

The Relationship Between Nutrition Knowledge and Physical Activity Levels in Mother-Daughter Dyads

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ABSTRACT

Purpose: The aim of this study was to investigate nutrition knowledge, food preferences knowledge, and physical activity levels between mother-daughter dyads. It also aimed to examine the associations between maternal characteristics and adult daughters' outcomes.

Methods: A total of 200 participants (100 mothers and 100 adult daughters) were included. Nutrition knowledge and food preferences were assessed using the Nutrition Knowledge Level Scale For Adults, and physical activity levels were assessed using the International Physical Activity Questionnaire-Short Form (IPAQ-SF). Comparisons were made between mothers' and daughters' outcomes, with associations examined using regression analyses.

Results: Adult daughters scored significantly higher than their mothers in nutrition knowledge and food preferences, but the groups did not differ in physical activity levels (MET-min/week). Regression analyses showed that maternal nutrition knowledge significantly predicted daughters' nutrition knowledge ($\Delta R^2 = 0.203$, $\beta = 0.415$, $p < 0.001$); daughters' food preferences were positively linked to both maternal nutrition knowledge and food preference ($\Delta R^2 = 0.317$, $p < 0.001$). Maternal physical activity did not significantly predict daughters' physical activity ($\Delta R^2 = 0.040$, $p = 0.242$).

Conclusion: Significant associations were found between maternal and adult daughters' nutrition knowledge and food preferences; physical activity similarities were less pronounced. This suggests continuity in nutrition-related traits within mother-daughter dyads into adulthood.

Keywords: Healthy lifestyle, Nutrition, Physical activity, Intergenerational Relations

ÖZET

Amaç: Bu çalışmanın amacı, anne-kız ikilileri arasında beslenme bilgisi, besin tercihi bilgisi ve fiziksel aktivite düzeylerini incelemektir. Ayrıca, annelere ait özellikler ile yetişkin kızların sonuçları arasındaki ilişkileri incelemektir.

Yöntem: Çalışmaya toplam 200 katılımcı, 100 anne ve 100 yetişkin kız dâhil edilmiştir. Beslenme bilgisi ve besin tercihleri Yetişkinler İçin Beslenme Bilgi Düzeyi Ölçeği kullanılarak değerlendirilmiştir. Fiziksel aktivite düzeyleri ise Uluslararası Fiziksel Aktivite Anketi Kısa Formu aracılığıyla ölçülmüştür. Anne ve kızların sonuçları karşılaştırılmıştır. Değişkenler arasındaki ilişkiler regresyon analizleri ile incelenmiştir.

Bulgular: Yetişkin kızların beslenme bilgisi ve besin tercihleri puanları annelerine kıyasla anlamlı düzeyde daha yüksek bulunmuştur. Buna karşın fiziksel aktivite düzeyleri açısından gruplar arasında anlamlı bir fark saptanmamıştır. Regresyon analizleri, annelerin beslenme bilgisinin kızların beslenme bilgisini anlamlı düzeyde yordadığını göstermiştir ($\Delta R^2 = 0,203$; $\beta = 0,415$; $p < 0,001$). Kızların besin tercihleri, annelerin hem beslenme bilgisi hem de besin tercihleri ile pozitif yönde ilişkili bulunmuştur ($\Delta R^2 = 0,317$; $p < 0,001$). Annelerin fiziksel aktivite düzeyleri ile kızların fiziksel aktivite düzeyleri arasında anlamlı bir ilişki bulunmamıştır ($\Delta R^2 = 0,040$; $p = 0,242$).

Sonuç: Anne ve yetişkin kızlar arasında beslenme bilgisi ve besin tercihleri açısından anlamlı ilişkiler saptanmış, fiziksel aktivite benzerliklerinin ise daha sınırlı olduğu görülmüştür. Bu bulgular, beslenmeye ilişkin özelliklerin anne-kız çiftleri arasında yetişkinlik dönemine kadar süreklilik gösterebileceğini düşündürmektedir.

Anahtar Kelimeler: Sağlıklı yaşam tarzı, Beslenme, Fiziksel aktivite, Nesiller arası ilişkiler

A healthy society depends on protecting individual health, and nutrition and physical activity are among the most important factors affecting human health (1,2). Healthy eating and regular physical activity play an important role in preventing chronic diseases such as obesity, cardiovascular disease, and type 2 diabetes. A lifestyle that includes proper nutrition and regular physical activity begins to develop in childhood. These behaviours formed at a young age continue into adolescence and adulthood (3–5).

