Home Environment Characteristics and BMI Z-Score Among Saudi Preschool Children: A Feasibility Study

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Abstract: *Objective*: To assess feasibility of using preschools in Saudi Arabia as a source for collecting nutrition-related data; To examine associations among home environment characteristics and child BMI z-score (BMIz).

Methods: Fifty-three (3-5 years old) children and their mothers were recruited from two preschools in Jeddah, Saudi Arabia. Mothers completed a self-administered questionnaire. Child anthropometry was completed using standardized procedures. BMIz was calculated using the WHO growth standards and reference data. Associations between child and home environment variables were tested using Pearson correlation, t-tests and ANOVA.

Results: Participation rate in the middle-to high-income preschool was higher compared to the low- to middle-income preschool (27.3% vs. 17.4%, respectively). Increase in child age and maternal BMI were associated with lower maternal playtime with the child (r= -0.31, p= 0.02, and r= -0.38, p= 0.006, respectively). Increase in child age was also associated with lower paternal playtime with the child (r= -0.26, p= 0.05). Paternal playtime with the child was positively associated with both paternal involvement in feeding (r= 0.30, p= 0.03) and regular family mealtimes (r= 0.26, p=0.05). There was a trend of positive association between paternal involvement in feeding and higher child BMIz (r= 0.26, p=0.08). Mean child BMIz was lower when mothers had ≥ a college education vs. not (p= 0.04). Greater child screen time was associated with fewer family mealtimes (p= 0.01).

Conclusion: Increasing awareness is needed in order to improve feasibility of studies conducted in Saudi preschools; Future work is needed to further establish the associations of home environment characteristics and child obesity.

Keywords: Saudi, Feasibility, Preschool, BMI, Home environment, Family.

BACKGROUND

Obesity is associated with many health consequences [1], and is considered a worldwide public health concern. During the first few years of life, children develop lifelong eating habits and lifestyle behaviors [2,3], and their weight status during this period can affect obesity risk in subsequent years [4,5]. In order to effectively combat child obesity, modifiable risk factors must be identified at an early age [6]. Characteristics of the home environment, including family characteristics and behaviors, are considered important modifiable risk factors for childhood overweight and obesity [3,7-9], and have been a target for obesity intervention programs [10,11]. Examples of family characteristics and behaviors found to be associated with child body mass index (BMI) or dietary intake include; maternal BMI, education and employment status [9,12], paternal involvement in child feeding [13,14], and regular gathering of the family to eat the evening meal [15].

In the Kingdom of Saudi Arabia (KSA), the prevalence of obesity and obesity related diseases (e.g., type 2 diabetes) has been alarmingly increasing [16]. The prevalence of overweight and obesity among children is concerning; Around 32% of children were found to be overweight or obese in 2010 [17]. Moreover, Saudi Arabia is classified as a country experiencing advanced nutrition transition; Dietary patterns are rapidly and drastically changing to mimic those seen in western countries [18,19]. It is suspected that these changes in dietary intake are secondary to changes in socioeconomic status and social and familial norms and functioning [20].

Among Saudi primary school children, the increasing prevalence of overweight and obesity has been attributed to dietary habits and sedentary lifestyle [21-24]. However, associations between home and family characteristics with BMI among children are not well established. In addition, studies among pre-primary school children are scarce [25], and associations between the home environment and BMI among this age group has not been explored. Identifying associations between characteristics of the home environment and BMI can help researchers and practitioners identify children at risk of obesity, and can help develop an obesity intervention framework that is culturally-sensitive.

Traditionally, pre-primary schools (i.e., preschools) have been an invaluable resource through which researchers may recruit healthy children who are less

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than 6 years of age for participation in research studies [26-28]. However, efficacy of using preschools as a recourse for data collection in Saudi Arabia is unknown. Documenting the feasibility of using preschools in Saudi Arabia as a source for collecting nutrition-related data can help inform and aid the design of future studies aiming to examine correlates with child weight and nutritional status.

The objectives of this study were to: 1) Assess the feasibility of using preschools in Saudi Arabia as a source for collecting nutrition-related data; 2) Examine associations among characteristics of the home environment and BMI z-score (BMIz) in a group of Saudi preschool children.

