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Students' perspectives on weight gain causes, prevention methods and barriers: Case study in Kazakhstan

Rustem Alkozha[1], Askhat Nalshybek[2*], Rinat Salikzhanov[3], Nurlan Baigabylov[4]

[1,2,3,4]*Faculty of Social Sciences, Department of Sociology, L.N. Gumilyov Eurasian National University, Astana 010008 Kazakhstan.*

Corresponding author: Askhat Nalshybek (*Email: asxat.nalshybek@bk.ru*)

Abstract

This cross-sectional study examined how university students in Kazakhstan perceive the causes of weight gain, the most effective prevention strategies, and the barriers to weight management. It also explored whether these beliefs predict Body Mass Index (BMI). A total of 376 undergraduates (aged 18–25) completed a questionnaire comprising 42 items on causes, 35 on prevention, and 34 on barriers. Principal component analyses, repeated measures ANOVAs, and hierarchical multiple regressions were conducted to identify core belief dimensions and assess their predictive value for BMI. Five causal-belief factors emerged (50.57% variance explained), with "self-control" most strongly endorsed. Prevention strategies also produced five factors (54.45%), with "physical exercise/activity" rated highest and "medication/dietary supplements" lowest. Barriers yielded four factors (55.93%), where "self-control and motivation" dominated. Although causal beliefs did not predict BMI, prevention and barrier beliefs accounted for up to 10% of BMI variance. Specifically, endorsing "access to education/exercise" correlated with lower BMI ($\beta = -0.16$, $p < .05$), whereas emphasizing "healthier eating" predicted higher BMI ($\beta = 0.24$, $p < .01$). Structural and psychological factors substantially shape BMI, despite the frequent attribution of weight gain to personal willpower alone. Many students' beliefs do not translate into lower BMIs. Integrating personalized strategies with accessible exercise facilities, nutrition education, and supportive policy measures can better address multifaceted barriers to healthy weight management among students.

Keywords: Body mass index, Healthy lifestyle initiatives, Kazakhstan, Preventive strategies, Public health interventions, Urban youth health, Weight management.

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1. Introduction

The issue of excess weight and obesity among students is increasingly drawing attention in healthcare and education. Even a minor weight gain, according to several studies, can lead to elevated health risks, including the early onset of cardiovascular and endocrine disorders [1, 2]. In addition, students may experience psychological challenges and reduced cognitive function, which ultimately affects their academic performance [3]. Consequently, preventing weight gain and maintaining a healthy lifestyle among the student population are considered top priorities for protecting health and establishing long-term healthy habits [4, 5].

In Kazakhstan, the overall prevalence of excess weight and obesity is considered to be among the highest in the world: approximately 60% of the adult population is overweight, and more than 25% suffer from obesity [6]. Although these statistics primarily concern adults, similar trends can develop among students at an early stage. In collaboration with the World Health Organization (WHO), the Ministry of Health of Kazakhstan has developed clinical guidelines aimed at promoting healthy eating habits and regular physical activity, including among young people [7]. The main objective of such measures is to prevent initial weight gain among individuals with a normal Body Mass Index (BMI) and to minimize further weight gain among those who are already overweight. However, studies show that individuals with obesity often face harsher judgment compared to those who are only moderately overweight, including in professional settings [8].

Several studies have examined perceptions of obesity among both the general public and professionals. The shared conclusion is that, although many respondents acknowledge the multifaceted nature of the problem, personal control factors—such as insufficient physical activity, overeating, and unbalanced nutrition—typically take center stage [9]. Social and biological factors, such as low socioeconomic status, genetic predisposition, and hormonal imbalances, are less frequently cited as key contributors to weight gain [10-12]. At the same time, there remains a discrepancy in attributing personal responsibility for health status: professionals are more inclined to hold individuals with obesity "personally responsible" compared to those with only moderate excess weight [10].

