the probability and the severity of long-term health complications^[5]; early obesity also enhances the likelihood of being obese as an adult^[6] and, furthermore, it is a strong predictor of expected mortality^[7].

Though no doubt exists about the medical consequences of obesity, the same can't be said about psychopathological correlates. Reviews addressing this association, indeed, have led to contradictory findings, so that some authors have concluded that there is no link between these two conditions^[8,9]. Friedman *et al*^[10] (1995) have instead maintained that the absence of overall significant results contradict clinical experience and can be explained by specific theoretical or methodological limitations in reviewed studies (*e.g.*, sampling errors and narrow measurement). They maintain that obesity will determine psychopathological consequences only in individuals carrying definite risk factors and that it prevalently affects specific domains of psychological functions (like self-concept, pessimistic attributions or body image disturbance) rather than overall psychopathology or personality (obesity has thus been defined as a "syndrome of subclinical suffering"). They propose a second generation of studies addressing factors likely to place overweight individuals at psychopathology risk and a third generation of studies to comprehend the relationship between obesity and psychopathological correlates.

Following Friedman *et al*^[10]'s (1995) considerations, the present research was conducted to investigate, utilizing the Draw-A-Person test (DAP), two possible psychopathological correlates of childhood obesity: Self-concept, a specific domain of psychological function, and general psychopathology. We also considered the effect of developmental age and gender on these correlations.

There are some reasons why obesity and child psychopathology are expected to be correlated. The stigma of obesity is widespread in Western society: Obese people are easily blamed and condemned for their condition since our culture favours aesthetic models characterized by thinness^[11,12]. Staffieri^[13] found that obese individuals are easily labelled with negative attributions such as "stupid" or "cheats" compared to normal weight individuals. Negative attributions by others can easily affect self-concept as this schema also evolves by feedbacks from the perceptions of others^[14,15]. The habit of being negatively addressed as obese can thus determine the development of a negative perception of oneself as worthless, inadequate, inferior or inept. Some research has in fact found a negative correlation between body image dissatisfaction and self-esteem^[16-18]; other studies have found this relation to be mediated by childhood teasing^[19,20].

Another hypothesis worth considering is the opposite one: Excessive eating may develop to reduce emotional suffering stemming from an aversive self-concept. This so-called "psychosomatic" hypothesis maintains that

food consumption is an attempt to cope with negative emotions like depression and anxiety^[21,22]. The ability of self-esteem to affect eating habits is evident if we consider that the manipulation of self-esteem (e.g., by telling subjects they have failed on a problem solving task) has been shown to provoke disinhibited eating^[23]. Furthermore, studies tracking mood and eating by periodic self-monitoring have shown that binge eating is preceded by greater negative moods and followed by emotional relief^[24-26]. Heatherton *et al.*^[27] (1991), in an extensive review, have proposed the so-called "escape model" according to which binge eating arises as a way to narrow a person's attention to immediate food sensations and consequently to avoid broadly and threatening thoughts concerning the self.

In spite of this, research addressing self-concept in obese children has led to contradictory findings, some indicating an association between negative self-worth and excessive weight^[28,29] and others which do not evidence this relationship^[30-34]. A meta-analysis of Miller *et al.*^[35] (1999) showed a moderate negative effect size was present as a measure of the relation between self-esteem and weight; they also found this relation to be higher for high school and college students than for children.

We think that obesity and children's self-worth are correlated and that, at least in part, contradictory findings can be explained by two kinds of factors.

The first is question of methodology. Studies of the psychopathological functioning of obese patients have prevalently employed assessment instruments like diagnostic interview schedules, self-made measurements, questionnaires, scales and inventories^[10]. The problem here is that children usually have significant difficulties in comprehending and correctly expressing inner feelings and, in general, all subjective states (especially those related to discomforting emotions). Consequently, projective measures have been expressly developed with the aim of capturing unconscious personality dynamics and functioning utilizing samples of behaviours which go beyond self description or clinical observations. It has been demonstrated that they can provide useful and valid information concerning personality and psychopathology (inner conflicts, perception of self and others, fears, relationships with family members or other relevant emotional figures) missed by self-report measures^[36,37]. This is one of the reasons why draw a person and other projective techniques are routinely applied for the assessment of children's psychopathology: They are among the first ten most used assessment tools in clinical practice^[38,39]. The assumption underlying the DAP is that when a person draws a human figure, he represents the way he views himself^[40]. According to this so-called "body image" hypothesis, the representation of one's body becomes a way to express inner emotions and beliefs related to the "self": "The general style and content of a drawing should give an interpreter a sense of how the respondent experiences him- or her-self in the world"^[41]. Given the low effect that obesity seems

to have on psychopathology and the methodological difficulties associated with the psychological assessment of children, a projective evaluation of adjustment level and self-concept through the DAP could be particularly effective. Most of all, we think that a projective evaluation of self-worth in obese children could be useful since negative self-attributions are seldom far from an almost tacit level of self-awareness^[42].

The 2nd factor which can shed light on the contradictory findings concerning self-worth in obese children is the effect of certain moderator variables like gender and age.

As far as the effect of gender is concerned, though the prevalence of obesity is about the same for both sexes, a number of results and clinical observations indicate that female subjects are at higher risk of developing emotional suffering than male subjects^[35,43,44]. Given the importance that body self-esteem plays in the development of female self-concept, women are surely stigmatized more than men^[45,46]. It's not a coincidence that treatment for obesity is predominantly requested by women rather than men and this could be explained by corresponding emotional suffering^[10]. We consequently hypothesize that obese female children should show higher levels of negative self-attributions than male ones.

As regards the effect of age, Friedman *et al.*^[10] (1995) maintained that the absence of a clear relationship between self-worth and obesity can be explained if we consider that the link between body esteem and self-esteem during childhood is weak and becomes stronger approaching adolescence. They maintain that this can explain why older obese individuals (adolescents and college-age women) show clearer evidence of negative self-attributions. We agree that this link is more evident during adolescence, but we think it slowly develops during childhood, becoming stronger as adolescence approaches.