METHOD

Sample and Procedure

Three preschools were contacted between September 2016 and March 2017. An official letter was sent and the study protocol was further explained to each school principle/supervisor over the phone. Study packets were sent home in the backpacks of 249 students. Each study packet included a recruitment form to screen for eligibility, a consent form, and the study questionnaire. Of the 249 study packets sent home, 65 (26%) were completed by mothers and returned to the school in a sealed envelope. Of the 65 participants, 53 had complete data on all variables, and these 53 mothers and their children were included in the final sample. The study inclusion criteria include; child aged between 3 and 5 years old, with no serious medical problems or history of food allergies and living with his/her biological mother. Participants received a small monetary compensation upon completion of the study. Ethical approval for this study was obtained from King Abdul-Aziz University Biomedical Ethics Unit.

Arrangements with the Preschools

The first preschool (Preschool A) that the study team contacted was located in the Northern area of the city of Jeddah (known to house well-off families), and included predominantly middle- to high-income families. One hundred and thirty-nine (n=139) children were enrolled in the preschool. The preschool owner, who also worked on site at the school, was very cooperative, and expressed deep interest in nutrition and healthy eating.

The second preschool (Preschool B) that the study team contacted was located in the South-Central area of the city of Jeddah (known to house lower-income families), and included predominantly low- to middle - income families. One hundred and nine (n=109) children were enrolled in the preschool.

The third preschool (Preschool C) that the study team contacted was located in the Southeast area of the city of Jeddah (known to house low-income families), and included predominantly low-income families. The school director declined to cooperate with the study team, citing mainly shortage of staff and that the teachers were not available to assist with distribution/collection of questionnaires.

Measures

Child and Home Environment Characteristics

The study questionnaire was an 18-item self-administered questionnaire; It included questions about child and home environment characteristics which previous studies found to be associated with child BMI or related outcomes. The questionnaire was in Arabic (the native language of all participants). Child characteristics assessed include: 1) Child sex (male vs. female); 2) child age (as a continuous variable); 3) Child screen time, assessed by asking mothers to report the average number of hours that the child usually spends using electronics (e.g., T.V, tablet, video games) per day (response options: none, 1 to 2 hours, 3 hours or more) [29]; 4) Child relative activity, assessed by asking mothers to rate the child's average physical activity level compared to others with similar age and sex characteristics (5-point Likert response scale, with 1= much lower and 5= much higher) [30]. Child screen time and child relative activity were used in this analysis as continuous variables.

Home environment characteristics assessed include: 1) Maternal age (as a continuous variable); 2) Maternal marital status (response options: married, separated, divorced, widowed, other), collapsed for this analysis into "married" vs. "single"; 3) Maternal education (response options: completed primary school, completed middle school, completed high school, completed college, completed a postgraduate degree), collapsed for this analysis into "less than a college education" vs. "more than or equal to a college education"; 4) Maternal weight and height, which were later used to calculate Maternal BMI by dividing weight (kg) by height^2 (m^2) (included in the analysis as a continuous variable); 5) Maternal employment (response options: employee, student, none of the above), collapsed for this analysis into employee or student = "yes" vs. none of the above= "no"; 6) Maternal work hours per day (response options: less than 4 hours, 4–8 hours, more than 8 hours, N/A (not applicable)); 7) Maternal playtime with child, assessed by asking mothers to rate how often they engage in active play with the child (5-point Likert response scale, with 1= never and 5= always)[31]; 8) Paternal work hours per day (response options: less than 4 hours, 4–8 hours, more than 8 hours, N/A (not applicable), collapsed for this analysis into "4-8 hours" vs. "more than 8 hours", as none of the responses fell into the other two categories; 9) Paternal playtime with child, assessed by asking mothers to rate how often the father of the child engages in active play with the child (5-point Likert response scale, with 1= never and 5= always)[31]; 10) Paternal involvement in feeding, assessed by asking mothers to rate how often the father of the child participates in making decisions regarding the child's nutrition (5-point Likert response scale, with 1= never and 5= always)[14]; 11) Regular family mealtimes, assessed by asking mothers to rate how often the their family gathers to eat the main meal of the day together (5-point Likert response scale, with 1= never and 5= always)[31]; 12) Grandparents' involvement in feeding, assessed by asking mothers to rate how often the child's grandparents participate in making decisions regarding the child's nutrition (5-point Likert response scale, with 1= never and 5= always) [32].