Considering these aspects, the present study pursued two main objectives. First, it aimed to achieve a more comprehensive understanding of beliefs and attitudes regarding weight gain specifically among students, acknowledging that previous research has often focused solely on the causes of obesity and relied on limited survey instruments. To address this, an extensive set of questions was developed, encompassing both potential causes and possible barriers and solutions.

Second, the study sought to test and expand upon the findings of McFerran and Mukhopadhyay [13] within a student population by employing a more comprehensive methodological approach. The investigation focused on whether beliefs about the causes of weight gain, proposed solutions, and the barriers to their implementation could predict students' BMI. This approach was designed to enhance understanding of the correlation between weight-related perceptions and the actual health parameters of the student population.

Based on the foregoing discussion, this study was guided by the following research questions:

1. What beliefs do students hold regarding the causes of weight gain, and how do they rank the significance of various contributing factors (e.g., lifestyle, psychological, biological, and environmental aspects)?
2. Which weight management and prevention methods (e.g., physical exercise, dietary interventions, policy-level measures) do students consider most and least effective, and how do these perceptions align with existing guidelines and recommendations?
3. What are the primary barriers students perceive (e.g., limited motivation, restricted access, biological or psychological constraints) that hinder them from maintaining or achieving a healthy BMI?
4. To what extent do these beliefs about causes, prevention, and barriers predict students' actual BMI, and are certain beliefs more strongly associated with higher or lower BMI levels?

The remainder of this paper is organized into four main sections. Section 2 provides a literature review of the major studies in the research area. Section 3 explains a detailed account of the methodology, including the survey design, sample selection, and analytic procedures. Section 4 presents the results of the principal component analyses, repeated measures ANOVAs, and regression models, offering a comprehensive breakdown of how students' beliefs about weight gain, prevention, and barriers relate to their BMI. Section 5 discusses the findings in light of the existing literature and theoretical frameworks, highlighting the implications for student health, policy, and future research. Finally, Section 6 offers a summary of the main conclusions, addresses the study's limitations, and suggests directions for subsequent research and interventions.

2. Literature Review

Research on how beliefs about the causes of obesity and weight gain affect actual BMI is of particular interest. In a series of studies by McFerran and Mukhopadhyay [13], it was found that students (along with other groups) typically attribute the origins of obesity either to improper eating habits or to a lack of physical activity. Notably, respondents who saw physical inactivity as the key factor had higher BMIs than those who primarily blamed unhealthy eating. Furthermore, in experimental conditions, participants exposed to explanations identifying insufficient exercise as the main cause of weight gain consumed more calories than those who were shown a dietary explanation. Thus, beliefs about the contributing factors to weight gain affect not only self-perception but also actual eating behaviors.

Studies focusing on potential solutions point to a broad range of measures perceived as effective by students and other groups. For example, Ogden and Flanagan found [11] that support groups were viewed as one of the most successful weight management strategies, whereas medication-based methods elicited the least trust among respondents. Other approaches, such as surgical interventions, counseling, and healthcare policy reforms, elicited more mixed evaluations. In another study conducted by Allnutt, et al. [12], students primarily supported increasing healthy food consumption, reducing caloric intake, promoting a more active lifestyle, and limiting sedentary behaviors. Moreover, there was generally positive feedback regarding government-led initiatives aimed at restricting certain advertising practices and banning unhealthy foods in educational institutions. However, insufficient motivation and the financial costs of healthy eating remain significant barriers to effective weight reduction [14].

Existing research provides important insights into students' views on weight gain and obesity. Nonetheless, many such studies rely on a narrow set of questions or on a formalized categorization of responses. These methodological constraints limit the breadth and depth of understanding, as most analyses focus on "standard" causes (e.g., overeating or lack of exercise) and traditional solutions. Furthermore, it is vital to bear in mind that, for students, gradual weight gain may be less noticeable; owing to changing schedules, stress, and the specifics of student life, young people may not always recognize fluctuations in their BMI [15]. Consequently, beliefs and attitudes toward even modest weight gain can differ significantly from those that form around more pronounced obesity.