Children's eating habits are shaped by the interaction of many factors and cannot be evaluated in isolation. During this process, behaviours that will last a lifetime in the child are shaped by the family environment, which is critical (6). A child's eating behaviour and food choices are most strongly influenced by their parents' eating habits and nutrition strategies (6–8). In this context, mothers play a more significant role than fathers in shaping their children's eating habits. This is because they are primarily responsible for organising the family's eating environment, and because their children perceive them as role models (9,10). It has been suggested that mothers' eating behaviours can be passed on to their daughters due to similarities in their eating patterns. It is suggested that this may influence daughters' attitudes towards health and affect public health in the long term (11).

In addition to nutrition-related behaviours, physical activity represents another key health-related factor that may be shaped by both familial and environmental factors (12). Regular physical activity is associated with numerous positive effects, such as weight control, reduction of cardiometabolic risk factors, strengthening of the musculoskeletal system, and support for psychological well-being (5). However, physical activity is considered a behavior that is more dependent on dynamic and external environmental conditions (12). Especially during young adulthood, the growing influence of factors such as education, work life, and social environment may limit parents' influence on physical activity behavior. Therefore, the intergenerational transmission of physical activity and parent-child similarity show more inconsistent results in the literature (5,13,14).

In this study, the sample was chosen specifically to enable a clearer assessment of similarities and differences in mother-daughter dyads. Mother-daughter dyads, particularly in terms of eating behaviours and the home food environment, demonstrate stronger interactions and

role-model relationships (9), thus providing an important model for examining intergenerational transmission. Additionally, it reduces the impact of many potential confounding factors by providing a similar cultural, social, and socioeconomic context. This allows for a more isolated assessment of differences in lifestyle components such as nutritional knowledge, food preferences, and physical activity.

It has been observed that most studies on parent-child relationships focus on childhood and adolescence (15–17). There appears to be a limited number of studies that jointly evaluate multiple lifestyle components such as nutritional knowledge, and physical activity in the mother-adult daughter dyads during young adulthood. Considering these circumstances, the aim of this study is to compare nutritional knowledge, and physical activity levels between mothers and their adult daughters, and to examine whether the mother's nutritional knowledge, food preferences knowledge, and physical activity level predict the relevant outcomes of adult daughters.

Material and Methods

Study Design

This study was designed as a cross-sectional study. The research was conducted on female university students studying at Niğde Ömer Halisdemir University and their biological mothers. The data collection process was carried out through face-to-face interviews between January 2025 and April 2025. The study was approved by the Non-Interventional Clinical Research Ethics Committee of Niğde Ömer Halisdemir University (2024/20-39).

Participants

The study included 100 biological mother-daughter dyads. Female university students aged 18-30 years and their biological mothers under the age of 65 were included in the study. In families with multiple daughters, only one mother-daughter dyads were included in the study. Dyads were excluded from the study if either the mother or the daughter refused to participate, was pregnant or breastfeeding, or had official documentation of a physical or mental disability. All participants were informed about the study, and written informed consent was obtained from those who agreed to participate. Data were collected by a researcher trained in this field.

As part of the study, participants were administered a Demographic Information Form, the Nutrition Knowledge Level Scale for Adults (NKLSA), and the International Physical Activity Questionnaire (IPAQ-short form).

Demographic Information Form

Demographic information such as age, height, and body weight was requested on the participant evaluation form.

Nutrition Knowledge Level Scale for Adults (NKLSA)

The Nutrition Knowledge Level Scale for Adults, developed by Batmaz (2018) and validated for reliability, consists of 32 items on a 5-point Likert scale. The scale comprises 20 items under the heading 'Basic Nutrition and the Diet-Health Relationship' and 12 items under the heading 'Food Preference'. The maximum score in the Basic Nutrition section is 80. The maximum score in the food preference section is 48. Participants with a basic nutrition score below 45 are considered to have poor nutrition knowledge. Those with a score between 45 and 55 are considered to have average knowledge. Those with a score between 56 and 65 are considered to have good knowledge. Those with a score above 65 are considered to have excellent knowledge. Participants with a food preference score below 30 are considered to have poor knowledge, those with a score between 30 and 36 are considered to have moderate knowledge, those with a score between 37 and 42 are considered to have good knowledge, and those with a score above 42 are considered to have excellent knowledge (18).