Maternal playtime with child, paternal playtime with child, paternal involvement in feeding, regular family mealtimes, and grandparents' involvement in feeding were included in this analysis as continuous variables.

Face validity of the questionnaire was assessed by performing a pretest among a group of mothers (n=8) with similar characteristics as mothers in the study sample. Some questions and response options were revised based on mothers' feedback, and some of the wording was adjusted for clarity. Furthermore, the questions were reviewed by an expert in childhood obesity studies.

Child BMI z-Score

Anthropometric measurements of children participating in the study were completed at the preschools by trained research assistants, using a digital scale and stadiometer. Standardized procedures to measure the weight and height of each child were followed. To avoid transcription error, two research assistants were present to measure weight and height; one obtained the measurement, and the other recorded the data. Shoes and heavy clothing were removed. The child was asked to stand still on the scale, with his/her weight equally distributed on both feet. Each child was weighed twice, and if the two readings were inconsistent by more than 0.1kg, the child was weighed two more times. Similarly, height was measured twice; if the measurements varied by more than 0.5 cm, two more measurements were taken [33]. BMI was calculated by dividing weight (kg) by height^2 (m^2), and z-scores were calculated based on the World Health Organization (WHO) age- and sex-specific growth standards and reference data [34,35].

Statistical Analysis

Analyses were conducted using IBM SPSS Statistics 21.0 (Armonk, NY, USA). Descriptive statistics were used to examine sample characteristics and differences by preschool; Chi-square statistics was used for categorical variables, and independent samples t-tests were used for continuous variables. Intercorrelations among continuous child and home environment variables and child BMIz were tested using Pearson correlation. Differences in child outcomes (including BMIz) by categorical home environment variables were tested using independent samples t-tests and one-way ANOVA. Significance level was set at $p \leq 0.05$.

RESULTS

Participation Rate

The overall participation rate from both schools involved in the study was 26%. In Preschool A, 38 of the 139 mothers who were contacted participated in the study (participation rate 27.3%). In preschool B, 19 of the 109 mothers who were contacted participated in the study (participation rate 17.4%) (Figure **1**).

Sample Characteristics

About half of the children participating in the study (47.2%) were male, and mean child age was 4.94 (SD= 1.10). Mean child BMIz was 1.10 (SD= 1.22). The majority of mothers (92.5%) were married, and had a college education or higher (88.7%). However, most of the mothers (60.4%) were unemployed. A large proportion of children (41.5%) had 3 hours or more of screen time per day (Table **1**). There were no significant differences between Preschool A and Preschool B with regard to any of the child, maternal, and home environment variables.