One of the few studies specifically investigating perceptions of weight gain is that of Jackson, et al. [16], in which participants often indicated "indefinite" reasons for weight gain, going beyond usual explanations such as dietary changes or reduced physical activity. However, even this study faced methodological limitations, hindering its ability to capture the full range of opinions and attitudes toward the dynamic process of weight gain.

3. Materials and Methods

3.1. Study Design

This research was conducted as a cross-sectional observational study. It aimed to examine students' beliefs about weight gain, potential strategies for weight control, and the barriers they encounter in managing body weight. In this study, three main statistical approaches—Principal Component Analysis (PCA), Analysis of Variance (ANOVA), and Hierarchical Multiple Regression—were employed to evaluate students' beliefs about weight gain, prevention strategies, and barriers to effective weight management. PCA was used to reduce the large number of survey items into interpretable components, each representing a cohesive cluster of related beliefs (e.g., "self-control," "biological/psychological vulnerabilities"). ANOVA (specifically, repeated measures) examined how participants' average endorsement levels differed across each extracted component. Finally, hierarchical multiple regression entered demographic variables first and then added belief components, thus showing whether certain weight-related beliefs predict Body Mass Index (BMI) beyond demographic factors.

Compared to many prior studies that typically focus on only one or two broad categories (e.g., "lack of exercise" vs. "unhealthy diet"), this study's use of multiple scales and detailed PCA generated a richer, multi-dimensional profile of how students conceptualize weight gain and its prevention. Instead of clustering explanatory factors prematurely, the study employed PCA to derive empirically grounded subcategories, then used repeated measures ANOVAs to compare their relative importance. By coupling these results with hierarchical regression, the design allowed for a nuanced look at whether and how specific beliefs contribute to BMI after controlling for demographic differences—yielding insights often obscured in studies that rely solely on direct correlations or simpler regression models.

3.2. Participants

The study enrolled 376 undergraduate students, comprising 94 men and 282 women, all between 18 and 25 years of age (mean age = 20.25, SD = 1.64). Participants were drawn from L.N. Gumilyov Eurasian National University and Al-Farabi Kazakh National University, two of the largest higher education institutions in Kazakhstan. Individuals came from both urban and rural settings across the country.

Socioeconomic status (SES) was assessed using regional income data and categorized according to national classifications [17]. A total of 77.13% were in the middle-to-high SES range, while 22% were identified as low SES. Sixty-five percent of participants were born and raised in urban locations before enrolling at the university, including 15.5% from major cities; the remaining 19.15% had lived in rural or remote areas.

Body mass index (BMI) was calculated from self-reported height and weight, with classifications based on the World Health Organization's reference guidelines [18]. According to these data, 67.2% of participants were overweight or obese. Sixty-eight percent reported having experienced weight gain, although just 21.7% managed to return to their usual weight. Approximately 79.7% of the sample stated that they were either actively trying to lose weight or maintain their current weight.

3.3. Ethical Approval

All procedures were reviewed and approved by the Ethics Committee of L.N. Gumilyov Eurasian National University in Astana, Kazakhstan, in coordination with Al-Farabi Kazakh National University in Almaty. Participation was entirely voluntary, and no financial or other incentives were offered.

3.4. Materials

A newly developed questionnaire served as the principal research instrument. Its items were generated in two stages. First, a pilot study involved semi-structured interviews with 20 respondents aged 18 to 24 years (9 men and 11 women, mean age = 19.00, SD = 1.51), who were not included in the main research. These interviews explored potential reasons for weight gain among students and possible hindrances to weight management. All ideas or explanations mentioned by at least two participants were incorporated into the initial version of the questionnaire.

