

Association between maternal parenting style and body mass index among 6–12-year-old girls in Saudi Arabia: A pilot study

Authorship and Affiliation

Aljawharah Alabdulkarim ¹; Lamia Binshaieg ¹; Ghadah Alrashood ¹; Shooq Alkhudhiri ¹; Yasmeeen Alqahtani ¹; Nada Benajiba ²; Enmanuel A. Chavarria ³; Joshua Bernstein ⁴; Basil H. Aboul-Enein ⁵

¹ Princess Nourah Bint Abdulrahman University
College of Health and Rehabilitation Sciences
Department of Health Sciences
Riyadh, Saudi Arabia
Email: aljawharahalabdulkarim@gmail.com; lamiabinshaieg@gmail.com; ohghada@gmail.com; shooqy51@hotmail.com; yasmeeen9763@gmail.com

² Ibn Tofail University-CNESTEN
Joint Research Unit in Nutrition and Food
RDC-Nutrition AFRA/IAEA
Rabat, 14000 Kenitra, Morocco
E-mail: benajibanada@gmail.com

³ Emory University
Rollins School of Public Health
Department of Behavioral, Social, and Health Education Sciences
1518 Clifton Rd. NE
Atlanta, GA 30322
E-mail: Enmanuel.Chavarria@Emory.edu

⁴ A.T. Still University of Health Sciences
College of Graduate Health Studies
Doctor of Education in Health Professions Department
800 W. Jefferson St.
Kirksville, MO 63501 USA
E-mail: jbernstein@atsu.edu

⁵ London School of Hygiene & Tropical Medicine
Faculty of Public Health and Policy
15-17 Tavistock Place
London
WC1H 9SH
United Kingdom
E-mail: Basil.Aboul-Enein@lshtm.ac.uk

Corresponding Author

Basil H. Aboul-Enein
London School of Hygiene & Tropical Medicine
Faculty of Public Health and Policy
15-17 Tavistock Place
London
WC1H 9SH
United Kingdom
E-mail: Basil.Aboul-Enein@lshtm.ac.uk

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Abstract

Background: An increasingly high prevalence of overweight and obesity exists among Saudi children. Parenting style may serve as a potential predictor in overweight and obesity.

Aim: This study examines parenting style as a potential predictor relationship in overweight and obesity among Saudi children.

Methods A cross-sectional study involving 92 paired girls and mothers was conducted to determine the association between maternal parenting styles and Saudi girls' BMI.

Findings: The results indicated that the most prevalent parenting style was the authoritative. Majority of students have a moderate obesogenic environment. However, it was not significantly correlated with students BMI. Also, parenting styles was not significantly correlated with an obesogenic environment.

Conclusion: Factors other than maternal parenting styles such as environmental factors, families' socioeconomic status, or cultural factors might be stronger contributors to an obesogenic environment. Larger heterogenous studies are warranted to explore children's BMI and parenting styles associations in Saudi Arabia.

Keywords

Parenting styles; Saudi Arabia; Body Mass Index; Children

Key points

- This is the first pilot study that investigates the association between maternal parenting style and body mass index (BMI) among 6-12 years old girls in an Arab country.
- Most prevalent parenting style obtained in the sample study was the *authoritative*. However, it was not significantly correlated with students BMI.
- The findings of this pilot study indicated that further studies are needed to explore the association between children's BMI and parenting styles and to include heterogeneous samples in Saudi Arabia.

Reflective Questions

- What are the four Baumrind's parenting typologies?
- Aside from parenting styles, children's BMI could be influenced by what other factors?
- What further research is warranted to explore children's BMI and parenting styles associations in Saudi Arabia?

