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Eating Competence and Weight Status among Middle School Students in Iraq

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ABSTRACT

Objective: This study aimed to examine the relationship between eating competence and weight status among middle school students in Karbala City, Iraq.

Methods and Materials: A non-experimental descriptive–predictive correlational study was conducted from November 25, 2025, to February 12, 2026. The sample included 429 male and female middle school students selected from 18 public schools in Karbala City using multistage random sampling. Data were collected using a sociodemographic questionnaire and the 16-item Expanded Eating Competence Inventory, which assesses eating attitudes, food acceptance, internal regulation, and contextual skills. Anthropometric measurements, including weight and height, were obtained, and body mass index was calculated. Data were analyzed using descriptive statistics, simple linear regression, and multiple linear regression in SPSS version 28.

Findings: The mean age of participants was 14.24 ± 1.05 years, and 55.9% were female. Most students belonged to the middle socioeconomic class, 57.1%. Regarding weight status, 60.3% had normal weight, 24.7% were underweight, 11.7% were overweight, 2.8% had class I obesity, and 0.5% had class II obesity. Eating competence significantly and negatively predicted BMI, $\beta = -0.203$, $t = -2.130$, $p = .034$. In the multiple regression model, eating competence remained significantly associated with BMI after controlling for age, $B = -2.3867$, $p = .0028$. Age was also significantly related to BMI, $p = .0010$, and socioeconomic status significantly moderated the relationship between eating competence and behavioral factors, $p = .0339$.

Conclusion: Higher eating competence was associated with lower BMI and healthier weight status among middle school students.

Keywords: Eating Competence, Body Mass Index, Middle School Students, Weight Status, Socioeconomic Status.

Introduction

Nutrition is the biological process through which the body consumes and utilizes nutrients essential for growth, development, and survival (Sciences, 2024). It plays a vital role in health promotion and disease prevention throughout the lifespan (Marshall et al., 2024; Organization, 2020). Adequate nutrition supports optimal organ function and reduces the risk of noncommunicable diseases, including type 2 diabetes, hypertension, and certain cancers (Organization, 2020). Among children and adolescents, proper nutrition enhances cognitive functions such as memory and concentration (Ralston et al., 2017).

Obesity is a chronic and complex disease defined as excessive fat accumulation, operationalized as a body mass index (BMI) $\geq 30 \text{ kg/m}^2$ (Organization, 2021). Since 1990, global obesity rates have doubled, with a fourfold increase among children and adolescents aged 5–19 years. By 2022, more than 20% of individuals in this age group were affected, and globally 2.5 billion adults are overweight, including 890 million who are obese (Organization, 2020). Similarly, Fund (2025) reported that 391 million children and adolescents aged 5–19 years were overweight or obese worldwide.

In Iraq, overweight and obesity rates among adolescents aged 13–15 years range between 20.6% and 22.6% (Alabada & Mohammed, 2023). In another study, Alkabban & Alkhazrajy (2023) found that 14% were underweight, 59% had normal weight, 21% were overweight, and 6% were obese. Furthermore, Iraqi adolescents often demonstrate misperceptions regarding body weight and limited understanding of BMI, which may lead to unhealthy weight-control behaviors (M. B. A. Al-Jubouri et al., 2025).

Obesity results from the interaction of non-modifiable factors, such as genetics, and modifiable behaviors, including unhealthy dietary intake and physical inactivity (Sørensen et al., 2022). In addition to health consequences, obesity imposes a significant economic burden, with projected global costs reaching US\$3 trillion annually by 2030 (Organization, 2020). Dietary risks alone contribute to 11 million deaths worldwide (Health & Services, 2021).

Adolescence is a critical developmental stage marked by rapid growth and behavioral formation (Das et al., 2017). Nutrition-related behaviors established during

this period often persist into adulthood (Barakat et al., 2023). Behavioral constructs, including perceived dietary factors and behavioral regulation, significantly influence health outcomes among adolescents (Hamadi & Majeed, 2025).

One important behavioral model is Eating Competence (EC), which encompasses eating attitudes, food acceptance, internal regulation, and contextual skills (de Queiroz et al., 2022). Although previous research has linked overweight and obesity to academic performance, sleep, and quality of life (Lin et al., 2021), limited studies have examined eating competence among Iraqi adolescents. Therefore, this study aims to investigate the relationship between eating competence and weight status among middle school students.