Second, additional items were drawn from government reports, policy documents [19-23], and relevant scholarly literature on weight gain, obesity, and weight management [11, 12, 24-30]. The final instrument was divided into three parts. The first section comprised 42 items related to beliefs about why students gain weight. The second included 35 items concerning strategies to prevent weight gain. The third contained 34 items on barriers to maintaining or reducing body weight. Each item was rated along a six-point Likert scale, ranging from "not at all important" to "extremely important."

3.5. Procedure

Participants were recruited via in-class announcements, peer referrals, and email invitations sent through official university mailing lists. An online version of the questionnaire was hosted on Google Forms, making it accessible to students regardless of location or schedule. For those preferring printed materials, paper questionnaires were distributed during select class sessions at both universities, with sealable envelopes provided to protect privacy upon return.

Data collection continued for three weeks and spanned various days and times in order to capture responses from participants with differing schedules and commitments. Completing the questionnaire generally required 15 to 20 minutes. The submission of either the online or paper questionnaire served as an indication of informed consent, as no separate consent form was required.

3.6. Variables

Key variables included BMI, demographic information (age, gender, SES, and geographic background), and participants' self-reported beliefs about weight gain and weight management practices. The questionnaire further explored perceived causes of weight gain, perceptions of effective weight control strategies, and reported obstacles to achieving or maintaining a healthy body weight.

3.7. Statistical Analysis

All quantitative data analyses were performed using IBM SPSS Statistics (version 26.0). Before running principal component analyses (PCAs), the average item scores were inspected to identify any values ≤ 1.0, as such low means would suggest minimal perceived relevance. Since no items fell below this threshold, all remained eligible for subsequent evaluation.

Three separate PCAs were then conducted, each dedicated to one of the following domains: (1) causal explanations for weight gain, (2) preventive strategies, and (3) barriers to effective weight management. Velicer's minimum average partial (MAP) tests [31] were employed to determine how many components to extract. Subsequently, a Varimax rotation was used to yield orthogonal factors that would be more straightforward to interpret. Items were retained if their principal factor loading was at least 0.30 and any secondary loading was 0.20 or lower. Internal consistency was assessed via Cronbach's α for each extracted component, and mean scores for these components were calculated by summing the relevant item scores and dividing by the number of retained items [32].

Within each domain, a one-way repeated measures analysis of variance (ANOVA) was conducted to test differences in mean endorsement among the identified components. For causal beliefs, the final five-component model exhibited statistically significant variations ($F(3.84, 1368.06) = 178$, $p < .0001$, partial $\eta^2 = .34$). Bonferroni-adjusted pairwise contrasts revealed that self-control was endorsed more strongly than the other four components (all $p < .0001$), whereas no significant differences were detected among the remaining four. In the domain of preventive strategies, another repeated measures ANOVA confirmed that the five components were endorsed at different levels ($F(3.16, 1132.80) = 431.57$, $p < .0001$, $\eta^2 = .55$). Pairwise comparisons indicated that physical exercise/activity received the highest rating (all $p < .0001$), followed by healthier eating, while medication/dietary supplements garnered the lowest level of endorsement. With respect to barriers, four components emerged. Their mean endorsements also varied significantly ($F(2.71, 941.09) = 146.86$, $p < .0001$, partial $\eta^2 = .30$), with self-control and motivation rated highest (all $p < .0001$), followed by limited resources/access. The remaining two—nutritional knowledge and biological/psychological vulnerabilities—showed no significant difference from one another.

To investigate how participants' beliefs might predict their Body Mass Index (BMI), three hierarchical multiple regression analyses were executed. Demographic factors (age, gender, education, socioeconomic status [SES], and geographic location) were entered into the first blocks, and the relevant belief components (causal, preventive, or barriers) were added in the final block. Multicollinearity checks employed Spearman's correlation coefficients (criterion $r > 0.70$) [33] along with variance inflation factor and tolerance diagnostics, as recommended by Field [34]. None of these tests signaled problematic intercorrelations (VIF < 10; tolerance > 0.2).