Introduction

Family is of great influence in the life of children (Ventola et al. 2017). Among children raised in a traditionally viewed family structure, parents serve as primary role models and the center of the family. Furthermore, the way parents rear children differ from culture to culture and family to family as observed following a survey of global parenting (Lansford et al. 2016). Since the 1940s, researchers have inquired on the differences between parents rearing practices and how they affect childhood development (Ventura and Birch 2008). The same study reported that parenting styles explain the variations between parental outlooks of interacting with children that will produce individual distinctions related to the child outgrowth, and parenting practices referred to the way parents socialize their children by implementing particular behavioral approaches. Moreover, developmental psychologists defined the concept of parenting style as a typology of attitudes and behaviors that characterize how a parent will interact with a child across domains of parenting (Sokol et al. 2017).

Review of the Literature

Recent studies using Baumrind's parenting typologies have explored parenting styles as it relates to child obesity (Johnson et al. 2012; Kiefner-Burmeister and Hinman 2020; Rutledge et al. 2019). These four types are: high acceptance/high control which is known as *authoritative*, low acceptance/high control known as *authoritarian*, high acceptance/low control known as *indulgent* or *permissive*, and low acceptance/low control known as *neglectful* (Baumrind 1966). Childhood health and well-being is one aspect affected by parenting styles (National Academies of Sciences et al. 2016). Additionally, parenting style can affect the child's physical activity and dietary behavior, since parents are responsible for their children's eating habits and their activity (Melis Yavuz and Selcuk 2018; Tami et al.

2015). As such, several studies found that parenting style type influences the child's weight and body mass index (BMI) (Fuemmeler et al. 2012; Sokol et al. 2017). An NIH study found that authoritarian and neglectful parenting styles were associated with higher body mass index (BMI) (Fuemmeler et al. 2012). Another study carried out on Mexican American mothers revealed that higher rates of overweight and obesity are seen among those with indulgent parenting styles, compared to authoritative and authoritarian parenting styles (Olvera and Power 2010). However, another study found contrasting results, where parenting style was not associated with risk of being obese or overweight (Sokol et al. 2017). Lack of consistency in the literature about the effect of parenting style on childhood BMI, overweight, and obesity could be a result of cultural variation. For this reason, we sought to examine the association between parenting style and BMI in Saudi Arabia. The rationale for this examination is the increasingly high prevalence of overweight and obesity (13.4% and 18.2 respectively in 2019) among Saudi children who aged from 6 to 11 years old and in light of the 'Saudi Vision 2030' initiative (Al-Hussaini et al. 2019; Rakha et al. 2022). The same study reported that overweight and obesity prevalence were higher among girls than boys. Obesity and overweight are considered serious health concerns in Saudi Arabia because they increase the risk of developing health complications such as diabetes and cardiovascular diseases in adult life (Sahoo et al. 2015). Additionally, the convergence of little to no organized physical or sport-related activity, increased screentime (video games, television, mobile devices), and low quality convenience foods have a significant and adverse effect on Saudi children (Al Harthi and El-Araby 2019).

Our efforts add to the established literature by examining parenting style as a potential predictor relationship in overweight and obesity among Saudi children, which is yet to be investigated in an Arab country. Our efforts examine and focus on how parenting styles of Saudi mothers correlate with their children's BMI, dietary habits, and physical activity.

Methods

A cross-sectional descriptive study was conducted [REDACTED] in Riyadh, Saudi Arabia. The school is located on the university campus, and it is exclusive for [REDACTED] faculty. The study was carried out among female students from first grade to sixth grade, ages 6 to 12 years old. The participants' mothers who are faculty members at [REDACTED] were included in the study. Participants who were not living with their mothers, or who were suffering from chronic illness or allergy related to diet and physical activity were excluded from the study. Non-probability purposive sampling was used to obtain a participant sample from each class. Participants included 123 students and 123 mothers. Mothers with more than one child ages 6 - 12 years old attending the same school were requested to answer for only one child. Incomplete data were removed, and the final analytical sample was 92 students and 92 mothers. Before initiating the study, the ethical approval was taken from the Institutional Review Board committee of [REDACTED] (IRB Number 19-0289). Also, an approval was taken from the school. Before answering the questionnaire, mothers were informed about the purpose of the study, and signed a written consent that includes participating details (voluntary participation, no harm or benefits to all participants, no penalty for withdrawing from the study or for refusing to participate, the obtained information will be confidential).

