



## Differential Child Body Perception in Children Ages 7-12 and Parents in Relation to Exercise and Eating Behaviors

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### Abstract

**Objective:** The purpose of this study was to investigate child body perceptions in children aged 7-12 and that of their parents in relation to exercise and eating behaviors .

**Methods:** Parent and paired child participants completed separate questionnaires that included anthropometric, exercise and eating behavior, and somatotype questions to assess perceived current and perceived ideal body type.

**Results:** Children perceived their bodies was larger than their parents viewed their offspring's bodies ( $p=0.022$ ). Children's perceived ideal body type was thinner than parents perceived ideal for their offspring ( $p=0.001$ ). The discrepancy between children's perceptions of their ideal and current body type was significantly larger than the discrepancy between parent's perception of their offspring's ideal and current body type ( $p=0.001$ ). There was a positive correlation between body type discrepancy and faster eating pace ( $p=0.004$ ) and an inverse correlation with family Physical Activity (PA) ( $p=0.017$ ).

**Conclusion:** This study indicate significant body type discrepancy among children. Body weight, body mass index, faster eating pace and less family PA may be contributing factors, though further research is needed to examine other potential factors to contribute the body type discrepancy.

### Keywords

Body image; Body perception; Children; Parents; Dietary behaviors

### Introduction

Body image concerns affect children as young as 5-6 years old [1-3] and young children have displayed a strong concern for body size, especially in regard to its social implications. Even among those at healthy body sizes, children between the ages of four and eleven display aspects of body dissatisfaction and actively evaluate their own body size, with many aspiring to body sizes that would be unattainable and unhealthy for most [4]. Body dissatisfaction has significant effects on weight-focused dietary restraint behaviors [1] and is associated with an increased risk of the development of eating disorders later in life [5]. Implementing prevention and treatment interventions during

early stages of development is crucial to support healthy growth and development and to reduce the risk of future health complications in adulthood [6-8].

Dietary and physical activity behaviors have also been linked to the development of eating disorders [6,9]. Eating disorders in children are associated with physical ailments such as failure to thrive, impaired bone development, and cardiac complications [10] in addition to an increased risk of mental health disorders during early adulthood, including anxiety and depressive disorders, insomnia, neurological symptoms, and suicide attempts [11]. While the average age of onset for anorexia nervosa and bulimia nervosa is 18 years the initiation and development of disordered eating behavior may be much earlier [12]. The participation of children in healthy physical activity and nutrition behaviors is largely influenced by parental modeling, with children demonstrating similar health behaviors to their parents [13-16]. Dietary and physical activity behaviors have been linked to body image discrepancy, or the difference between how an individual perceives their body size and the body size they believe to be ideal [17,18]. This association has been closely examined among adolescent and adult populations [19,20], but it is unclear if the same relationships exist among younger age groups.

Body image discrepancy is associated with increased body dissatisfaction in addition to other negative psychological outcomes [21]. Body dissatisfaction predicts the development of disordered eating patterns, higher Body Mass Index (BMI), low physical activity, poor dietary quality, low self-esteem, depressive symptoms and clinical eating disorders in children and adolescents [5,8,22]. This indicates the detrimental impacts that impaired body image perception can potentially have on the general well-being of youth and the need to examine the extent to which body dissatisfaction exists among young children. In addition, research indicates negative comments about body shape or weight by parents directed at their offspring as a contributing factor in the development of eating disorders [23,24]. Since parental perceptions of their offspring's body size or weight can negatively influence the physical activity and dietary behaviors of their offspring, it is pertinent to analyze both the child's perception of their body size and the parent's perception of their offspring's body size. This would offer critical insight into the relationships between parent and child attitudes toward body image and lifestyle behaviors and aid in the development of proper interventions to ensure healthy growth and development through childhood, adolescence, and young adulthood.

To the authors' knowledge, this is the first study to examine child body perception, physical activity behaviors, and eating behaviors of parents and children within the 7-12-year-old age group. This study investigated children's perceptions of their own bodies, parents' perceptions of their offspring's bodies, and potential links between these perceptions and child and family diet and physical activity behaviors. In addition, the relationship between child body type discrepancy and physical activity and dietary behaviors was examined.