These two factors can affect the correlation between obesity and psychopathology whatever the direction of the causal link between them. If we take into consideration the "psychosomatic" model, we can hypothesize that, once it develops in order to reduce emotional suffering, obesity might, in turn, have a worse effect on females and on adolescents for the same reason.

These are, consequently, the hypotheses of this study: (1) obesity has no clear correlation with children's overall level of adjustment; (2) obesity has a specific negative correlation with self-worth; and (3) being female and older in age have an effect on the psychopathological correlates of obesity.

Traditionally, two methods of scoring have been developed for DAP evaluation: A quantitative approach based on the aggregation of multiple variables and a qualitative approach based on holistic clinical evaluation^[41]. We used this last method to evaluate drawings since qualitative methods have shown to be sounder than quantitative ones^[47,48]. Holistic evaluation scales have been developed on the assumption that the intuitive judgement of clinical psychologists can be a valid and reliable assessment tool^[49]. Overall adjustment was assessed through the so-called "Estimated Adjustment of the

Client" (EAC)^[50], while we tried a new procedure we called "Estimated Self-Worth" (ESW) to evaluate self-concept of obese children.

Before evaluating children's drawings, it was decided to ascertain the interpretative skills of the two clinicians who were instructed to evaluate adjustment and self-worth through the DAP. Hammer^[51] stressed how human figure drawing can be a sensitive tool in the hands of some evaluators while it could be a misleading instrument in the hands of others. Hunt^[52] and Fowler^[53] maintained that the same clinician should be considered as an assessment instrument and that interpretative performance should be evaluated just like we ordinarily do for tests. Personality characteristics like empathy, intuition, creativity and "affiliative" interpersonal orientations have been underlined as factors predicting good interpretive skills^[54]. Above all, we found this evaluation essential since we decided to use a holistic approach which - differently from quantitative scales - relies almost entirely on the clinician's emotional and cognitive reactions to the observation of drawings. We validated interpretative skills using two drawing samples of patients with two different personality disorders and a control group made by subjects with no history of psychopathological problems. The assignment of a patient to a group was decided according to the specific self-concept associated with the correspondent personality disorder (low self-worth vs overvalued self-worth). We expected patients belonging to low-self worth personality to have the lower mean score on the ESW measure, patients belonging to the overvalued self-worth personality to reach the higher mean score and subjects with no history of psychopathological problems to have the middle mean score. As regards the evaluation of adjustment, we expected both groups with personality disorders to have lower levels of psychological adjustment than the control group.

MATERIALS AND METHODS

Preliminary analyses regarding interpreters judges

Raters were two experienced clinical psychologists with a formal education and at least five years of clinical practice in the field of assessment through projective techniques and psychotherapy.

DAP scoring

EAC: Following the instructions of Albee *et al.*^[49,55] judges were first introduced to a definition of adjustment as the capacity for emotional investment in relationships and as the ability to translate reality in a way that is compatible with conventional perceptions of others. No specific DAP indicators were recommended to them: They were instructed to feel free to choose any sign they thought helpful in making a conclusion concerning children's well being. They were also told to rely on clinical experience, empathy and intuition. Adjustment was rated on a 5-point scale ranging from very maladjusted (1) to extremely

well-adjusted (5); the midpoint (3) was labelled as normally adjusted. Intuitive adjustment evaluation has already been successfully applied to evaluate the presence of psychopathology^[55,56], to predict psychiatric hospital admission^[57] and foster-care placements^[50] and to differentiate children with mood and mood/anxiety disorders from control group children^[48].

ESW: As regards the measurement of self-esteem, judges were first introduced to a definition of self-esteem as a global judgement of self-worth^[58]; it was rated on a 5-point scale ranging from viewing oneself as worthless (1) to viewing oneself as special (5); the midpoint (3) was labelled as balanced view of self-worth. Judges were instructed to choose level 1 when they thought children had a negative view of themselves as worthless; this adjective was further explained using terms referring to personality characteristics like feeling inadequate, fragile, weak, lacking in self-confidence and self-esteem, inept, inferior. Level 5 was defined as feeling special: This term was further explained with other words like superior, admirable, unique, grandiose. Level 3 was labelled as balanced self-worth: Judges were told to select this midpoint level when they thought children were characterised by a balanced self-confidence and self-esteem. As with EAC, no specific DAP indicators were suggested to judges who were left free to choose any indicator they thought helpful in making a conclusion concerning children's self-concept.

Reliability of interpretative skill

Training was carried out to reach at least 80% agreement of all DAP measures on two samples of drawings before working on the experimental ones. A first training sample of twenty-five human figure drawings was randomly selected from the files of a neuropsychiatry service; a second training sample of twenty-five drawings was taken from a local primary school. These drawings were selected to assure that the training could be reliable both with psychopathological and normal subject evaluations; the random selection of training drawings was realized controlling the participants in the main study for age and sex. The choice of experienced clinical psychologists and a period of training were preferred since it has been proved that experience can improve both the interpretative ability and reliability rates of skilled interpreters^[59]. Pearson correlations between the two judges were computed for continuous variables: Interrater reliability for EAC was 0.79, for ESW it was 0.81.

Validity of interpretative skill

The overall sample of participants used for the validation of interpreters consisted of 45 individuals, 30 of whom had been seen for psychological testing and psychotherapy at a public psychiatric health service; 15 more participants with no history of psychological counselling or intervention were selected as a control group, controlling for age and sex. A diagnosis of personality disorders was carried out

Table 1 Evaluation of interpretative skill: Mean scores by group membership

Measure	DPD group (<i>n</i> = 15)		NPD group (<i>n</i> = 15)		<i>n</i> (<i>n</i> = 15)	
	M	SD	M	SD	M	SD
EAC	1.86	0.65	1.8	0.96	3.93	0.79
ESW	2.13	1.06	4.27	0.88	3.13	1.12

EAC: Estimated adjustment of the client; ESW: Estimated self-worth; DPD: Dependent personality disorder; NPD: Narcissistic personality disorder; *n*: Subjects with no history of psychopathological problems.

through the SCID-II, the Structured Clinical Interview for DSM-IV Personality Disorders^[60]. Since all the patients involved in the study entered psychotherapy soon after the assessment procedure, initial SCID diagnoses were confirmed by subsequent clinical observations. Two groups of 15 patients were formed: The first one who received a diagnosis of "dependent personality disorder" and the second one received a diagnosis of "narcissistic personality disorder". It was not possible to assess self-esteem through questionnaires or other measures, since we used randomly selected archival data which were collected before planning and executing this study. However both experimental and clinical research have widely demonstrated the association between low self-esteem and dependency^[61-63] while high self-esteem and narcissism are obviously linked. We essentially relied on a clinical diagnosis of the whole personality to assess self-worth, the single domain of psychopathological functioning we were interested in. Drawings were scored on a blind basis: Scorers were unaware of diagnoses of personality disorders (they only knew sex and age).