International Physical Activity Questionnaire (IPAQ)

The short form of the International Physical Activity Questionnaire, based on the last 7 days, was used to assess physical activity levels. The questionnaire covers physical activities performed by individuals for at least 10 minutes during the last seven days. Physical activity level was calculated in MET-minutes/week. The Turkish validity and reliability study of the questionnaire was conducted by Sağlam and colleagues (19).

Statistical analysis

The sample size was calculated a priori using G*Power version 3.1.9.7 based on a linear multiple regression model (R^2 increase), with the primary outcome defined as the association between mothers-daughters' nutritional

knowledge scores (20). The effect size was approximated from a previously reported correlation coefficient ($r = 0.38$) in a conceptually related study, corresponding to an effect size of $f^2 \approx 0.17$ (21). Assuming a two-sided α of 0.05, a statistical power of 90%, three tested predictors, and six total predictors, the required minimum sample size was calculated as 88. A total of 100 mother-daughter dyads ($n = 200$) were included in the study.

Statistical analyses were performed using SPSS software (version 25.0; IBM Corp., Armonk, NY, USA). The normality of the data distribution was assessed using frequency graphs (histograms and detrended graphs) and descriptive statistics such as the Shapiro-Wilk test, skewness and kurtosis, and the coefficient of variation. Continuous variables are expressed as mean \pm standard deviation, while categorical variables are expressed as number (percentage). Descriptive comparisons between mothers and daughters were conducted using independent samples t-test and chi-square test. Differences in nutrition knowledge and physical activity levels between mothers and daughters were assessed using the paired samples t-test for normally distributed variables and the Wilcoxon signed-rank test for non-normally distributed variables. Categorical comparisons between mothers and daughters were analyzed using the Bowker test of symmetry (marginal homogeneity test) in Jamovi (version 2.6.44). Clinical significance was assessed using Cohen's d_z statistic for paired samples t-test. The effect size was interpreted according to Cohen's thresholds: 0.20 indicates a small effect, 0.50 a moderate effect, and 0.80 a large effect (22). The Rank-Biserial Correlation coefficient was used to determine the effect size for variables analyzed with the Wilcoxon signed-rank test (0.10 small, 0.30 medium, and 0.50 large effect) (23).

The relationships between maternal characteristics and daughters' nutritional knowledge, food preferences, and physical activity levels were examined using multiple linear regression analysis. In the first step, the mother's body mass index (BMI), the mother's education level, and the daughter's BMI were included as control variables. Mother's education level, an ordinal variable with three categories, was included in the regression analyses as a continuous variable coded from 1 to 3, with higher values indicating higher education levels. In the second step, mother-related nutrition variables were added to the model, and the change in explained variance (ΔR^2) was evaluated. A $p < 0.05$ value was considered statistically significant.

Results

Mothers had higher body weight and BMI values than their daughters ($p < 0.01$). Daughters had higher normal

BMI and higher educational levels than their mothers ($p < 0.001$). The presence of chronic disease and regular physical activity showed significant differences between mother-daughter dyads ($p < 0.05$) (Table 1).

Table 1. Comparison of descriptive characteristics of mothers and daughters

Variables	Mother (n:100)	Daughter (n:100)	p
	Mean±SD	Mean±SD	
Age (years)	49.64 ± 4.31	21.14 ± 2.05	<0.001*
Weight (kg)	74.74 ± 11.35	59.61 ± 10.74	<0.001*
Height (cm)	160.54 ± 5.47	163.30 ± 6.77	0.002*
Body mass index (kg/m ²)	29.03 ± 4.46	22.34 ± 3.76	<0.001*
	n (%)	n (%)	p
BMI category	<18.5	0 (0)	<0.001*
	18.5-24.9	17 (17)	
	25-29.9	44 (44)	
	>30	39 (39)	
Educational level	Primary school	65 (65)	<0.001*
	High school	31 (31)	
	Bachelor's	4 (4)	
Smoking status	Smoker	13	0.329
	Non-smoker	87	
Presence of chronic disease	Yes	26 (26)	0.001*
	No	74 (74)	
Regular physical activity	Yes	33 (33)	0.024*
	No	67 (67)	

p values were obtained using independent samples *t*-test for continuous variables and chi-square test for categorical variables. *: $p < 0.05$

Daughters' nutrition knowledge and food preference scores were higher than those of their mothers ($p < 0.001$ and $p = 0.005$, respectively); however, no significant

difference was observed between the groups in physical activity levels ($p = 0.154$) (Table 2).