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## Methods

### Participants

One hundred forty-five families were recruited in Southern California by word of mouth to participate in this study. One parent and one child, who fell within the target age group, were requested to participate from each family. Families were required to have a child between the ages of 7-12 and be comfortable reading English. This age range was chosen because it was thought that most children would not have completed pubertal changes. Literacy was necessary for study participation because all surveys were given in a written format in English. Eligibility was determined in person prior to participation in the study. Parent consent and child assent were obtained from parents and children if willing and eligible to participate prior to starting the questionnaire. Survey data were collected from August 2017 to June 2018. This study protocol was approved by the San Diego State University Institutional Review Board.

### Measures

**Questionnaires:** Two separate questionnaires were designed for parents and children participating in the study. The questionnaires were modeled after the Family Eating and Activity Habits Questionnaire [25]. The original questionnaire has been previously validated for use among children aged 6-11 and their parents [26]. Questionnaires were modified for the present study by eliminating questions unnecessary for this study, editing diction to be more easily understood by children, and adding somatotype questions. The somatotype Figures used was previously validated by Collins [27]. These somatotype questions were designed to investigate both perceived current body type and perceived ideal body type. The scale included seven illustrated Figures, with 1 being the thinnest and 7 being the largest. Parent questionnaires contained questions and child questionnaires contained 20 questions. Parent questionnaires contained six questions regarding parent behaviors in addition to the questions present on the child questionnaire. Questionnaires included demographic, exercise behavior, screen time, eating behavior, perceived current body type and ideal body type questions.

**BMI calculation and classification:** Parent BMI was calculated using self-reported height and weight with a standard equation ( $BMI = kg/m^2$ ). Child BMI percentile was calculated with parent-reported height and weight of the child using the Center for Disease Control and Prevention website's BMI percentile calculator [28]. BMI categories were assigned to parents and BMI percentile categories were assigned to children. For children, categories were divided into underweight ( $BMI < 5^{th}$  percentile), normal weight ( $BMI 5^{th}$ - $84.9^{th}\%$ ), overweight ( $BMI 85^{th}$ - $94.9^{th}\%$ ), and obese ( $BMI \geq 95^{th}\%$ ). For adults, categories were divided into underweight ( $BMI < 18.5 kg/m^2$ ), normal weight ( $BMI 18.5$ - $24.9 kg/m^2$ ), overweight ( $BMI 25$ - $29.9 kg/m^2$ ), and obese ( $BMI \geq 30 kg/m^2$ ).

**Dietary behavior:** Dietary behavior was assessed using a series of four dietary behavior questions [26]. Three of these inquired into the frequency participants ate when bored, ate while watching TV, and ate late at night and were answered using a Likert-type scale (1=never, 5=always). A fourth dietary behavior question asked participants to self-rate their eating pace as fast, average, or slow.

**Body type discrepancy:** Body type discrepancy was calculated post-questionnaire by subtracting the ideal body type number from the perceived current body type number. A positive score

would indicate that children perceived their current body type as being larger than their ideal, while a negative score would indicate the perception that their current body type is thinner than ideal. A neutral score would indicate the child perceived their current body type as matching their ideal.

### Procedure

Participants were instructed to complete the questionnaire at their convenience. If a child needed assistance with reading or comprehension, parents were instructed to assist with, but not influence, the child's completion of the questionnaire. Completed questionnaires were sealed in envelopes and returned to researchers. Returned parent and child questionnaires were coded to remain paired by family.

### Data analysis

Data analysis was performed using SPSS Statistics for Windows, version 25 (IBM, Armonk, NY). Paired t-tests were used to compare parent responses with that of their offspring regarding perceived current body type, ideal body type, body type discrepancy, weekly physical activity, and dietary behavior of the child. Chi-square ( $\chi^2$ ) tests were used to evaluate differences by BMI category with gender, physical activity, screen time, dietary behavior and body type discrepancy. Spearman's correlations were conducted to analyze relationships between parent and child body weight, reported physical activity, and reported screen time. Spearman's analyses were also conducted to examine relationships between body image discrepancy and body weight, lifestyle behaviors and eating and physical activity behaviors.

## Results

### BMI and characteristics of study participants

In this study, 78.6% (N=114) of adult participants were female and 55.9% (N=81) of child participants were female. The average age of parents was 39.6 years (SD=6.2 years) and the average age of children was 9.7 years (SD=1.2 years) (Table 1). The majority of parents were White (51%) while 23.4% were Latinx, 17.9% were Asian, 2.1% were African American, and 5.5% identified as other. Average BMI was significantly higher for male parents ( $26.0 kg/m^2$ ,  $SD=2.8$ ) than for female parents ( $24.2 kg/m^2$ ,  $SD=4.5$ ) ( $p=0.032$ ). Out of the 145 adult participants, 1.4% were underweight, 63.4% were normal weight, 22.8% were overweight, and 12.4% had obesity based on BMI. Out of the 145 child participants, 1.4% were underweight, 76.6% were normal weight, 11.0% were overweight, and 11.0% had obesity based on BMI percentile. BMI percentile was not different between genders within the child population (58.8<sup>th</sup> percentile for females, 56.0<sup>th</sup> percentile for males).