In accordance with our predictions, mean scores on EAC resulted significantly lower for both groups with personality disorders and higher for the group with no history of psychopathological problems (Table 1); the ANOVA test yielded significant differences between groups on the mean total score, $F(44, 2) = 34.24$, $P < 0.0001$. Planned contrasts indicated that the two groups with personality disorders did not differ on mean EAC score, but they all had significant lower mean scores than the group without psychopathological problems. To examine the validity of ESW, an ANOVA test was computed yielding significant differences between groups on the mean total score, $F(44, 2) = 16.16$, $P < 0.0001$. As predicted, the sample with dependent personality disorder had the lowest ESW mean score while the sample with narcissistic personality disorder had the highest ESW value; balanced self-worth personalities had the middle mean score (Table 1).

Evaluation of obese psychopathology

Subjects and procedure: The participants were 78 Italian children from two Roman schools. To assure generalizability of data, the two schools were randomly selected from the whole sample Roman public schools. Eight children refused to participate in the study, data

coming from 20 children had to be dropped from the sample because of missing information. Thirty-three children were signalled by their teachers due to their excessive weight, thus suggesting the possible risk of obesity. The remaining 17 were taken from the same schools as a control group (controlling for age and sex). Body mass index [BMI; weight (kg)/height (m²)] was used as a measure of body fat. Height was measured to the nearest millimeter with a portable stadiometer while weight was assessed to the nearest 0.1 kg using digital scales. Children did not dress shoes and wore light clothing. Heightbar^[10] was fixed on the wall, and children were standing with back and heels pressed to the wall. Measurements were performed by three trained examiners according to standard procedures (Lohman *et al.*^[64], 1992). Children were subdivided into normal (*n* = 17), overweight (*n* = 14) and obese (*n* = 19) using the standard definition established by Cole *et al.*^[65] (2000). Participants had a mean (\pm SD) age of 9.74 ± 1.84 years and a mean BMI of 22.01 ± 2.81 ; mean BMI were 18.87 (normal), 22.25 (overweight) and 24.65 (obese).

Human figure drawings were obtained by providing children with a pencil and instructing them to simply "draw a person" on a sheet of white typing paper. They were scored on a blind basis: Scorers were unaware of the child's weight, they only knew their sex and age. Pearson correlations between the two judges were computed for continuous variables: Interrater reliability for EAC was 0.81, for ESW it was 0.82. Disagreements were solved by computing the mean for each of the two divergent scores. The research project was described to the parents of obese children as a study of the psychological functioning of obese and overweight children. Parental consensus was requested and obtained for each subject before starting assessment procedures. All of the children's parents gave their assents.

Statistical analysis

A one-sample Kolmogorov-Smirnov test was conducted beforehand to detect excessively skewed data; data which were not normally distributed were subjected to natural log transformations. Analysis of variance (ANOVA) was used to compare the dependent variables across the three groups. Pearson correlation test was used to search for possible association between the different variables under investigation. χ^2 test was used to investigate for possible differences whenever qualitative variables were involved. Statistical analyses were performed in SPSS for Windows 16.0 (SPSS, 2007).

RESULTS

Before testing experimental hypotheses, it was verified that EAC and ESW were not correlated through the Pearson correlation test ($r = -0.034$; $P = \text{ns}$). Nor were differences found regarding distribution of sex, χ^2 (2, $n = 50$) = 0.31, $p = \text{ns}$ and mean age, $F(47, 2) = 2.81$,

Table 2 Evaluation of anthropometrical outcomes and Draw-A-Person test measures by gender

Measure	Male (<i>n</i> = 24)		Female (<i>n</i> = 26)	
	M	SD	M	SD
BMI	21.47	0.24	23.56	0.34
EAC	3.32	0.28	2.91	0.32
ESW	3.12	0.36	2.93	0.37

BMI: Body mass index; EAC: Estimated adjustment of the client; ESW: Estimated self-worth.

$P = \text{ns}$; mean BMI across the groups gave significantly different results, $F(47, 2) = 84.43$, $P < 0.0001$ (means and standard deviations for BMI, EAC and ESW are shown in Tables 2 and 3).

Two univariate ANOVA tests were computed to examine possible differences on EAC and ESW among children subdivided into groups according to weight; analyses yielded negative results both for EAC, $F(47, 2) = 0.92$, $P = \text{ns}$, and for ESW, $F(47, 2) = 2.88$, $P = \text{ns}$. Since ESW means showed the trend we expected on the basis of our hypothesis, diminishing from normal to obese children, we decided to run a Pearson correlation test to verify our hypothesis: It was thought to be a more sensible measure of the association between DAP scores and BMI. As predicted by our hypothesis, BMI was negatively correlated with ESW, $r(50) = -0.29$, $P < 0.05$, but not with EAC, $r(50) = -0.08$, $P = \text{ns}$.

To evaluate the effect of gender, Pearson correlations were re-computed regrouping the sample accordingly: BMI and EAC reached a significant negative correlation in female subjects, $r(24) = -0.36$, $P < 0.05$, and a positive correlation in male subjects, $r(26) = 0.37$, $P \leq 0.05$; negative correlation between BMI and ESW became stronger in females, $r(24) = -0.51$, $P < 0.01$ but not in males, whose correlation disappeared resulting not-significant, $r(26) = -0.06$, $P = \text{ns}$.