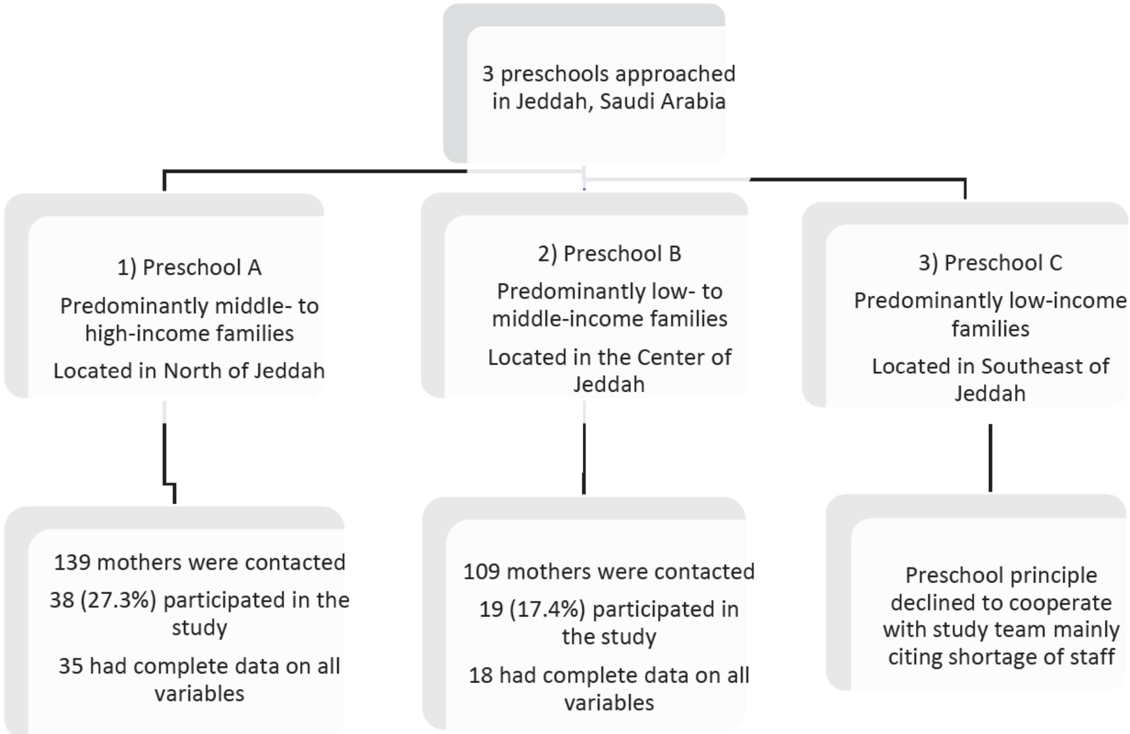

Figure 1: Description of preschools approached; Location and participation rate.

Table 1: Sample Characteristics and Differences by Preschool

Variable	Total N= 53	Preschool A N= 35	Preschool B N= 18	*P*
Child Sex, n (%)				
Male	25 (47.2)	16 (45.7)	9 (50)	0.76
Female	28 (52.8)	19 (54.3)	9 (50)	
Child Age, M (SD)	4.94 (1.10)	4.79 (1.04)	5.2 (1.19)	0.17
Child BMI z-score, M (SD)	1.10 (1.22)	1.15 (1.07)	1.01 (1.48)	0.70
Maternal Age, M (SD)	32.9 (5.67)	32.14 (4.68)	34.3 (7.07)	0.20
Maternal Education, n (%)				
≥ College	47 (88.7)	32 (91.4)	15 (83.3)	0.37
< College	6 (11.3)	3 (8.6)	3 (16.7)	
Maternal BMI, M (SD)	26.7 (6.96)	27.16 (7.72)	25.9 (5.07)	0.57
Maternal Employment, n (%)				
Yes	21 (39.6)	15 (42.9)	6 (33.3)	0.50
No	32 (60.4)	20 (57.1)	12 (66.7)	
Maternal Work Hours per Day, n (%)				
< 4	2 (3.80)	1 (2.9)	1 (5.6)	
4 - 8	10 (18.9)	7 (20.0)	3 (16.7)	0.79
>8	9 (17.0)	7 (20.0)	2 (11.1)	
N/A	32 (60.4)	20 (57.1)	12 (66.7)	
Maternal Playtime with Child, M (SD)	2.49 (0.86)	2.45 (0.91)	2.55 (0.78)	0.70
Paternal Work Hours per Day, n (%)				
4-8	21 (36.9)	13 (37.1)	8 (44.4)	0.35
>8	32 (60.4)	22 (62.9)	10 (55.6)	

(Table 1). Continued.

Variable	Total N= 53	Preschool A N= 35	Preschool B N= 18	*P*
Paternal Playtime with Child, M (SD)	2.37 (0.90)	2.37 (0.91)	2.38 (0.91)	0.94
Paternal Involvement in Feeding, M (SD)	2.27 (1.05)	2.41 (1.13)	2.00 (0.84)	0.18
Regular Family Mealtimes, M (SD)	2.92 (0.99)	2.80 (1.05)	3.16 (0.85)	0.20
Grandparents' Involvement in Feeding, M (SD)	1.71 (1.07)	1.82 (1.05)	1.50 (1.09)	0.30
Child's Screen time (Hours per Day), n (%)				0.73
0	8 (15.1)	6 (17.1)	2 (11.1)	
1-2	23 (43.4)	14 (40.0)	9 (50.0)	
≥ 3	22 (41.5)	15 (32.9)	7 (38.9)	
Child Relative Activity, M (SD)	2.14 (0.91)	2.08 (1.01)	2.23 (0.66)	0.58

BMI, Body mass index. BMIz, Body mass index z-score
Table showing means (M) and standard deviations (SD) or counts (*n*) and percentages (%).
Significant differences between weight status groups tested by *t*-tests for continuous variables and Chi-square tests for categorical variables.