Average screen time was 9.26 hours per week (SD=7.39 hours) for male parents and 8.88 hours of per week (SD 6.57 hours) for female parents (Table 1). There were no significant differences in screen time between genders among adult participants. Boys showed a trend of higher screen time (11.5 hours per week) compared to girls (8.99 hours) ( $p=0.065$ ). There were no significant differences in screen time between BMI categories among adult or child participants. Average physical activity was 9.31 hours per week (SD=9.34 hours) for male parents and 6.98 hours per week (SD=5.69 hours) for female parents. There were no significant differences in physical activity between genders among adult participants. Average physical activity was 10.48 hours per week (SD=8.80 hours) for boys and 10.13 hours per

**Table 1:** Participant information and screen time and physical activity data for parent and child dyads (n=145).

	Parent (n=145)	Child (n=145)
<b>Gender</b>		
Male	31 (21.4%)	64 (44.1%)
Female	114 (78.6%)	81 (55.9%)
Age (years) (mean ± SD)	39.6 ± 6.2	9.7 ± 1.2
<b>Ethnicity</b>		
Asian	26 (17.9%)	
African American	3 (2.1%)	
Latinx	34 (23.4%)	
White	74 (51.0%)	
Other	8 (5.5%)	
BMI (mean ± SD)*	25.1 ± 3.7	57.4 ± 29.8
Underweight	2 (1.4%)	2 (1.4%)
Normal	92 (63.4%)	111 (76.6%)
Overweight	33 (22.8%)	16 (11.0%)
Obese	18 (12.4%)	16 (11.0%)
Screen time per week (hours)		
Male (mean ± SD)	9.26 ± 7.39	11.50 ± 9.32
Female (mean ± SD)	8.88 ± 6.57	8.99 ± 6.03
Physical activity per week (hours)		
Male (mean ± SD)	9.31 ± 9.34	10.48 ± 8.80
Female (mean ± SD)	6.98 ± 5.69	10.13 ± 7.04
*BMI: Underweight=BMI<18.5 kg/m <sup>2</sup> ; Normal weight=BMI 18.5 kg/m <sup>2</sup> -24.9 kg/m <sup>2</sup> ; Overweight=BMI 25 kg/m <sup>2</sup> -29.9 kg/m <sup>2</sup> ; Obese=BMI ≥ 30 kg/m <sup>2</sup> ; Child BMI%: underweight, <5 <sup>th</sup> %; Normal weight, 5 <sup>th</sup> % -84.9 <sup>th</sup> %; overweight, 85 <sup>th</sup> %-94.9 <sup>th</sup> %; obese, ≥ 95 <sup>th</sup> %		

week (SD=7.04 hours) for girls. There were no significant differences in physical activity between BMI categories among adult or child participants. 66% of parents answered with “yes” when asked if they did physical activity as a family while only 59% of kids responded “yes.”

### Body image

Children perceived their current body type as significantly larger than their parents viewed their offspring’s current body type (p=0.022) (Table 2). Children’s perceived ideal body type was significantly thinner than parents’ perceived ideal for their offspring (p=0.001) for both girls and boys. The discrepancy between children’s perceptions of their ideal and current bodies was significantly larger (0.414 ± 0.902) than the discrepancy between parent’s perception of their offspring’s ideal and current bodies (-0.014 ± 0.717) (p=0.001). There were no significant differences between girls and boys on their current body type, ideal body type and the discrepancy on body type in parents’ perceptions for their children and children’s their perception.

### Correlations between parent and child on body weight, BMI and eating behaviors

There was a significant positive correlation between parent and child body weight (coefficient= 0.179, p=0.031), BMI category (coefficient=0.215, p=0.009), physical activity (coefficient=0.257, p=0.002) and screen time (coefficient=0.244, p=0.003) (Table 3). There was positive trend between parent BMI and child BMI (coefficient=0.156, p=0.062). Likewise, a significant positive correlation between parent and child eating behaviors were identified with regard to eating from the pan (coefficient=0.313, p<0.001),

eating when board (coefficient=0.192, p=0.021), and eating late at night (coefficient=0.214, p=0.010).