These data strongly suggest that gaining weight is associated both with an overall level of psychopathology and negative self-worth but only in female children, not in males; better still, males show a positive association between weight and adjustment. The effect of BMI is stronger on the specific domain of self-worth rather than on the general level of psychopathology. If we consider the most obese children ($\text{BMI} > 24$; $n = 15$) we find further confirmation of our conclusions, since nine of them have the lowest level of ESW ($\text{ESW} = 1$).

To calculate the effect of age on EAC and ESW, a possible correlation between them was first verified. Age resulted associated with ESW, $r(50) = 0.36$, $P < 0.005$ while EAC had a near-significant correlation with age, $r(50) = 0.23$, $P = 0.06$. Further analysis was performed to test the possible interaction between age and BMI on EAC and ESW. It was found that controlling for BMI, both the correlation between age and ESW, $r(47) = 0.37$, $P < 0.004$, and between age and EAC, $r(47) = 0.23$, $P = 0.053$, showed no substantial change.

Table 3 Evaluation of obesity: Mean scores by group membership

Measure	Normal weight group (<i>n</i> = 17)		Over weight group (<i>n</i> = 14)		Obese (<i>n</i> = 19)	
	M	SD	M	SD	M	SD
BMI	18.87	0.37	22.25	0.31	24.66	0.32
EAC	3.18	0.32	3.43	0.27	2.89	0.23
ESW	3.24	0.36	2.79	0.37	2.11	0.32

BMI: Body mass index; EAC: Estimated adjustment of the client; ESW: Estimated self-worth.

Contrary to our predictions, we consequently found no effect of age on the level of self-worth and on the overall level of adjustment of obese children.

DISCUSSION

Obesity

The results of the present study suggest that obesity is associated with low self-worth and lower levels of overall adjustment exclusively in female subjects. Obese female children dislike themselves and show a tendency to feel worthless, inadequate and lacking in self-esteem. Male children do not seem to suffer because they are overweight: Our data even suggest that in male children, weight may be associated with higher levels of adjustment.

Our data are consistent with Friedman *et al.*^[10]'s idea of obesity as a "syndrome of subclinical suffering". It can be hypothesized that being an obese female child is a risk factor for the development of a negative self-concept (self-worth) and for the development of low levels of adjustment. This negative bias toward females supports the hypothesis that obesity is a cultural problem: It may be that aesthetic models characterised by thinness have negative consequences on self-concept.

The other explanation worthy of consideration is that obesity develops as a consequence of emotional suffering coming from low self-worth: Once developed, overeating could be enhanced by the negative affect caused by social stigma, especially for female children for whom cultural models are particularly demanding. According to this different explanation, it is possible that the negative self-image associated with obesity reinforces pre-existent self-deprecating processes which usually affect self-worth.

In any case, whatever the direction of this link, the management of obesity should focus on self-worth since obese young females are prone to emotional distress and negative mood: Working on self-esteem is of primary importance in facilitating mental health and adjustment to body fat. Some non-dietary approaches to obesity have in fact successfully attempted to improve self-esteem and body image through self-acceptance^[66-69]. Nevertheless, it is also important to consider the role that sex hormones, and maturity of the hypothalamic, pituitary gonad axes in the psychological symptoms and

self-esteem of adolescent girls. Some researchers have shown that there is a negative relationship between self-esteem and sexual development of girls and adolescents. Specifically, Huerta *et al.*^[70] showed that girls who are older and achieve highest sexual development had lower self-esteem, more anxiety and depression than girls younger and with less sexual development, independent of the girls' body weight. Consequently, it may be important to consider sexual development of obese female adolescents in the assessment of their possible emotional problems, as it may take an important role in the development of their psychological troubles.

Clinical judgement of DAP made by experienced clinical psychologists can be successfully used to evaluate self-worth and overall adjustment level in obese children. Indeed, the self-defeating and often unconscious convictions concerning the self found in female subjects, may be observed through some specific DAP signs produced by our sample. For instance, insecurity and low self-esteem may have brought participants to draw human figures with light lines, line discontinuity or erasures. Some DAP indicators may be used to evaluate these psychopathological correlates. According to our judges, the most frequent signs influencing their evaluation might have been small human figures, light lines, line discontinuity, erasures, body simplification, sad or frightened posture/facial expression. These signs are usually associated with anxiety^[71] and depression^[40,72-74]. This is consistent with research findings that show how obese female adolescents spend significantly fewer months at high school^[75] and with other studies which have found an association between obesity and depression^[76,77]. Both of these conditions - depression and low scholastic achievement - are indeed associated with low self-esteem and low self-efficacy. Since DAP can be administered in a short period of time and is easily complied by patient, it could be used as a preliminary screening test for the selection of children needing therapeutic intervention.

We also found that age does not mediate the relationship between weight and psychopathology. The absence of the effect of age can be related to the typology of measure used in this study. It may be that an implicit negative self-perception develops during childhood and that it does not change during adolescence, while overt emotional suffering concerning the self, may start during adolescence or later during adulthood. Further research is needed to solve this question: Longitudinal studies with different kinds of assessment instruments should be used to distinguish between low self-esteem and emotional suffering.

Methodological considerations concerning the DAP

The "intuitive reading" of figure drawings can be considered a valid and reliable tool of assessment both from a scientific and clinical point of view. The DAP "feeling approaches" consist of using the cognitive and emotional reactions of a clinician when the drawings are

examined to obtain information concerning the drawer's personality: They probably rely on primitive layers of "knowing" far beyond an individual's awareness^[54,78] because, while evaluating drawings, judges describe empathising as an involuntary and automatic mental activity. When evaluating drawings characterised by low self-worth our judges said they had the "impressions" of feeling sad or frightened, or imagining a weak child lacking in self-confidence. Sometimes they said they didn't know exactly why they attributed specific scores to drawings: They said they intuitively felt the child had a negative view of himself or a grandiose one even when signs didn't suggest anything clear.