Anthropometrics

Trained clinical nutrition researchers performed the anthropomorphic measurements. Height was measured using a Stadiometer in centimeters (measurements were read to the nearest 0.1 cm). Weight was measured using an electronic scale in kilograms (weight was

documented to the nearest 0.1kg). Height and weight were used to calculate the students' BMI (read to the nearest 0.01 kg/m²). Results were interpreted and compared to standardized measurements from CDC growth chart and categorized to the following categories: underweight (Less than the 5th percentile), normal weight (5th percentile to less than the 85th percentile), overweight (85th to less than the 95th percentile), and obese (95th percentile or greater) (CDC. 2017).

Questionnaires

Information about dietary behavior, physical activity and parenting style were collected from mothers. We utilized a 3-section questionnaire covering socio demographics, parenting style, and obesogenic environment (physical activity/inactivity, and dietary habits). Items in the questionnaires were elicited from valid and reliable English language measures. Validated measures were translated from English to Arabic using the Brislin method where items were then translated back to English by an expert for further clarity (Cha et al. 2007). The final translated Arabic questionnaire was pre-tested among a small number of mothers prior to full implementation.

Sociodemographic Items

Sociodemographic characteristics of the participants were collected by asking three questions. The first question was the students' date of birth, it was used to calculate BMI for age. The second question was the mothers' educational level, and the third question was the household income.

Parenting Style Items

The valid and reliable Parenting Style Four Factor Questionnaire (PS-FFQ) was utilized (Shyny 2017). Containing 32 items, the questionnaire categorizes the parenting styles most used by mothers to rear their children. Mothers were asked to respond to the five-point

scale in the questionnaire (five to one score), answering 5 for “all the time”, 4 for “most of the time”, 3 for “sometimes”, 2 for “rarely” and 1 for “never”. The results provided four separate parenting scores for each participant, namely authoritarian, authoritative, neglectful, and indulgent. Each group of statements indicates one of the parenting styles.

Obesogenic Environment

The Family Nutrition and Physical Activity (FNPA) screening tool items were used to assess dietary habits and physical activity (Ihmels et al. 2009; Tami et al. 2015). The valid and reliable 20 items comprise a behaviorally based assessment designed to evaluate obesogenic environments and practices that may predispose children to overweight and obesity. All 20 items reflect the obesogenic environment of the children in general, and within these items there are three categories representing a certain set of items; child nutrition category are items 1-9, items 10-13 assess sedentary activity, items 14-18 assess physical activity, and items 19-20 reflect the overall obesogenic environment. The total maximum score for the obesogenic environment was 80 and the minimum was 20 with three cut-off points; high obesogenic: 20-40, Moderate obesogenic: 41-60, Low obesogenic: 61-80. Whereas for the children's nutrition the maximum score was 36 and the minimum score was 9 with three cut-off points; Good nutrition: 28-36, Moderate nutrition: 19-27 and Poor nutrition: 9-18. The maximum children's physical activity score was 20 and the minimum score was 5 with three cut-off points: low physical activity: 5-10, moderate physical activity 11-15, and high physical activity 16-20. Finally, the total maximum score for the sedentary activity was 12 and the minimum score was 3, the three cut-off points were High: 9-12, Moderate: 6-9, Low: 3-6.

Statistical Analysis

SPSS version 21 was used to complete a Chi Square data analysis. For variables that are less than five categories, Fisher's Exact Test was used for correction. Incomplete data was removed before the analysis. Categorical data were represented using a frequency table as

numbers and percentages, and associations between different variables. Results were considered as significant when the p-value was $<.05$.