Although the causal belief components did not explain BMI beyond demographic variables ($F(10, 314) = 0.946$, $p > 0.05$), the models for preventive strategies and barriers were both significant ($F(13, 314) = 1.75$, $p = 0.05$, and $F(12, 303) = 3.09$, $p < 0.0001$, respectively). In the preventive strategies model, two components—access to education/exercise ($\beta = -0.16$, $p < 0.05$) and healthier eating ($\beta = 0.24$, $p < 0.01$)—accounted for a notable portion of the variance in BMI. In the barriers model, three components emerged as significant predictors: limited resources/access ($\beta = 0.25$, $p < 0.01$), nutritional knowledge ($\beta = -0.38$, $p < 0.0001$), and biological/psychological vulnerabilities ($\beta = 0.16$, $p < 0.05$).

Lastly, binary logistic regression analyses were conducted to determine whether these belief components could predict overweight or obesity status when controlling for the same demographic covariates. Stronger endorsement of access to education/exercise was linked to a lower likelihood of being overweight (Wald = 7.00, $p < 0.01$), whereas stronger endorsement of healthier eating was associated with higher odds of being classified as overweight (Wald = 12.74, $p < 0.0001$). However, none of the barrier components significantly predicted overweight or obesity classification in these models. All significance tests were two-tailed, with $p < 0.05$ as the conventional alpha threshold, unless otherwise noted for Bonferroni adjustments.

4. Results

Separate principal component analyses (PCAs) were carried out to evaluate participants' ratings in three distinct domains: (i) causal explanations of weight gain, (ii) preventive strategies, and (iii) barriers to successful weight management. Initially, mean scores of all items were checked to see if any fell at or below 1.0—an indicator of very low perceived relevance. None met this criterion, implying that all items were viewed as plausible factors or potential solutions to weight problems. To decide the number of components to extract, Velicer's minimum average partial (MAP) tests were implemented [31], followed by Varimax rotation to generate orthogonal factors that would be more interpretable. Items were deemed salient if their primary loading exceeded .30, while cross-loadings on any other factor stayed below .20. Mean component scores were then calculated by summing scores on the constituent items and dividing by the number of retained items [32].

4.1. Causal Beliefs About Weight Gain

An analysis of 42 items related to causal attributions produced a five-component structure, collectively accounting for 50.57% of the total variance. Fifteen items were eliminated due to similar loadings across multiple components (see Table 1). The first component, referred to as self-control, explained 12.27% of the variance and centered on eight items describing lapses in dietary regulation and physical activity. The second component, lifestyle limitations (11.37% of the variance), included five items concerning constraints such as the high cost of nutritious foods, the relative affordability of high-fat/high-sugar options, and the negative effects of working extended or irregular hours.

Next, a psychological component emerged (10.63% of the variance), comprising items indicative of emotional or mental health challenges (e.g., depression, stress, low self-esteem). The fourth component, termed biological/medical, accounted for 8.27% of the variance and included four items related to hormonal, metabolic, and medication-induced causes. Lastly, a modern living component (8.10% of the variance) contained four items describing the decline in physical movement due to reliance on automobiles, the ubiquity of household appliances, increased screen time, and overconsumption of so-called "diet" products.

A one-way repeated measures analysis of variance revealed statistically significant variations in the overall endorsement of these five causal components ($F(3.84, 1368.06) = 178$, $p < .0001$, partial $\eta^2 = .34$). As outlined in Table 1, the highest endorsement was reserved for the self-control dimension, with its eight items occupying the top eight positions in mean scores. Pairwise comparisons, corrected using the Bonferroni method ($\alpha = .005$), showed that this component was rated significantly higher than the other four (all $p < .0001$). Meanwhile, none of the remaining four components differed appreciably from one another (all $p > .005$).

Table 1.
Rotated component loadings, mean ratings (with standard deviations), and rankings for individual items related to causal beliefs.