Riethmiller *et al.*^[41] stressed the importance of multivariable scales when discussing quantitative evaluations of DAP. They maintained that the same construct can find expression through different signs: Evaluating a single sign could consequently be misleading since a single item has a low correlation with the associated construct^[79]. Qualitative evaluation of DAP could be useful since clinical intuition may produce a deeper and sounder evaluation of single signs whose meaning may vary in relation to the remaining characteristics of the figure. In other words, holistic evaluation of the figure, through clinical intuition, could give the correct importance and meaning to the varying individual signs of the drawing, thus making possible a more valid overall interpretation.

The problem here is that it is not clear what kind of personality factors or experiences are responsible for the development of interpretative skill: This is the reason why assessment is sometimes considered an art rather than a scientific discipline. From a methodological point of view the problem is the correspondence between subjective involuntary mental activity and objective external reality: Subjective impressions could simply be wrong. The reliability of certain indicators is not enough: Joiner *et al.*^[80] found that size, detail and line heaviness had high rates of reliability but they were not significantly associated with external measures of depression and anxiety. We used the evaluation of personality disorders as a measure of validity by sorting subjects with different levels of self-worth and adjustment. This choice was made on the assumption that DAP is particularly suitable for the assessment of stable personality tendencies rather than for transient behavioural or mood alterations^[81]. The evaluator's personality should consequently be considered as an assessment tool to be validated^[53], just like tests, before starting an empirical and holistic evaluation of DAP research data^[82]. Even when evaluators have good interpretative skills, countertransference problems could bias interpretations of the drawings. Hammer *et al.*^[83] found a correlation between the degree of evaluators' hostility and their inclination to perceive aggressive tendencies when evaluating drawings. We consequently think that all research involving holistic DAP measures should require an evaluation of the judges' skills, specifically those relating to the variables to be measured.

The validation procedure which discriminates between the different personality disorders here tested can be thus considered a way to scientifically ascertain the intuitive and empathic skills of evaluators, rather than a way of validating EAC or ESW. It is indeed simply impossible to use traditional tests to evaluate clinical skills like empathy or affiliative tendencies. It would be sounder to validate the accuracy of judges' evaluations by using categories of patients which share the same characteristics of the experimental group. To evaluate disordered thinking for instance, it would be useful to test interpretative skills by comparing drawings by subjects with a diagnosis of schizophrenia with other drawings made by subjects with different psychopathological problems and samples from individuals without any kind of psychiatric diagnosis.

DAP research has been characterised by lack of coherent findings and severe methodological criticism, just like other research involving projective techniques. One of the reasons why DAP research has produced contradictory findings is that the interpreters who evaluate the drawings have different skills. Consequently, interpreters' skills should always be assessed and measured before executing each single studies in order to guarantee sound methodological praxis: "...focus should instead be on good interpreters, who demonstrate outstanding ability to interpret the DAP"⁽⁷⁸⁾.

This study has different limitations. First of all, it was not considered the possible effect of socioeconomic strata on the relationship between obesity and the EAC and ESW variables; however, random selection of the two samples probably reduced the possible effect of socioeconomic factors on the results of this study. Also, sexual development that children and the antecedent of age at menarche had at the moment of the study were not considered; this is a limitation as these variables are related with different personality characteristics of children. Future research may address this question.

ACKNOWLEDGMENTS

We wish to thank Dr. Francesco Garozzo (PsyD) for his help in the scoring of the human figure drawings but, most of all, for his invaluable clinical suggestions.

COMMENTS

Background

Obesity is a serious problem all over the world. Reviews addressing the association between obesity and psychopathology have led to contradictory findings. It has been proposed that obesity will determine psychopathological consequences only in individuals carrying definite risk factors and that it prevalently affects specific domains of psychological functions. Thus, the present research was conducted to investigate two possible psychopathological correlates of childhood obesity (self-concept and general psychopathology) via the Draw-A-Person test (DAP). The authors also considered the effect of developmental age and gender on these correlations.

Research frontiers

Current research suggests that clinical judgement of DAP made by experienced clinical psychologists can be successfully used to evaluate self-worth and

overall adjustment level in obese children.

Innovations and breakthroughs

This study is, to the authors' knowledge, the first to investigate psychopathological correlates of child obesity via DAP.

Applications

Clinical judgement of DAP made by experienced clinical psychologists can be successfully used to evaluate self-worth and overall adjustment level in obese children. Since DAP can be administered in a short period of time and is easily complied by patient, it could be used as a preliminary screening test for the selection of children needing therapeutic intervention.

Terminology

Obesity: Excessive accumulation of body fat that may impair health; **Draw-A-Person test:** An implicit measure of personality consisting of drawing a person on a sheet of white typing paper.

Peer-review

This is an interesting and methodologically well developed study.