### Correlations between body image discrepancy and BMI, eating behaviors, and physical activity

A significant positive correlation was identified between body image discrepancies and body weight (coefficient=0.212, p=0.011), BMI percentile (coefficient=0.322, p<0.001), BMI category (coefficient=0.205, p=0.014), and current body image (coefficient=0.575, p<0.001) (Table 4). There was a significant inverse correlation between body image discrepancies and ideal body image (coefficient=-0.361, p<0.001). There was a significant positive correlation between body image discrepancy and reports of faster eating pace (coefficient=0.237, p=0.004) (Table 4), indicating that as

**Table 2:** Body type perceptions and body image discrepancy of parent and child dyads (n=145).

	Parent	Child	p-value
Child’s current body type	3.69 ± 0.92	3.88 ± 0.98	0.022
Girls	3.65 ± 0.82	3.86 ± 1.01	0.065
Boys	3.73 ± 1.03	3.89 ± 0.95	0.184
Child’s ideal body type	3.70 ± 0.64	3.46 ± 0.84	0.001
Girls	3.63 ± 0.68	3.40 ± 0.83	0.016
Boys	3.80 ± 0.57	3.55 ± 0.85	0.031
Body type discrepancy*	-0.014 ± 0.72	0.414 ± 0.90	<0.001
Girls	0.025 ± 0.63	0.47 ± 0.95	<0.001
Boys	-0.063 ± 0.81	0.34 ± 0.84	0.003
*Body type discrepancy=Child’s current body type-child’s ideal body type			

**Table 3:** Correlations between parents (n=145) and children (n=145) on body weight and lifestyle behaviors.

	Co-efficient	p-value
Body weight	0.179	0.031
BMI	0.156	0.062
BMI category	0.215	0.009
Faster eating pace	0.034	0.685
Eating from pan	0.313	<0.001
Eating while watching TV	0.12	0.152
Eating when board	0.192	0.021
Eating late night	0.214	0.01
Screen time	0.244	0.003
Physical activity	0.257	0.002

**Table 4:** Correlations between body image discrepancy with BMI, eating behaviors, and physical activity behaviors in children.

	Coefficient	p-value
Body weight	0.212	0.011
BMI percentile	0.322	<0.001
BMI category	0.205	0.014
Current body image	0.575	<0.001
Ideal body image	-0.361	<0.001
Faster eating pace	0.237	0.004
Eating from pan	0.121	0.147
Eating while watching TV	0.097	0.244
Eating when bored	0.148	0.076
Eating late at night	0.078	0.348
Screen time	0.159	0.056
Physical activity	-0.033	0.689
Family physical activity	-0.183	0.028

body image discrepancy increased, eating pace increased. There was a significant inverse correlation between body image discrepancy and family physical activity (coefficient=-0.183,  $p=0.028$ ), indicating that as body image discrepancy increased, family physical activity together decreased. There was a trend toward positive correlation between body image discrepancy and eating when bored (coefficient=0.148,  $p=0.076$ ) and screen time (coefficient=0.159,  $p=0.056$ ). No significant correlations were observed between body image discrepancies and eating from the pan, eating while watching TV, eating late at night or physical activity hours.

## Discussion

### Body image discrepancy

The objective of this study was to use paired parent and child groups to examine differences in their perception of the child's body and its relationship to dietary and physical activity behaviors. Children perceived their bodies to be larger than their parents viewed their offspring's bodies. Children's ideal body type was thinner than what parents endorsed as ideal for their children. This contributed to a significantly substantial body type discrepancy among child responses compared to adult responses, indicating that children viewed themselves as currently being larger than parents did, while also wanting to be thinner compared to parent perceptions of ideal body size. This discrepancy indicates that children aged 7-12 may be experiencing aspects of distorted body image and body dissatisfaction, which are associated with the development of clinical eating disorders [5]. This finding aligns with previous studies that have found that child populations as young as 5 to 6-years-old, including those having healthy body sizes, experience body dissatisfaction and often wish their bodies were leaner, sometimes aspiring to unattainable and unhealthy thin body weights [1-4].