Methods and Materials

Study Design

This quantitative study employed a non-experimental, descriptive–predictive correlational design. The study was carried out from November 25, 2025, to February 12, 2026. The study was conducted in 18 public schools chosen to represent the four geographical regions of Karbala City in Iraq.

Sampling Procedure

A multistage sampling technique was applied. Initially, middle schools were divided into four geographic sectors within Karbala City. Schools were then selected using stratified simple random sampling based on students' sex and grade distribution to ensure proportional representation. Within the selected schools, students from first, second, and third middle grades were recruited using simple random sampling. Names were drawn from official student lists until the required sample size for each grade level was achieved.

Participants and Sampling Procedure

The target population was middle school students in their first, second, and third classes of study. The sampling procedure involved four stages:

(1): Stratification by Geographic Sector

Middle schools were initially stratified into four sectors based on their geographical location (Sector 1 (4 schools), Sector 2 (5 schools), Sector 3 (3 schools), and Sector 4 (6 schools)). This stratification ensured proportional representation of schools across different regions.

(2): Selection of Schools: within each sector, schools were selected using stratified simple random sampling, taking into consideration the sex of the school (male or female schools). A total of 18 middle schools were included across the four sectors.

(3): Allocation by Grade Level

Students were proportionally allocated from three grade levels (first, second, and third middle grades) within each selected school. The number of students drawn from each school was determined based on the total student population and sex distribution.

(4): Simple Random Selection of Students

Within each selected school, students were chosen using simple random sampling. Lists of students' names were obtained from school administrations. The names were written on uniform pieces of paper, folded consistently, and placed into separate containers according to grade level. A teacher randomly selected names until the required sample size for each grade was achieved.

Sample Size

The required sample size was calculated using G*Power software (version 3.1.9.2). Based on a medium effect size (0.25), an alpha error probability of 0.05, statistical power of 0.95, 10 degrees of freedom, and 10 groups, the estimated sample size was 390 participants, which was increased to 448 students to account for the design effect of cluster sampling. The inclusion criteria were official registration of first, second, and third middle school students of both sexes (male and female) enrolled in morning study, including students from single-sex schools, and giving their informed consent. Incomplete questionnaires were not included in the data analysis.

Instruments

Sociodemographic and Anthropometric Data

The study instrument consisted of two main sections: The first section collected sociodemographic information, including age, sex, grade level, and Family socioeconomic class. Anthropometric measurements included body weight (kg) and height (cm). Body mass index (BMI) was calculated as weight in kilograms divided by height in meters squared (kg/m^2).

The second section included the Expanded Eating Competence Inventory (ecSI 2.0™). The ecSI 2.0™ consists of 16 items measured on a five-point Likert scale. The items are categorized into four subscales:

Eating Attitudes (6 items), Food Acceptance (3 items), Internal Regulation (2 items), and Contextual Skills (5 items). Response options include: always (3), often (2), sometimes (1), rarely (0), and never (0). The total score ranges from 0 to 48, with higher scores indicating greater eating competence (Claes et al., 2023).

The content validity of the instrument was checked by a panel of seven experts from nursing faculties in different Iraqi universities. Some minor adjustments were made according to their suggestions. Regarding reliability, the Dutch version of the ecSI 2.0™ demonstrated high internal consistency. The Cronbach's alpha coefficient for the total scale was 0.91. Subscale reliability coefficients were 0.91 for Eating Attitudes, 0.69 for Food Acceptance, 0.81 for Internal Regulation, and 0.80 for Contextual Skills (Claes et al., 2023).

Data Collection

Permission was sought from the Ministry of Planning and from the respective schools. Data collection was arranged in collaboration with the offices of academic affairs to gain access to schools students. The questionnaire was distributed using paper-based forms in the classroom. Each participant was given a unique code to avoid duplication.

Ethical Considerations

The research protocol was approved by the Research Ethics Committee of the College of Nursing, University of Baghdad, on November 11th, 2025. Written informed consent was sought from all participants after they were informed of the purpose of the study. The confidentiality of the information and also their right to withdraw from the study.

Analysis

Data were analyzed using IBM SPSS Statistics for Windows, Version 28.0. Descriptive statistics (frequency, percentage, mean, and standard deviation) were used to summarize demographic characteristics. descriptive statistics, simple linear regression, and multiple linear regression analyses. Significance was set at $p < 0.05$.