Associations of Home Environment Characteristics with Child Outcomes and BMIz

Increase in child age and maternal BMI were each associated with lower maternal playtime with the child (*r*= -0.31, *p*= 0.02*, and r*= -0.38, *p*= 0.006, respectively). Similarly, increase in child age was also associated with lower paternal playtime with the child (*r*= -0.26, *p*= 0.05). Paternal playtime with the child was positively associated with both paternal involvement in feeding (*r*= 0.30, *p*= 0.03) and regular family mealtimes (*r*= 0.26, p=0.05). In addition, paternal involvement in feeding was also associated with higher child BMIz, though this association only approached statistical significance (*r*= 0.26, *p*=0.08). Increase in maternal age was associated with lower grandparents' involvement in feeding (*r*= -0.27, *p*=0.05). Furthermore, increase maternal playtime with the child was associated with higher child relative activity (*r*= 0.27, *p*= 0.04) (Table **2**).

Children whose mothers had a college education or more had significantly lower BMIz (M= 0.98, SD= 1.13) compared to children whose mothers had less than a

Table 2: Intercorrelations among Child and Home Environment Characteristics and Child BMI Z-Score

	Child Age	Child BMIz	Maternal Age	Maternal BMI	Maternal Playtime with Child	Paternal Playtime with Child	Paternal Involvement in Feeding	Regular Family Mealtimes	Grandparents' Involvement in Feeding	Child Relative Activity
Child Age	-									
Child BMI z-score	0.17	-								
Maternal Age	0.13	**0.22**$^{\tau}$	-							
Maternal BMI	**0.20**$^{\tau}$	0.09	**0.31***	-						
Maternal Playtime with Child	**-0.31***	0.16	-0.13	**-0.38****	-					
Paternal Playtime with Child	**-0.26***	0.07	0.13	-0.13	0.15	-				
Paternal Involvement in Feeding	-0.04	**0.26**$^{\tau}$	-0.04	0.11	-0.08	**0.30***	-			
Regular Family Mealtimes	0.16	0.17	0.09	-0.15	-0.04	**0.27***	0.06	-		
Grandparents' Involvement in Feeding	0.12	-0.04	**-0.27***	0.13	0.11	0.09	0.02	0.10	-	
Child Relative Activity	0.13	0.11	-0.15	-0.03	**0.27***	0.08	-0.04	0.11	0.10	-

BMI, Body mass index. BMIz, Body mass index z-score.
Significant correlations: τ p <0.10, *p < 0.05, **p < 0.01 (two-tailed Pearson correlation).

Table 3: Comparison of Mean (Standard Deviation) Child Outcomes by Home Environment Characteristics