Results

The socio-demographic characteristics of participants (n=184; 92 mothers and 92 daughters) revealed 73.9% of mothers had four or more children while 1.1% had one child. And 58.7% of the mothers had doctoral degrees, and 15.2% of them had master's degrees. The mean for children age was 7.6 years old, and 42% of them were 7 years old. Table 1 illustrates the mothers parenting styles with 89.1% using authoritative parenting style while only 1.1% of the mothers categorized as uninvolved. In addition, 6.5% of mothers had a permissive parenting style. Overweight and obese students were 37% of the sample, 26.1% of students were overweight and 10.9% were obese. In addition, most students (56%) had a healthy weight. The distribution of students according to obesogenic environment is represented in table 2, nutrition, physical activity, and sedentary activity. Most of the students (82.6%) had a moderate obesogenic environment while no students had a high obesogenic environment. Low physically active students were 44.6%, and 5.4% of students had a high sedentary activity. Also, students with good nutrition were 33.7% of the sample. Moderate nutrition was the most prevalent among students 66.3%.

Table 3 shows the association between parenting styles and students BMI. The majority of obese students (80%) have mothers who follow the authoritative parenting style. In addition, the highest percentage of overweight students (91.7%) was found among authoritative mothers. No statistical significance was obtained between different parenting styles and students BMI ($P = .955$).

Table 4 reports the association between obesogenic environment and categories of students' BMI. Approximately 81% of healthy weight students were found to have moderate

obesogenic environment. Similarly, 80% of obese and 91.7% of overweight students are within moderate obesogenic environment. No statistically significant association between obesogenic environment and BMI was obtained (p-value =.377).

Generally, physical activity level did not differ significantly across weight status categories. No statistical significance correlation between BMI and level of physical activity was found (p-value = .395). Regarding the association between sedentary activity and students BMI, the majority of students adopted moderate sedentary activity.

The association test between physical activity and parenting styles found 46.3% of students with mothers using an authoritative-parenting style have low physical activity, while a relatively similar number of students 43.9% follow moderate physical activity (p=.345). Regarding the association between sedentary activity and parenting style, 95.1% of students among mothers who adopted authoritarian parenting style have sedentary activity (p =.172). In addition, no significant association between parenting styles and nutrition (p=.321) was found. Results summarized in table 5 revealed that no significant association exists between parenting styles and obesogenic environment (p=.501).

Discussion

The objectives of this study were to measure the students BMI, identify the parenting styles mothers adopted, assess the obesogenic environments, and assess the associations between these variables. Childhood obesity prevalence in Saudi Arabia rose from 2.7% in 2006 to 18.2% in 2015 (Al-Hussaini et al. 2019). Based on the aforementioned, it is important to further investigate contributing factors of childhood obesity. Furthermore, although the literature contains many studies on obesity and overweight, few focus on parenting styles as a contributing factor to children's obesity. The literature communicates conflict in the labeling of parenting styles by Saudi families. Prior literature communicates

that Saudi families tend to adopt an authoritarian parenting style (Dwairy et al. 2006). Yet, more current literature suggests 94% of the Saudi parents (n=282) adopted an authoritative parenting style (Alagla et al. 2019). The small nuance in category prompted further investigation. Our finding is consistent with the efforts of Alagla et al. (2019) and their finding, which states that 94% of the parents, adopted authoritative parenting style, while our data communicates that 89.1% (n= 92) of mothers adopted an authoritative parenting style. The suggested reason behind this small nuance might stem from the level of education held by the mothers of the students in our sample. The mothers were predominantly well educated as 58.7% of them have a doctoral degree. However, Rakha et al. (2022) found widespread parental reluctance to adopt overarching health guidelines associated with weight and BMI in households with children age 3-12. Interestingly, in yet another study conducted by Mortada et al. (2017) among █████ Saudi (not Saudi female employees) obtained the same results even when the sample was heterogeneous, as their educational level was distributed as the following: 15.4% high school degree, 50% bachelor's degree, 14.6% master's degree, and 20% doctoral degree (Mortada et al. 2017). Despite the distribution of education level, the majority of the sample had authoritative parenting styles. Thus, further investigations may lead to conclusive results on categorizing Saudi parenting styles.