Causal belief components and items	Mean	SD	Rank	1	2	3	4	5
Self-control (Cronbach's $\alpha = .81$)	4.22	0.63						
Eating the wrong types of foods	4.50	0.86	2	0.68				
Eating more food than you need	4.48	0.87	1	0.64				
Not enough physical activity/exercise	4.41	0.91	3	0.62				
Lack of self-control	4.09	1.07	6	0.60				
Eating too many convenience foods/takeaways	4.12	1.10	5	0.58				
Enjoying high fat/high sugar 'bad' foods	4.30	1.01	4	0.55				
Too much snacking	3.84	1.05	8	0.54				
Being lazy	3.96	1.20	7	0.54				
Lifestyle limitations (Cronbach's $\alpha = .76$)	3.12	0.98						
Lack of awareness of problems with current eating/exercise habits	3.12	1.29	20		0.63			
Working long hours	3.15	1.40	19		0.58			
Low price of high fat/high sugar foods compared with fruit and vegetables			16		0.57			
Shift work/irregular working hours	2.92	1.43	25		0.56			
High cost of healthy foods (e.g., fruits, vegetables, grains, lean meat)	3.16	1.41	18		0.51			
Psychological (Cronbach's $\alpha = .80$)	3.21	1.00						
Poor self-confidence	2.94	1.31	24			0.68		
Loneliness/social isolation	3.32	1.39	14			0.60		
Low self-esteem	3.30	1.31	13			0.59		
Depression	3.39	1.39	12			0.58		
Stress	3.46	1.28	11			0.57		
Normal part of growing old (i.e., aging)	2.80	1.25	26			0.53		
Biological/Medical (Cronbach's $\alpha = .80$)	3.12	1.08						
Medical conditions (e.g., thyroid problem)	3.25	1.43	15				0.75	
Side effects of medication	3.05	1.38	22				0.73	
Hormonal/Pregnancy-related changes in metabolism	3.18	1.39	17				0.70	

Causal belief components and items	**Mean**	**SD**	**Rank**	**1**	**2**	**3**	**4**	**5**
Slow metabolism	2.99	1.29	23				0.60	
Modern living (Cronbach's $\alpha = .72$)	3.19	0.95						
Increased use of modern appliances rather than	3.10	1.31	21					0.69
Manual labor (e.g., ride-on mowers, remote controls) Increased use of cars over walking/cycling	3.49	1.20	10					0.68
Increased participation in sedentary leisure activities (e.g., TV, computers, electronic games)	3.68	1.21	9					0.64
Eating too much of 'diet', 'low fat,' 'fat free' foods	2.39	1.38	27					0.43

Note: This table also shows the reliability estimates for the five components.

Fifteen items were removed from the analyses due to overlapping loadings across multiple components: using food for emotional "comfort," drinking excessive amounts of carbonated or sugary beverages, consuming too much alcohol, choosing larger portion sizes, increasing the intake of refined or processed foods, lacking adequate nutritional knowledge, sustaining poor family eating habits, mistaking boredom or thirst for hunger, undergoing significant life disruptions (e.g., divorce, grief), possessing genetic predispositions, having insufficient physical activity at work, discontinuing smoking, having little time for meal planning, being influenced by pervasive advertising and marketing of unhealthy foods, and relying too heavily on "diet," "low-fat," or "fat-free" products.

4.2. Beliefs About Prevention Strategies Against Weight Gain

A five-component solution, accounting for 54.45% of the variance, emerged from the analysis of participants' beliefs regarding strategies to prevent weight gain. The first component, identified as access to education/exercise, explained 14% of the variance and consisted of six items. The second component, termed healthier eating, was formed by seven items emphasizing improvements in dietary habits and accounted for 11.25% of the variance. The third component, labeled physical exercise/activity, encompassed five items aimed at increasing overall physical movement and explained 10.40% of the variance. The fourth component, medication/dietary supplements, included three items highlighting the preventive use of medication or dietary supplements, accounting for 9.78% of the variance. The final component, reduced serving size, contained three items that addressed reducing portion sizes for convenience foods, snacks, and restaurant meals, contributing 9.00% of the variance (see Table 2).