### Physical activity and nutrition

Physical activity and proper nutrition are effective methods for supporting normal growth and development in children and early initiation of these healthy behaviors encourages their continuation through adulthood, leading to improved health outcomes [29-31]. Our study supports previous findings that role modeling by parents might be important in the development of healthy physical activity and nutrition behaviors in children [13-16], as significant positive correlations between parent and child body weight, BMI category, physical activity and screen time were identified. These data along with previous evidence indicate a need for health interventions to include both parents and children in their efforts to maximize any beneficial impacts.

### Dietary behavior and body image

Other than a significant correlation observed for faster eating pace, this study did not find significant correlations between chaotic dietary behaviors and body image discrepancy. Reasons for this may include the young age of participants who, while already experiencing aspects of body dissatisfaction, may not yet be experiencing its behavioral manifestations. Another possible explanation may be that this study's questionnaires may not have successfully gathered all pertinent information regarding eating behavior and participants may have been engaging in other dietary behaviors not specified. For instance, one study of ten-year-old girls observed binge behaviors in 10% of participants and purging behaviors in 7% of participants [32].

Dietary restraint, which poses a threat to proper nutrition among children, has been observed among children as young as seven-years-old [33] and specifically among girls as young as 5-years-old [1]. Future research should examine the prevalence of these behaviors in conjunction with family dietary and physical activity behaviors.

### Limitation

The present study is not without limitations. This study utilized self-reported data for feasibility and efficiency of data collection. With self-reported data of any kind, participants' level of honesty and ability to recall information accurately must be considered. However, due to the anonymity of responses and option to decline participation, it is likely that most participants intended to provide honest responses. Parents were instructed to help children as needed, but not to influence their responses. The differences between "helping" and "influencing" can be difficult to discern when parenting young children. Also, because this study was completed in the family's home, parents might have felt more comfortable influencing their children. This study is based on research in primarily white population. There has been research in differences in body image ideal among other racial and ethnic groups [34,35]. Further research is needed specifically focused on differences in cultural, racial, and ethnic perspectives of idealized body images. The method of screen time assessment poses another limitation to this study. Screen time was assessed among parents and children; however, screen time type was not specified in this study's questionnaire, which was modeled after the validated Family Eating and Activity Habits Questionnaire [25]. The increasing use of technology for non-leisure activities indicates a need for differentiation when assessing screen time. For example, social media is a relatively new subcategory of screen time that has detrimental effects on mental health, self-esteem, body image [36] and body dissatisfaction [37,38]. Future studies should aim to investigate the differential impacts of various forms of screen use on body type discrepancy among children and parents. Another limitation to this study is the age range. The age range of 7-12 was selected because it is generally considered to be prior to pubertal onset. However, many girls experience pubertal onset prior to age 12. This difference between male and female development must be taken into consideration for future studies.

### Future considerations

This study's results indicate a need for increased focus on the development of health education programs that incorporate parental and child participation aimed toward preventing the development of body dissatisfaction in early childhood. Parents may be less well-informed about the impact of body image in early childhood, believing that body image becomes a problem only in early adolescence [39]. However, this does not seem to be the case. While some studies have found beneficial effects of parent-focused educational programs designed to promote body satisfaction and weight management in early childhood, the implementation of these programs is seemingly insufficient [40]. The full impact of body dissatisfaction and its associated factors on today's youth is not yet known as their effects may not manifest as measurable behaviors until individuals are well into adolescence or adulthood. Understanding the influences of familial, environmental, and physiological factors continues to be necessary in the aim toward developing targeted interventions for improving and maintaining the health and well-being of children throughout growth and development.



## Conclusions

This study found a discrepancy between the perception of children and their parents regarding body type. Children aged 7-12 perceived their body type as larger than their parents viewed their offspring's bodies. This indicates that even prepubertal aged girls and boys are preoccupied with body image and may be experiencing aspects of distorted body image and body dissatisfaction. Body weight, BMI, faster eating pace and less family physical activity may be contributing factors, however further research is needed to examine the influence of other factors such as type of screen time and additional specific eating behaviors.

## Conflict of Interest

All other authors declare that they have no conflicts of interest.

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## Author Contribution

Katelynn Sasaki: Conceptualization, Data curation, Formal analysis, Writing-Original draft preparation; Molly Ginsburg: Writing-Reviewing and Editing, Visualization; Celeste O'Mealy: Writing-Reviewing and Editing; Mee Young Hong: Conceptualization, Data curation, Formal analysis, Supervision, Writing-Reviewing and Editing. All authors have read and agreed to the published version of the manuscript.

## Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author.

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