Our results showed that 26.1% of children (n = 92) were obese while 10.9% were overweight. This totals in 37% of children sampled are struggling with obesity, or at risk of obesity which is most definitely an alarming percentage. Additionally, we found that 82.6% of students have a moderate obesogenic environment, and 80% of children with obesity had a moderate obesogenic environment. Nonetheless, the percentage of households with a moderate obesogenic environment were similar where 80.4 % of those children in the healthy weight category also lived in a moderate obesogenic environment. Thus, our findings suggest

that an obesogenic environment does not affect children's BMI. Thus, conclusive evidence remains to be sought on the subject.

The physical activity section of the FNPA tool showed that 44.6% of the sample were physically inactive, moreover, a brief review study indicated that the physical inactivity rate in Saudi Arabia ranged from 43.3% to 99.5%, and Saudi females had a higher physical inactivity rate than males (Al-Hazzaa 2004). Further, the above finding is repeated in separate 2016 study (Ahmed et al. 2016) where 96.7% of female Saudi children had low physical activity and none of them had high physical activity.

Furthermore, our results communicate that there is no statistical significance between different parenting styles and students' BMI (p-value=.955). The results also demonstrate no association between the obesogenic environment and BMI (p-value =.377). These findings could be due to the sample being homogeneous and included only mothers. Along with this, students were recruited from one school. Lending to this topic, a systematic review study concluded that there is an association between parenting styles and children's weight, and indulgent and uninvolved parenting styles were associated with greater children's BMI (Shloim et al. 2015). However, the same study suggested that feeding practices were more consistently related to the risk of children's obesity than parenting styles. Additionally, a cohort study, conducted by Fuemmeler et al. (2012) assessed the relationship between parenting styles and changes in body mass index (BMI) from adolescence to young adulthood. The sample of the study included 20,745 participants and the results indicate that adolescents with authoritarian or uninvolved parents had greater increases in BMI (Fuemmeler et al. 2012). In contrast, our study is cross sectional, and there was no association found between parenting styles and children's BMI.

Additionally, we find that the distribution of parenting styles among participants could affect the results. For example, a study conducted among 80 Mexican American

mothers found that 19% of them were authoritative, while 16% are authoritarian, 37% of them are uninvolved, and 28% of them are indulgent (Olvera and Power 2010). The study illustrates that parenting styles may affect children's BMI. Our study finding did not include findings of parents representing the four types of parenting styles because 89.1% of our sample were authoritative and only 1.1% of them were uninvolved. Additionally, we did not find an association between the obesogenic environment (FNPA) and children's BMI. The present finding also supports Johnson et al. (2012) findings in which the assessed association between children's BMI and obesogenic environment (using the FNPA tool) found no association. However, the same study illustrates that there is a significant association between an obesogenic environment and parenting styles, and their results showed that FNPA score was positively associated with score on the authoritative parenting scale but negatively associated with scores on the authoritarian and permissive scale.

Thus, aside from parenting styles, children's BMI could be influenced by numerous other factors such as socioeconomic status, ethnicity, race, environmental factors, and culture. For example, efforts by Balistreri and Van Hook (2009) illustrate that family income had a strong negative association with children's BMI, and parental education had weak negative association with children's BMI (Balistreri and Van Hook 2009).

Limitations

This study had several limitations worth noting. First, the uneven distribution of categorical data (parenting style and children's BMI). Additionally, our sample size was small; only 92 mothers and 92 children were included. Also, we used a purposive sampling method, that resulted in our sample being of a homogenous make up. Most of the mothers had doctoral degrees, and most of them adopted authoritative parenting styles. As a consequence, the sample may not be representative of Saudi children and mothers. Thus, our results might not be generalizable to all of Saudi Arabia's populations. We also recommend

including fathers in future studies and ensuring a varied socioeconomic makeup of participants. Based on the literature and our results, we recommend undertaking larger studies regarding parenting styles and children's BMI in Saudi Arabia. Additionally, further studies are needed to investigate factors that contribute to children's obesity in Saudi Arabia other than parenting styles. Obesity-reducing awareness programs and campaigns are in need in order to lower the obesogenic environment among Saudi families.