Findings and Results

Participant Characteristics

A total of 429 middle school students participated in the study show Table 1. The mean age was 14.24 ± 1.05 years, with most participants aged 12–14 years (59.9%). More than half were females (55.9%). Regarding grade

level, second-grade students represented the largest group (35.0%), followed by first grade (34.3%) and third grade (30.7%). In terms of socioeconomic status, most participants belonged to the middle socioeconomic class (57.1%), followed by the lower middle class (36.8%) and upper middle class (6.1%). The results showed

significant gender differences in eating competence and contextual skills, with male students reporting higher levels than females. Additionally, eating attitudes differed significantly across grade levels, with third-grade students demonstrating more positive eating attitudes than first- and second-grade students.

Table 1

Participants' sociodemographic characteristics

Variable	Frequency	Percent
Age (Years): Mean 14.24 ± 1.05		
12-14	257	59.9
15-17	172	40.1
Gender		
Male	189	44.1
Female	240	55.9
Grade		
First	147	34.25
Second	150	35.0
Third	132	30.75
Family socioeconomic class		
Lower Middle Class	158	36.8
Middle Class	245	57.1
Upper Middle Class	26	6.1

Regarding BMI, most middle school students had normal weight ($n = 259$, 60.3%), followed by underweight ($n = 106$, 24.7%), overweight ($n = 50$, 11.7%), obesity class I ($n = 12$, 2.8%), and obesity class II ($n = 2$, 0.5%). The linear regression analysis found that

eating competence significantly predicted BMI and had an inverse relationship with weight status ($\beta = -0.203$, $p = .034$), indicating that higher total eating competence was associated with lower BMI. as presented in Table 2.

Table 2

Linear regression model for predicting weight status

Coefficients ^a		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
Model		B	Std. Error	Beta		
1	(Constant)	22.190	1.285		17.272	.000
	Eating Attitudes	-.065	.073	-.048	-.897	.370
	Food Acceptance	-.024	.097	-.013	-.246	.806
	Internal Regulation	.002	.101	.001	.019	.985
	Contextual Skills	-.037	.051	-.038	-.724	.469
	Eating Competence	-.106	.050	-.203	-2.130	.034

a. Dependent Variable: BMI

The multiple linear regression analysis showed that eating competence was significantly associated with BMI, where a one-unit increase in eating competence was associated with a 2.39-point decrease in BMI after controlling for age ($p = .0028$). Age also showed a significant inverse relationship with BMI ($p = .0010$).

Furthermore, socioeconomic status moderated the relationship between eating competence and behavioral factors, indicating that the effect of eating competence varied across different levels of age and socioeconomic status ($p < .05$), as presented in Table 3.

Table 3

Multiple linear regression model where eating competence is the independent variable in predicting body mass index with the mediation of age and socioeconomic status

	Coeff	Se	T	P	LLCI	ULCI
Constant	-74.787	107.1057	-.6983	.4854	-285.3157	135.7416
EC	-2.3867	3.0664	1.3029	.0028	-2.0321	10.0224
Age	-5.4375	7.4830	1.0062	.0010	-7.1789	22.2383
Int_1	-.3082	.2132	-1.4453	.1491	-.7273	.1109
SES	12.5773	6.9358	1.8134	.0705	-1.0559	26.2105
Int_2	-.4291	.2016	-2.1285	.0339	-.8300	-.0300
Int_3	-.8949	.4889	-1.8306	.0679	-1.8558	.0660
Int_4	.0307	.0141	2.1762	.0301	.0030	.0585

code: Correlation Coefficient, EC: Eating Competence, LLCI: Lower-limit Confidence Interval, P: Probability Level, t: T-Statistics, ULCI: Upper-limit Confidence Interval, SES: Socioeconomic Status

Discussion and Conclusion

The present study showed that more than half of the students were classified as belonging to the middle socioeconomic class (57.1%). These findings are consistent with the results reported by [Abdoun & Hussein \(2022\)](#), which indicated that most students perceived their socioeconomic status as moderate.