Table 2. Comparison of nutrition knowledge, food preference, and physical activity levels between mothers and daughters

Variables	Mother (n:100)	Daughter (n:100)	p-value	Cohen dz / Rank biserial correlation
	Mean±SD	Mean±SD		
NKLSA-Nutrition knowledge	52.78±8.37	57.07±10.60	<0.001 ^a	0.426*
NKLSA- Food preference	36.93±5.77	38.71±6.33	0.005 ^a	0.289*
Physical activity (MET-min/week)	1298.35±1980.67	1289.17±1433.27	0.154 ^b	0.187**
Nutrition knowledge category		n (%)	n (%)	<0.001 ^c
	Poor	14 (14)	13 (13)	
	Moderate	49 (49)	30 (30)	
	Good	31 (31)	31 (31)	
Food preference category				0.017 ^c
	Poor	11 (11)	13 (13)	
	Moderate	41 (41)	23 (23)	
	Good	33 (33)	37 (37)	
Physical activity level				0.042 ^c
	Low	61 (61)	48 (48)	
	Moderate	23 (23)	41 (41)	
		High	16 (16)	11 (11)

NKLSA: Nutrition Knowledge Level Scale for Adults, a: Paired sample *t* test, b: Wilcoxon test, c: Bowker test of symmetry *: Cohen'dz, **: Rank biserial correlation

In regression analysis, the control variables included in the model in step 1 (mother's BMI, mother's education level, and daughter's BMI) did not significantly explain the variance in the daughter's nutrition knowledge ($R^2=0.035$), food preference ($R^2=0.012$), and physical activity level ($R^2=0.081$). In step 2, when the mother's parameters were added to the model, the explained variance increased significantly for the daughter's nutritional knowledge ($\Delta R^2=0.203$, $\Delta F=8.258$, $p<0.001$), and it was observed that the mother's nutritional knowledge significantly and positively predicted the daughter's nutritional knowledge

Similarly, the explanatory power of the model also increased significantly for the daughter's food preference ($\Delta R^2=0.317$, $\Delta F=14.663$, $p<0.001$), and both the mother's nutritional knowledge ($\beta=0.313$, $p<0.05$) and the mother's food preferences ($\beta=0.362$, $p<0.05$) were found to predict the daughter's food preferences in a significant and positive direction. In contrast, adding the mother's parameters to the model for the daughter's physical activity level did not result in a significant increase in the explained variance ($\Delta R^2=0.040$, $\Delta F=1.419$, $p=0.242$) (Table 3).

Table 3. Factors predicting daughters' nutrition knowledge, food preferences, and physical activity levels

Independent variables	Daughters' Nutrition knowledge (β)	Daughters' Food preference (β)	Daughters' Physical activity (β)
Step 1: Control variables			
Maternal BMI	-0.018	-0.007	-0.155
Maternal education level	0.083	0.017	-0.166
Daughter's BMI	0.112	-0.057	0.176
R²	0.035	0.012	0.081
Step 2: Maternal parameters			
Maternal nutrition knowledge	0.415*	0.313*	-0.102
Maternal food preference	0.090	0.362*	0.116
Maternal physical activity	-0.006	0.059	0.176
ΔR^2	0.203	0.317	0.040
Final R²	0.238	0.329	0.121
ΔF	8.258	14.663	1.419
p (ΔR^2)	<0.001	<0.001	0.242
<i>BMI: Body mass index. Values are standardized regression coefficients (β).</i>			

Discussion

This study examined the relationship between nutritional knowledge, knowledge of food preferences and levels of physical activity among mother-daughter dyads. Our findings indicate that adult daughters have significantly higher nutrition knowledge and food preference scores than their mothers. Intergenerational similarity in nutrition-related characteristics was evident in mother-daughter dyads, however, this similarity was not as pronounced for physical activity.