Table 2.
Rotated component loadings, average ratings (with standard deviations), and rankings for individual items on strategies to prevent weight gain.

Prevention strategies	**Mean**	**SD**	**Rank**	**1**	**2**	**3**	**4**	**5**
Access to education/exercise (Cronbach's $\alpha = 0.87$)	3.64	0.92						
Increased advertising of health information	3.55	1.16	15	0.76				
More affordable access to nutritionists and dieticians	3.59	1.22	13	0.74				
Increased education on food and nutrition	3.81	1.12	11	0.70				
Local government initiatives to increase access to inexpensive exercise areas and programs	3.60	1.25	12	0.66				
Increased levels of health education regarding	3.56	1.18	14	0.64				
effects of weight gain Subsidy for gyms/trainers to lower costs	3.53	1.38	16	0.63				
Healthier eating (Cronbach's $\alpha = .78$)	3.98	0.69						
Eating less high-sugar food	4.13	0.94	7		0.66			
Increased availability of healthy foods	4.08	1.05	8		0.63			
Stress management	3.48	1.21	18		0.60			
Eating less fat	4.03	1.13	9		0.59			
Eating more healthy foods (e.g., fruits, vegetables, grains, lean meat)	4.65	0.63	1		0.57			
Meal planning	3.91	1.00	10		0.57			
Being more aware of what one is eating (e.g., Counting kilojoules)	3.49	1.28	17		0.38			
Physical activity (Cronbach's $\alpha = .79$)	4.44	0.61						
Increased participation in physical activity/ exercise	4.55	0.71	3			0.84		
Higher levels of physical activity	4.39	0.86	5			0.72		
Eating a balanced diet	4.60	0.71	2			0.64		
Lifestyle change to include regular healthy eating and physical activity	4.44	0.84	4			0.63		
Encourage the use of active forms of transport (e. g. walking, cycling)	4.17	0.99	6			0.58		
Medication/dietary supplements (Cronbach's $\alpha = 0.70$) Use of dietary supplements (e.g., vitamins, fish	2.29	1.08	23				0.67	

Prevention strategies	Mean	SD	Rank	1	2	3	4	5
oil)	2.33	1.39						
Use of medication	2.42	1.37	22				0.65	
Use of meal replacements (e.g., protein bars, shakes)	2.07	1.39	24				0.60	
Reduced serving sizes (Cronbach's $\alpha = .84$)	3.18	1.20						
Reduced serving sizes of meals in restaurants	3.04	1.41	21					0.85
Smaller serving sizes of pre-packaged foods/ takeaways	3.35	1.42	19					0.84
Reduced serving sizes of snacks	3.11	1.39	20					0.69

Note: The reliability estimates for the five components are also shown.

The 11 items excluded from further analyses due to similar loadings on two or more components include: increased development of safe areas for physical activity (e.g., bicycle paths, parks), clear labeling of nutritional content of all foods, counseling for emotional issues, subsidies to lower the cost of health foods (e.g., fruit, vegetables, grains, lean meat), return to eating natural foods, support groups, reduced serving sizes of meals at home, engaging in non-food-related social activities, higher taxes on high-fat and high-joule 'junk' food making them more expensive, limiting advertising of unhealthy foods, and higher taxes on takeaway foods.

A one-way repeated measures ANOVA revealed significant differences in endorsement levels across these five components ($F(3.16, 1132.80) = 431.57$, $p < .0001$, $\eta^2 = .55$) [1]. Physical exercise/activity received the highest endorsement as a prevention strategy, followed by healthier eating, while access to education/exercise and reduced serving size were ranked next. Medication/dietary supplements garnered the lowest level of endorsement, with its mean rating falling below the scale's midpoint. Pairwise comparisons confirmed that the average ratings for all five components were significantly different from one another (all $p < .0001$).