Regarding weight status, the present study found that the majority of middle school students had a normal BMI (60.3%), followed by underweight (24.7%), overweight (11.7%), obesity class I (2.8%), and obesity class II (0.5%). These findings are consistent with previous studies conducted in Iraq. A study by [M. B. Al-Jubouri et al. \(2025\)](#) reported that more than half of the participants (64.40%) had a normal BMI, while only 2.20% were classified as obese. Similarly, [Baji & Mohammed \(2019\)](#) found that 27.7% of students were underweight, 11.2% were overweight, 1.7% had obesity class I, and 0.4% had obesity class II. The similarity between these findings may reflect comparable lifestyle patterns, dietary habits, and environmental factors influencing adolescents' weight status.

The results also indicated that eating competence is a significant predictor of body mass index (BMI). Linear regression analysis demonstrated a statistically significant negative association between eating competence and BMI, suggesting that adolescents with higher eating competence tend to have lower BMI values. This relationship may be explained by the behavioral characteristics of eating competence, as individuals with higher competence tend to recognize hunger and satiety cues, maintain regular meal patterns, and regulate food intake more effectively, which supports healthier energy balance and weight management.

These findings are consistent with previous studies. [Tilles-Tirkkonen et al. \(2019\)](#) reported that individuals with higher eating competence were more likely to maintain normal body weight among Finnish adults at risk of type 2 diabetes. Similarly, [Claes et al. \(2023\)](#) found a negative relationship between eating competence and BMI among Flemish adolescents. [Boeira et al. \(2023\)](#) also reported lower eating competence among obese individuals, while [de Queiroz et al. \(2022\)](#) observed that higher eating competence was associated with lower BMI in a Brazilian adult population.

The present study further showed that a one-unit increase in eating competence was associated with a 2.3867-point decrease in BMI after controlling for age. This finding reinforces the role of eating competence as an important behavioral determinant of weight status. Supporting this interpretation, [Clifford et al. \(2010\)](#) found that weight satisfaction and the desire to lose weight were stronger predictors of eating competence than BMI among college students, suggesting that interventions should address body image and weight perceptions to improve eating competence. Longitudinal evidence also supports the stability and developmental importance of eating competence, as [Vankerckhoven et al. \(2025\)](#) reported that individuals with competent eating profiles tended to maintain their status over time.

The study also revealed a significant inverse relationship between age and BMI. This finding contrasts with previous literature indicating that BMI generally increases with age due to metabolic changes and reduced physical activity ([Ng et al., 2014](#)). One possible explanation is that individuals with higher eating competence maintain healthier lifestyle behaviors over time, which may align with behavioral theories such as the self-efficacy framework ([Bandura, 1997](#)). However, the influence of unmeasured factors such as physical

activity or medication use should be considered, and future longitudinal research is recommended to clarify this relationship (Prochaska & DiClemente, 1983).

Overall, these findings highlight the complex role of eating competence in influencing BMI and behavioral factors, emphasizing the importance of considering both age and socioeconomic context when developing interventions aimed at improving eating behaviors and weight outcomes.

The present study demonstrates that eating competence plays a significant role in predicting body mass index among adolescents. Higher levels of eating competence were associated with lower BMI and healthier weight status. The findings also indicate that age and family socioeconomic status influence the relationship between eating competence and behavioral factors such as self-control and motivation. These results suggest that promoting eating competence through nutrition education and supportive behavioral interventions may contribute to healthier eating behaviors and improved weight outcomes among adolescents. Future research should further explore the longitudinal effects of eating competence and the influence of social and environmental factors to better inform effective public health strategies.

Limitations

Despite its contributions, the present study has several limitations. First, the data were collected using self-reported instruments, which may introduce reporting bias or inaccuracies in participants' responses. Second, several important factors that may influence weight status—such as physical activity level, sleep quality, stress, the built environment, and the food environment—were not included in the current study. Future research should consider these variables to provide a more comprehensive understanding of the determinants of weight status and eating-related behaviors.

Recommendations

Iraqi schools should implement nutrition education programs to improve eating competence, including awareness of hunger and satiety, balanced meals, and healthy food choices. Programs should consider socioeconomic differences by improving access to healthy foods and supportive environments. Future longitudinal studies are recommended to explore the

relationship between eating competence, socioeconomic factors, and BMI over time.

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Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Declaration of Helsinki, which provides guidelines for ethical research involving human participants. Ethical considerations in this study were that participation was entirely optional.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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Authors' Contributions

All authors equally contribute to this study.

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