Our study found a significant difference between mothers' nutrition knowledge and their adult daughters' nutrition knowledge. This is thought to stem from the difference in educational levels between the mother and daughter. Furthermore, maternal nutrition knowledge was significantly associated with daughters' nutrition knowledge. This finding suggests that nutrition knowledge may be a trait that can be transmitted across generations, and that mothers' level of nutrition

knowledge may influence their daughters' knowledge levels even in adulthood. A similar study found that mothers' nutritional knowledge is related to children's nutritional knowledge aged 5-12 (24). Similarly, it has been reported that in adult children, the mother's intention to eat healthily explains the child's intention (25). A study conducted in Türkiye reported that children of mothers with high nutritional knowledge had a higher quality diet (17). Another study similar to ours also indicates a weak positive correlation between adolescent and maternal nutrition knowledge (21). In our study, however, this relationship was moderate, even in the older age group ($\beta = 0.415$). This difference can be partially explained by the fact that the sample consisted solely of mother-daughter dyads. Our finding is consistent with a previous study indicating that nutrition-related parameters are higher between mothers and daughters than between mothers and sons (9). Our results show that nutritional knowledge in mother-daughter dyads can show meaningful parallels even in adulthood, and that this parallelism reaches a moderate effect size.

Children's food preferences begin with the transfer of flavours during the prenatal period and through breast milk and are shaped by the foods offered at home and the family's consumption patterns. During the transition from childhood to adulthood, food preferences evolve from biologically based instincts to complex behaviours learned culturally and socially (26). The younger generation tends towards practical, quick, and innovative foods, while older generations continue to maintain traditional and more established dietary habits (27). A study conducted in Turkey also reported that factors such as convenience, cost, and sensory pleasure influence the food choices of younger generations (28). In our study, however, it was found that adult daughters' food preference scores were significantly higher than those of their mothers. Although our study assessed knowledge of food preferences rather than actual preferences, the discrepancies reported in the literature should be interpreted with caution. These differences may be explained by access and opportunity factors, such as economic constraints, time limitations, and availability, which can limit individuals' ability to act on their knowledge of healthy choices. In addition to these findings, the fact that mothers' nutritional knowledge and food-preference scores are significantly associated with their daughters' food preferences indicates that nutritional habits and knowledge acquired through the family's cultural beliefs, attitudes, and eating practices are maintained into adulthood (26).

When comparing physical activity levels between mothers and adult daughters using MET-min/week scores, no significant difference was found between the dyads. However, when physical activity levels were evaluated categorically, a significant difference was observed between the dyads. This result is consistent with a recent study conducted in Türkiye, which found no difference in physical activity levels between children and their parents (13). This situation can be explained by the high variation in physical activity data and the wide distribution of MET values, which prevent average scores from adequately reflecting group differences. Regression analyses showed that the mother's physical activity level did not significantly predict the daughters' physical activity level. A systematic review showed a weak positive relationship between parents' and children's physical activity (29). Similarly, it has been found that parental attitudes influence children's physical activity, and that the parent's own level of physical activity is associated with children being more active (5,30). Studies conducted in Türkiye have indicated that parental participation in physical activity is weakly to moderately associated with

children's participation in physical activity (13,15). The lack of a significant relationship in our study may be related to the fact that physical activity was assessed based on self-report using the IPAQ short form, which is more susceptible to measurement error. Furthermore, the fact that the IPAQ is based solely on the last seven days and that MET values show a wide distribution may have made it difficult to statistically detect a possible relationship. This finding suggests that physical activity may be influenced more by individual lifestyle, environmental conditions, daily routines, and social factors than by dietary behaviour.

Our study has some limitations. It has not been determined how many of the participants included in the study live away from their families. This situation may lead to differences among participating dyads in external environmental factors that affect physical activity levels, such as access to social facilities and walking paths. In addition, the measure used in this study assesses knowledge related to food preferences rather than actual dietary behaviors, which may limit the ability to draw conclusions about real-life food choices.

Conclusion

The findings indicate similarities in nutrition-related knowledge within mother-daughter dyads. However, maternal physical activity was not significantly associated with daughters' physical activity, suggesting that intergenerational similarity in physical activity may be more limited. Overall, the results suggest that nutrition-related characteristics may show greater similarity between mothers and daughters in young adulthood, whereas physical activity may be more strongly related to individual and environmental factors.

Declarations

Funding

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Conflicts of interest

The authors report there are no competing interests to declare.

Ethics approval

This study was approved by the Non-Interventional Clinical Research Ethics Committee of Niğde Ömer Halisdemir University (2024/20-39). The purpose of the study was explained to all participants in detail, and written informed consent was obtained from those who agreed to take part. The research was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki.

Availability of data and material

The datasets are available from the corresponding author upon reasonable request.

Authors' contributions: GD

Conceptualization, Methodology, Formal analysis, Writing – original draft, Visualization, Supervision, Project administration. **BK:** Methodology, Investigation. **AS:** Conceptualization, Methodology, Writing – review & editing, Supervision.

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