REFERENCES

- 1 **World Health Organization.** The European Health Report 2002. 2002; 38 [accessed 2006 May 7]. Available from: URL: <http://www.who.dk/eprise/main/who/progs/ehr/home>
- 2 **World Health Organization.** Obesity: Preventing and managing the global epidemic. Geneva, Switzerland: World Health Organization, 1998
- 3 **Troiano RP,** Flegal KM, Kuczmarski RJ, Campbell SM, Johnson CL. Overweight prevalence and trends for children and adolescents. The National Health and Nutrition Examination Surveys, 1963 to 1991. *Arch Pediatr Adolesc Med* 1995; **149**: 1085-1091 [PMID: 7550810 DOI: 10.1001/archpedi.1995.02170230039005]
- 4 **Wang Y,** Lobstein T. Worldwide trends in childhood overweight and obesity. *Int J Pediatr Obes* 2006; **1**: 11-25 [PMID: 17902211 DOI: 10.1080/17477160600586747]
- 5 **Must A,** Strauss RS. Risks and consequences of childhood and adolescent obesity. *Int J Obes Relat Metab Disord* 1999; **23** Suppl 2: S2-11 [PMID: 10340798 DOI: 10.1038/sj.ijo.0800852]
- 6 **Whitaker RC,** Wright JA, Pepe MS, Seidel KD, Dietz WH. Predicting obesity in young adulthood from childhood and parental obesity. *N Engl J Med* 1997; **337**: 869-873 [PMID: 9302300 DOI: 10.1056/NEJM199709253371301]
- 7 **Strauss R.** Childhood obesity. *Curr Probl Pediatr* 1999; **29**: 1-29 [PMID: 9919427 DOI: 10.1016/S0045-9380(99)80011-5]
- 8 **O'Neil PM,** Jarrell MP. Psychological aspects of obesity and dieting. In: Wadden TA, Van Itallie TB, eds. Treatment of the Seriously Obese Patients. New York: Guilford Press, 1992: 252-270
- 9 **Stunkard AJ,** Wadden TA. Psychological aspects of severe obesity. *Am J Clin Nutr* 1992; **55**: 524S-532S [PMID: 1733121]
- 10 **Friedman MA,** Brownell KD. Psychological correlates of obesity: moving to the next research generation. *Psychol Bull* 1995; **117**: 3-20 [PMID: 7870862 DOI: 10.1037/0033-2909.117.1.3]
- 11 **DeJong W,** Kleck RE. The social psychological effects of overweight. In: Herman CP, Zanna MP, Higgins ET, eds. Physical appearance, stigma and social behavior: The Ontario Symposium. Hillsdale, NJ: Lawrence Erlbaum, 1986; **3**: 65-87
- 12 **Puhl RM,** Latner JD. Stigma, obesity, and the health of the nation's children. *Psychol Bull* 2007; **133**: 557-580 [PMID: 17592956 DOI: 10.1037/0033-2909.133.4.557]
- 13 **Staffieri JR.** A study of social stereotype of body image in children. *J Pers Soc Psychol* 1967; **7**: 101-104 [PMID: 6052651 DOI: 10.1037/h0021227]
- 14 **Mead GH.** Mind, self & society from the standpoint of a social behaviorist. In: Morris CW, editor. Chicago: University of Chicago Press, 1934