	Child BMIz	Maternal Playtime with Child	Paternal Playtime with Child	Paternal Involvement in Feeding	Regular Family Mealtimes	Grandparents' Involvement in Feeding	Child Relative Activity
Maternal Education							
≥ College	0.98 (1.13)	2.48 (0.88)	2.34 (0.91)	2.28 (1.10)	2.89 (0.98)	1.71 (1.12)	2.15 (0.78)
< College	2.15 (1.61)	2.50 (0.83)	2.66 (0.81)	2.16 (0.40)	3.16 (1.16)	1.66 (0.51)	2.00 (1.67)
*P**	**0.04**	0.97	0.41	0.80	0.53	0.91	0.70
Maternal Employment							
Yes	1.00 (1.29)	2.27 (0.82)	1.94 (0.80)	1.88 (0.90)	2.55 (0.92)	1.94 (1.11)	2.00 (0.84)
No	1.09 (1.23)	2.62 (0.90)	2.62 (0.90)	2.48 (0.99)	3.03 (0.99)	1.50 (0.98)	2.16 (0.93)
*P**	0.83	0.21	**0.01**	**0.04**	0.10	0.15	0.54
Maternal Work Hours per Day							
< 4	0.40 (0.32)	2.50 (2.12)	2.00 (0.00)	2.50 (0.70)	3.50 (0.70)	3.00 (0.00)	1.50 (0.70)
4 - 8	1.18 (1.59)	2.40 (0.69)	1.80 (0.91)	1.70 (0.82)	2.50 (0.84)	1.80 (1.22)	2.00 (0.47)
>8	1.22 (0.73)	2.22 (0.83)	2.22 (0.66)	2.11 (1.36)	2.88 (1.16)	2.12 (1.12)	2.33 (1.22)
N/A	1.09 (1.23)	2.59 (0.97)	2.62 (0.90)	2.48 (0.99)	3.30 (2.76)	1.50 (0.98)	2.16 (2.09)
*P***	0.86	0.71	**0.06**	0.21	0.42	0.14	0.66
Paternal Work Hours per Day							
4-8	1.50 (1.63)	2.61 (0.86)	2.66 (0.91)	2.28 (1.00)	3.00 (1.09)	1.95 (1.14)	2.05 (0.94)
>8	0.86 (0.84)	2.40 (0.87)	2.18 (0.85)	2.25 (1.09)	2.87 (0.94)	1.56 (1.01)	2.18 (0.89)
*P**	**0.08**	0.38	**0.05**	0.92	0.66	0.20	0.60
Child's Screen time (Hours per Day)							
0	1.79 (1.38)	2.37 (1.06)	2.50 (0.755)	2.12 (1.45)	3.37 (0.91)	1.71 (1.25)	2.50 (1.30)
1-2	1.16 (1.38)	2.56 (0.78)	2.52 (0.94)	2.60 (0.83)	0.85 (0.17)	1.14 (0.23)	0.83 (0.17)
≥ 3	0.74 (0.83)	2.45 (0.91)	2.18 (0.90)	1.95 (1.02)	2.45 (1.01)	1.54 (1.83)	1.95 (0.80)
*P***	0.12	0.84	0.42	0.10	**0.01**	0.60	0.34

BMI, Body mass index. BMIz, Body mass index z-score.
* *p* value for independent samples t-test.
** *p* value for one-way ANOVA.

college education (M= 2.15, SD= 1.61) (p= 0.04). Paternal playtime with the child was higher among children whose mothers were unemployed (M= 2.62, SD= 0.90) compared to children whose mothers were employed (M= 1.94, SD= 0.80) (p= 0.01). Paternal playtime with the child was also higher when fathers worked 4 to 8 hours a day (M= 2.66, SD= 0.91) compared to more than 8 hours (M= 2.18, SD= 0.85) (p= 0.05). Lastly, greater child screen time was associated with fewer regular family mealtimes (p= 0.01) (Table **3**).

DISCUSSION

Feasibility of Conducting Nutrition-Related Research in Saudi Preschools

Our study suggests that preschools can be used as a resource for collecting nutrition-related data in Saudi Arabia. However, there are concerns regarding representativeness of samples selected from preschools, and generalizability of findings. First, we were unable to attain participation of a low-income preschool in an underprivileged area in Jeddah city. The school simply had too many children and too little staff to engage in any activities that would disrupt their daily routine. Second, participation rate was higher among the higher income preschool (Preschool A) compared to the lower income preschool (Preschool B) (27.3% vs. 17.4%). This discrepancy might be due to the owner of Preschool A being invested in improving nutritional awareness and dietary practices of her students and their mothers. The past efforts of Preschools A's owner might have enlightened parents regarding the importance of proper child nutrition and related research, and could have encouraged them to participate. This might also be a result of families from Preschool A having more money and resources to invest in healthy eating and willingness to implement lifestyle changes. Finally, in KSA, enrolment in pre-primary education (for children ages 3 to 5) is not a prerequisite for admission into primary education and first grade; Pre-primary education (including nursery or preschool and kindergarten) are not part of the official education ladder. Therefore, only a limited number of public pre-primary schools exist in Saudi Arabia, and general enrolment rate is low [36,37]. Since a large proportion of Saudi children rely on government-subsidized public schools for their education (2.2 out of 2.8 million primary school students were enrolled in public schools in 2015) [38], we can infer that children enrolled in private preschools may not be accurate representatives of 3- to 5-year old Saudi children.