Conclusion

This study set out to examine BMI among female students from first grade to sixth grade, ages 6 to 12 years old, and to identify the parenting style that their mothers adopt. To our knowledge, this is the first pilot study to be conducted in an Arabic-speaking country. We assessed the obesogenic environment of the students and examined if there was an association between the variables. The main findings among our population can be summarized as follows: 1- there is no association between maternal parenting style and children's BMI. 2- there is no association between maternal parenting style and obesogenic environment. 3- There is no association between an obesogenic environment and children's BMI. These results may be due to the homogeneous make up of our sample. Thus, factors other than maternal parenting styles such as environmental factors, families' socioeconomic status, or cultural factors might be stronger contributors to an obesogenic environment.

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Running Head: BMI and parenting style among Saudi girls**Table 1:** The distribution of the parenting styles adopted by mothers and the girls according to their BMI

	Frequency	Percent
Parenting style		
Authoritative	82	89.1
Permissive	6	6.5
Uninvolved	1	1.1
Authoritarian	3	3.3
Total	92	100.0
BMI category		
Under weight	2	2.2
Healthy weight	56	60.9
Overweight	24	26.1
Obese	10	10.9
Total	92	100.0

Running Head: BMI and parenting style among Saudi girls**Table 2:** Distribution of students according to obesogenic environment, nutrition, physical activity, and sedentary activity (N=92)

	Frequency	Percent
Obesogenic environment		
High obesogenic environment	0	0
Moderate obesogenic environment	76	82.6
Less obesogenic environment	16	17.4
Total	92	100.0
Physical activity		
High physical activity	9	9.8
Moderate physical activity	42	45.6
Low physical activity	41	44.6
Total	92	100.0
Sedentary activity		
High sedentary activity	5	5.4
Moderate sedentary activity	87	94.6
Low sedentary activity	0	0
Total	92	100.0
Nutrition		
Poor nutrition	0	0
Moderate nutrition	61	66.3
Good nutrition	31	33.7
Total	92	100.0

Running Head: BMI and parenting style among Saudi girls

Table 3: The association between parenting styles adopted by mothers and students BMI

		Parent style				Total	
		Authoritative	Permissive	Uninvolved	Authoritarian		
Categories of BMI	Under weight	Frequency	2	0	0	0	2
		Percent	100.0	0.0	0.0	0.0	100
	Healthy weight	Frequency	50	4	1	1	56
		Percent	89.3	7.1	1.8	1.8	100
	Overweight	Frequency	22	1	0	1	24
		Percent	91.7	4.2	0.0	4.2	100
	Obese	Frequency	8	1	0	1	10
		Percent	80.0	10.0	0.0	10.0	100
	Total	Frequency	82	6	1	3	92
		Percent	89.1	6.5	1.1	3.3	100
p-value =.955							

Running Head: BMI and parenting style among Saudi girls

Table 4. The association between obesogenic environment and categories of students BMI

			High obesogenic environment	Moderate obesogenic environment	Less obesogenic environment	Total
Categories of BMI	Under weight	Frequency	0	1	1	2
		Percent	0	50	50	100
	Healthy weight	Frequency	0	45	11	56
		Percent	0	80.4	19.6	100
	Over weight	Frequency	0	22	2	24
		Percent	0	91.7	8.3	100
Total	Obese	Frequency	0	8	2	10
		Percent	0	80	20	100
	Frequency	0	76	16	92	
	Percent	0	82.6	17.4	100	
p-value =.377						

Running Head: BMI and parenting style among Saudi girls

Table 5: The association between obesogenic environment and parenting styles

			High obesogenic environment	Moderate obesogenic environment	Less obesogenic environment	Total
Parenting style	Authoritative	Frequency	0	66	16	82
		Percent	0	80.4	19.5	100
	Permissive	Frequency	0	6	0	6
		Percent	0	100	0	100
	Uninvolved	Frequency	0	1	0	1
		Percent	0	100	0	100
	Authoritarian	Frequency	0	3	0	3
		Percent	0	100	0	100
	Total	Frequency	0	76	16	92
		Percent	0	82.6	17.4	100
p- value=.501						