- 15 **Shrauger JS**, Schoeneman TJ. Symbolic interactionist view of self-concept: Through the looking glass darkly. *Psychological Bulletin* 1979; **86**: 549-573 [DOI: 10.1037/0033-2909.86.3.549]
- 16 **Foster GD**, Wadden TA, Vogt RA. Body image in obese women before, during, and after weight loss treatment. *Health Psychol* 1997; **16**: 226-229 [PMID: 9152700 DOI: 10.1037/0278-6133.16.3.226]
- 17 **Grilo CM**, Wilfley DE, Brownell KD, Rodin J. Teasing, body image, and self-esteem in a clinical sample of obese women. *Addict Behav* 1994; **19**: 443-450 [PMID: 7992678 DOI: 10.1016/0306-4603(94)90066-3]
- 18 **Matz PE**, Foster GD, Faith MS, Wadden TA. Correlates of body image dissatisfaction among overweight women seeking weight loss. *J Consult Clin Psychol* 2002; **70**: 1040-1044 [PMID: 12182267 DOI: 10.1037/0022-006X.70.4.1040]
- 19 **Thompson JK**, Coovert MD, Richards KJ, Johnson S, Cattarin J. Development of body image, eating disturbance, and general psychological functioning in female adolescents: covariance structure modeling and longitudinal investigations. *Int J Eat Disord* 1995; **18**: 221-236 [PMID: 8556018 DOI: 10.1002/1098-108X(199511)18:3<221::AID-EAT2260180304>3.0.CO;2-D]
- 20 **Lunner K**, Werthem EH, Thompson JK, Paxton SJ, McDonald F, Halvaarson KS. A cross-cultural examination of weight-related teasing, body image, and eating disturbance in Swedish and Australian samples. *Int J Eat Disord* 2000; **28**: 430-435 [PMID: 11054790 DOI: 10.1002/1098-108X(200012)28:4<430::AID-EAT11>3.0.CO;2-Y]
- 21 **Schachter S**. Emotion, obesity, and crime. New York: Academic Press, 1971
- 22 **Herman CP**, Polivy J. Anxiety, restraint, and eating behavior. *J Abnorm Psychol* 1975; **84**: 66-72 [PMID: 1194527 DOI: 10.1037/0021-843X.84.6.666]
- 23 **Heatherton TF**, Herman CP, Polivy J. Effects of physical threat and ego threat on eating behavior. *J Pers Soc Psychol* 1991; **60**: 138-143 [PMID: 1995833 DOI: 10.1037/0022-3514.60.1.138]
- 24 **Johnson C**, Larson R. Bulimia: an analysis of moods and behavior. *Psychosom Med* 1982; **44**: 341-351 [PMID: 6959174 DOI: 10.1097/00006842-198209000-00003]
- 25 **Davis R**, Freeman RJ, Garner DM. A naturalistic investigation of eating behavior in bulimia nervosa. *J Consult Clin Psychol* 1988; **56**: 273-279 [PMID: 3372835 DOI: 10.1037/0022-006X.56.2.273]
- 26 **Lingswiler VM**, Crowther JH, Stephens MAP. Affective and cognitive antecedents to eating episodes in bulimia and binge eating. *Int J Eat Disord* 1989; **8**: 533-539 [DOI: 10.1002/1098-108X(198909)8:5<533::AID-EAT2260080505>3.0.CO;2-O]
- 27 **Heatherton TF**, Baumeister RF. Binge eating as escape from self-awareness. *Psychol Bull* 1991; **110**: 86-108 [PMID: 1891520 DOI: 10.1037/0033-2909.110.1.86]
- 28 **Sallade J**. A comparison of the psychological adjustment of obese vs. non-obese children. *J Psychosom Res* 1973; **17**: 89-96 [PMID: 4582397 DOI: 10.1016/0022-3999(73)90009-3]
- 29 **Strauss CC**, Smith K, Frame C, Forehand R. Personal and interpersonal characteristics associated with childhood obesity. *J Pediatr Psychol* 1985; **10**: 337-343 [PMID: 4078659 DOI: 10.1093/jpepsy/10.3.337]
- 30 **Mendelson BK**, White DR. Relation between body-esteem and self-esteem of obese and normal children. *Percept Mot Skills* 1982; **54**: 899-905 [PMID: 7099901 DOI: 10.2466/pms.1982.54.3.899]
- 31 **Wadden TA**, Foster GD, Brownell KD, Finley E. Self-concept in obese and normal-weight children. *J Consult Clin Psychol* 1984; **52**: 1104-1105 [PMID: 6520282 DOI: 10.1037/0022-006X.52.6.1104]
- 32 **Kimm SY**, Sweeney CG, Janosky JE, MacMillan JP. Self-concept measures and childhood obesity: a descriptive analysis. *J Dev Behav Pediatr* 1991; **12**: 19-24 [PMID: 2016398 DOI: 10.1097/00004703-199102000-00005]
- 33 **Kaplan KM**, Wadden TA. Childhood obesity and self-esteem. *J Pediatr* 1986; **109**: 367-370 [PMID: 3734976 DOI: 10.1016/S0022-3476(86)80407-3]
- 34 **Klesges RC**, Haddock CK, Stein RJ, Klesges LM, Eck LH, Hanson CL. Relationship between psychosocial functioning and body fat in preschool children: a longitudinal investigation. *J Consult Clin Psychol* 1992; **60**: 793-796 [PMID: 1401395 DOI: 10.1037/0022-006X.60.5.793]
- 35 **Miller CT**, Downey KT. A Meta-Analysis of Heavyweight and Self-Esteem. *Pers Soc Psychol Rev* 1999; **3**: 68-84 [DOI: 10.1207/s15327957pspr0301_4]
- 36 **Bornstein RF**, Bowers KS, Robinson KJ. Differential relationships of objective and projective dependency scores to self-reports of interpersonal life events in college student subjects. *J Pers Assess* 1995; **65**: 255-269 [PMID: 16367718 DOI: 10.1207/s15327752jpa6502_3]
- 37 **Meyer GJ**. On the integration of personality assessment methods: the Rorschach and MMPI. *J Pers Assess* 1997; **68**: 297-330 [PMID: 16370782 DOI: 10.1207/s15327752jpa6802_5]
- 38 **Camara WJ**, Nathan JS, Puente AE. Psychological test usage: Implications in professional psychology. *Professional Psychology: Research and Practice* 2000; **31**: 141-154 [DOI: 10.1037//0735-7028.31.2.141]
- 39 **Cashel ML**. Child and adolescent psychological assessment: Current clinical practices and the impact of managed care. *Professional Psychology: Research and Practice* 2002; **33**: 446-453 [DOI: 10.1037/0735-7028.33.5.446]
- 40 **Machover K**. Personality projection in the drawing of the human figure: A method of personality investigation. Springfield: Charles C Thomas Publisher, 1949
- 41 **Riethmiller RJ**, Handler L. Problematic methods and unwarranted conclusions in DAP research: Suggestions for improved research procedures. *J Pers Assess* 1997; **69**: 459-475 [DOI: 10.1207/s15327752jpa6903_1]
- 42 **Beck A**, Rush A, Shaw B, Emery G. Cognitive therapy for depression. New York: Guilford Press, 1979
- 43 **Pliner P**, Chaiken S, Flett GL. Gender Differences in Concern with Body Weight and Physical Appearance Over the Life Span. *Personality and Social Psychology Bulletin* 1990; **16**: 263-273 [DOI: 10.1177/0146167290162007]
- 44 **Rodin J**, Silberstein L, Striegel-Moore R. Women and weight: a normative discontent. *Nebr Symp Motiv* 1984; **32**: 267-307 [PMID: 6398857]
- 45 **Brownell KD**. Dieting and the search for the perfect body: Where physiology and culture collide. *Behavior Therapy* 1991; **22**: 1-12 [DOI: 10.1016/S0005-7894(05)80239-4]
- 46 **Rodin J**. Body traps. New York: Morrow, 1992
- 47 **Coopersmith S**, Sakai D, Beardslee B, Coopersmith A. Figure drawing as an expression of self-esteem. *J Pers Assess* 1976; **40**: 370-375 [PMID: 784939 DOI: 10.1207/s15327752jpa4004_5]
- 48 **Tharner DJ**, Stark K. A qualitative versus quantitative approach to evaluating the Draw-A-Person and Kinetic Family Drawing: A Study of Mood- and Anxiety-Disorder Children. *Psychological Assessment* 1990; **2**: 365-375 [DOI: 10.1037/1040-3590.2.4.365]
- 49 **Albee GW**, Hamlin RM. The place of judgment in clinical research. *J Clin Exp Psychopathol* 1950; **11**: 174-177 [PMID: 24539318]
- 50 **Yama MF**. The usefulness of human figure drawings as an index of overall adjustment. *J Pers Assess* 1990; **54**: 78-86 [PMID: 2179524]
- 51 **Hammer E**. Projective drawings. In Rabin A, editor. Projective techniques in personality assessment. New York: Springer, 1968: 366-393 [DOI: 10.1007/978-3-662-39577-6_12]
- 52 **Hunt WA**. The future of diagnostic testing in clinical psychology. *J Clin Psychol* 1946; **2**: 311-317 [PMID: 21002770]
- 53 **Fowler JC**. The trouble with learning personality assessment. In: Handler L, Hilsenroth MJ, eds. Teaching and learning personality assessment. Mahwah, NJ: Erlbaum, 1998: 31-41
- 54 **Scribner CM**, Handler L. The interpreter's personality in Draw-A-Person interpretation: a study of interpersonal style. *J Pers Assess* 1987; **51**: 112-122 [PMID: 16372861 DOI: 10.1207/s15327752jpa5101_10]
- 55 **Albee GW**, Hamlin RM. An investigation of the reliability and validity of judgments of adjustment inferred from drawings. *J Clin Psychol* 1949; **5**: 389-392 [PMID: 15391960 DOI: 10.1002/1097-4679(194910)5:4<389::AID-JCLP2270050409>3.0.CO;2-O]
- 56 **Albee GW**, Hamlin RM. Judgment of adjustment from drawings: the applicability of rating scale methods. *J Clin Psychol* 1950; **6**: 363-365 [PMID: 14794805 DOI: 10.1002/1097-4679(195010)6:4<363::AID-JCLP2270060411>3.0.CO;2-Q]