In developed countries, such as the United States, using pre-primary schools as a base for data collection has proven efficient and resourceful [26-28]; Since kindergarten (for children age 5) is an official grade and mandatory prerequisite for enrollment in first grade in some states/countries [39,40], research data from 5-year olds and their parents can be collected through both private and public schools. Similarly, some preschools (for children ages 3 and 4), such as Head Start in the United States [28], are subsidized by the government, which helps ensure availability of a reliable source for research data from a representative sample. However, in Saudi Arabia, researchers may elect to use other sources for data collection, that will provide higher external validity. Primary healthcare and well-child pediatric check-ups are provided in both private and public (i.e., government-subsidized) healthcare centers, and may be a valuable resource of research data. Otherwise, generalizability of data from preschools can be improved by increasing awareness regarding child nutrition and related health outcomes among both parents and school supervisors, and by increasing assistance in low-income preschools to facilitated participation.

Home Environment Characteristics, Child Outcomes and BMIz

Findings from this pilot study provide preliminary evidence that significant associations exist among home environment characteristics, child outcomes and BMIz in a group of Saudi preschoolers. We found that higher maternal education was associated with lower child BMIz, which is consistent with findings from previous studies [9]. There was a trend towards increased child BMIz with increased paternal involvement in feeding. It is unclear whether fathers' involvement in making nutrition decisions leads to increased child weight status, or whether higher child adiposity leads fathers to try to alleviate the problem and improve child dietary intake. Although one study found that father involvement in feeding may be associated with greater consumption of fast foods [14], longitudinal studies are needed in order to establish directionality of the association between father involvement in feeding and child BMIz.

Although previous work found that maternal and paternal playtime with the child is associated with lower child obesity risk [41,42] our findings suggest that maternal and paternal playtime may decrease with older child age and higher maternal BMI. Paternal playtime with the child was also negatively associated with the father's work hours per day and maternal employment, which suggests that fathers may play more with their children when they spend less time at work, and when the mother is available to contribute to other household necessities. In addition, higher paternal playtime with the child was related to higher paternal involvement in feeding and regular family mealtimes, which alludes to better family functioning overall when fathers are more generally involved, as seen previously [43]. Higher maternal playtime with the child was associated with higher ratings of child's relative physical activity. This could imply that mothers may play more with their children when they perceive them to be more active, or that mothers' efforts to play with their children lead to increased child activity level. Additional studies are needed in order to establish these associations, and to further examine specific types and determinants of parent-child play.

In our sample, grandparents were shown to participate more in making decisions regarding the child's nutrition when mothers were of younger age. Given previous findings showing the important role that grandparents play in child feeding in some cultures [44], the role of grandparents should be further explored in Saudi cohorts. Lastly, we found that increased child screen time was associated with lower family mealtimes. This corroborates previous data showing associations between screen time and negative child outcomes [45].

To our knowledge, our study was the first to describe feasibility of collecting home environment and nutrition-related data in preschools in Saudi Arabia. Additionally, we were unable to identify studies examining associations between home environment characteristics and child BMIz among Saudi preschools. Further strengths of our study include that child anthropometrics were objectively measured, and that participants were selected from two preschools in different areas of the city.

Limitations of our study include that our sample size was small, which limited our ability to perform adjusted analyses. Future studies with larger sample sizes are needed to confirm our findings. Our questionnaire was self-administered, and literacy level might have influenced comprehension and response to questions. However, due to the conservative customs and desire for privacy, mothers may not have felt comfortable reporting on home and family practices in an one-on-one interview; Answering the questions alone at home might have resulted in more honest responses. As with similar studies which invlove assessing behaviors, our data might have been subjected to reporting bias. Further studies are needed in oreder to identify the best method for collecting similar data.

CONCLUSION

Our study suggests that increasing awareness regarding child nutrition and related research is needed in order to improve feasibility of studies conducted in Saudi preschools, and generalizability of findings. Our study found preliminary evidence that home environment characteristics are associated with child weight status in Saudi children. Future work is needed to further establish these associations and to develop a framework for obesity interventions that are sensitive to the Saudi culture.

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