- 57 **Kahn MW**, Jones NF. Human figure drawings as predictors of admission to a psychiatric hospital. *J Proj Tech Pers Assess* 1965; **29**: 319-322 [PMID: 14337520 DOI: 10.1080/0091651X.1965.10120215]
- 58 **Rosenberg M**. Society and the adolescent self-image. Princeton, NJ: Princeton University Press, 1965
- 59 **Murray DC**, Deabler HL. Drawings, diagnoses, and the clinician's learning curve. *J Proj Tech* 1958; **22**: 415-420 [PMID: 13611707 DOI: 10.1080/08853126.1958.10380874]
- 60 **First MB**, Spitzer RL, Gibbon M, Williams JBW, Benjamin LS. Structured Clinical Interview for DSM-IV Personality Disorders, (SCID-II). Washington, DC: American Psychiatric Press, 1997
- 61 **Beck A**, Freeman A, Davis DD, Associates. Cognitive therapy of personality disorders. New York: Guilford Press, 2004
- 62 **Ederer E**. Dysthymia, psychosocial dependency, and self-esteem in ten-year-old boys and girls. *Studia Psychological* 1988; **30**: 227-235
- 63 **Overholser JC**. Interpersonal dependency and social loss. *Personality and Individual Differences* 1992; **13**: 17-23 [DOI: 10.1016/0191-8869(92)90212-8]
- 64 **Lohman TG**, Roche AF, Martorell R. Anthropometric standardization reference manual. Champaign Illinois: Abridged Edition Human Kinetics Books, 1992
- 65 **Cole TJ**, Bellizzi MC, Flegal KM, Dietz WH. Establishing a standard definition for child overweight and obesity worldwide: international survey. *BMJ* 2000; **320**: 1240-1243 [PMID: 10797032 DOI: 10.1136/bmj.320.7244.1240]
- 66 **Foreyt JP**, Goodrick GK. Living without dieting. Houston, TeX: Harrison Publishing, 1995
- 67 **Foster GD**, Johnson C. Facilitating health and self-esteem among obese patients. *Primary Psych* 1998; **5**: 89-95
- 68 **Polivy J**, Herman CP. Undieting: A program to help people stop dieting. *Int J Eat Disorder* 1992; **11**: 261-268 [DOI: 10.1002/1098-108X(199204)11:3<261::AID-EAT2260110309>3.0.CO;2-F]
- 69 **Roughan P**, Seddon E, Vernon-Roberts J. Long-term effects of a psychologically based group programme for women preoccupied with body weight and eating behaviour. *Int J Obes* 1990; **14**: 135-147 [PMID: 2341222]
- 70 **Huerta R**, Brizuela-Gamiño OL. Interaction of pubertal status, mood and self-esteem in adolescent girls. *J Reprod Med* 2002; **47**: 217-225 [PMID: 11933687]
- 71 **Handler L**. Anxiety indexes in the draw a person test: a scoring manual. *J Proj Tech Pers Assess* 1967; **31**: 46-57 [PMID: 4863064 DOI: 10.1080/0091651X.1967.10120375]
- 72 **Gordon N**, Lefkowitz MM, Tesiny EP. Childhood depression and the Draw-A-Person Test. *Psychol Rep* 1980; **47**: 251-257 [PMID: 6999521 DOI: 10.2466/pr0.1980.47.1.251]
- 73 **Lewinsohn PM**. Relationship between height of figure drawings and depression in psychiatric patients. *J Consult Psychol* 1964; **28**: 380-381 [PMID: 14197933 DOI: 10.1037/h0040886]
- 74 **Rapaport D**, Gill M, Schafer R. Diagnostic psychological testing. Chicago: Year Book Medical Publishers, 1946
- 75 **Gortmaker SL**, Must A, Perrin JM, Sobol AM, Dietz WH. Social and economic consequences of overweight in adolescence and young adulthood. *N Engl J Med* 1993; **329**: 1008-1012 [PMID: 8366901 DOI: 10.1056/NEJM199309303291406]
- 76 **Leckie EV**, Withers RF. Obesity and depression. *J Psychosom Res* 1967; **11**: 107-115 [PMID: 6049023 DOI: 10.1016/0022-3999(67)90063-3]
- 77 **Hafner RJ**, Watts JM, Rogers J. Psychological status of morbidly obese women before gastric restriction surgery. *J Psychosom Res* 1987; **31**: 607-612 [PMID: 3430423 DOI: 10.1016/0022-3999(87)90039-0]
- 78 **Handler L**. The clinical use of the Draw-A-Person (DAP). In: Newmark C, ed. Major Psychological Assessment Instruments. Boston: Allyn & Bacon, 1985: 165-216
- 79 **Rushton JP**, Brainerd CJ, Pressley M. Behavioral development and construct validity: The principle of aggregation. *Psychological Bulletin* 1983; **94**: 18-38 [DOI: 10.1037/0033-2909.94.1.18]
- 80 **Joiner TE**, Schmidt KL, Barnett J. Size, detail, and line heaviness in children's drawings as correlates of emotional distress: (more) negative evidence. *J Pers Assess* 1996; **67**: 127-141 [PMID: 8683422 DOI: 10.1207/s15327752jpa6701_10]
- 81 **Hutt ML**. Psychopathology, assessment and psychotherapy. In: Rabin AI. Projective techniques in personality assessment. New York: Springer, 1968: 64-84 [DOI: 10.1007/978-3-662-39577-6_3]
- 82 **Handler L**, Riethmiller R. Teaching and learning the administration and interpretation of graphic techniques. In: Handler L, Hilsenroth MJ, eds. Teaching and learning personality assessment. Mahwah, NJ: Erlbaum, 1998: 267-294
- 83 **Hammer EF**, Piotrowski ZA. Hostility as a factor in the clinician's personality as it affects his interpretation of projective drawings (H-T-P). *J Proj Tech* 1953; **17**: 210-216 [PMID: 13062262 DOI: 10.1080/08853126.1953.10380480]

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