4.3. Beliefs About Barriers to Effective Weight Management

A four-component solution was derived from the data analyzing barriers to effective weight management, explaining 55.93% of the variance (see Table 3).

Table 3.
Rotated component loadings, average ratings (with standard deviations), and rankings for individual items related to barriers to weight management.

Barriers to weight management components and items	Mean	SD	Rank	1	2	3	4
Limited resources and access (Cronbach's $\alpha = 0.92$)	3.37	0.95					
Cost of sporting activities	3.13	1.39	19	0.79			
Cost of physical activities, such as gym memberships	3.58	1.41	6	0.79			
Cost of active leisure activities	3.20	1.35	15	0.79			
Cost of weight management services, such as dietitians	3.26	1.36	13	0.73			
Cost of healthy foods (e.g., fruits, vegetables, grains, lean meat)	3.55	1.33	8	0.72			
Limited resources (e.g., time, money).	3.57	1.35	7	0.70			
Long distance between services/facilities making the use of cars necessary	3.19	1.40	17	0.68			
Lack of safe areas for exercise	2.95	1.38	23	0.65			
Difficulty accessing health services	2.86	1.40	24	0.61			
Ease and convenience of unhealthy options (e.g., drive the car, eat takeaway food) The health benefits of maintaining the ideal weight are long-	3.77 3.49	1.78 1.21	4 9	0.52 0.43			
The term makes it difficult to maintain motivation due to a lack of time for planned exercise	3.65	1.28	5	.35			
Nutritional knowledge (Cronbach's $\alpha = .82$)	3.18	1.07					
Lack of nutritional knowledge	3.29	1.25	12		0.77		
Lack of nutritional education	3.18	1.30	18		0.72		
Cultural and family values regarding food and body weight	3.21	1.36	14		0.68		
Inconsistent health advice and information	3.05	1.34	21		0.61		
Biological & psychological vulnerabilities (Cronbach's $\alpha = .86$) Lack of self-esteem	3.19 3.32	1.05 1.31	 10			 0.79	
Genetics	3.09	1.24	20			0.77	
Depression	3.30	1.34	11			0.76	
Slow metabolism	3.01	1.30	22			0.69	
Poor self-confidence	3.20	1.29	16			0.67	
Self-control & motivation (Cronbach's $\alpha = .77$)	4.18	0.81					
Laziness	4.12	1.04	2				0.84
Lack of willpower and self-control	4.31	0.89	1				0.81
Lack of motivation	4.06	1.02	3				0.72

Note: This table also shows the reliability estimates for the four components.

[1] Adjusted for equal variances not assumed.

The eight items excluded from further analyses due to similar loadings on two or more components include: low availability of healthy snack food options (e.g., fruits, vegetables), lack of family/social support, a modern lifestyle that limits the opportunity for physical activity throughout the day, unrealistic expectations regarding body weight – wanting to achieve a 'perfect' body, dislike of gyms/exercising, maintaining a healthy body weight is not an immediate priority, physical disability, injury, or illness, and limited access to healthy foods/exercise facilities.

Limited resources/access emerged as the first component, accounting for 24.29% of the variance, with 14 items highlighting obstacles such as high costs for healthier foods, sports, and exercise facilities, as well as difficulties linked to safety or distance when accessing health-related services. This component displayed high internal consistency (Cronbach's α = .92). Some of the more highly rated items included "Cost of physical activities (e.g., gym membership)" (M = 3.58, SD = 1.41, rank 6) and "Limited resources (e.g., time, money)" (M = 3.57, SD = 1.35, rank 7). Meanwhile, "Lack of safe areas for exercise" (M = 2.95, SD = 1.38, rank 23) and "Difficulty accessing health services" (M = 2.86, SD = 1.40, rank 24) reflected somewhat lower average ratings.

The second component, nutritional knowledge (12.39% of the variance; α = .82), encompassed four items pointing to inadequate nutrition education, gaps in formal schooling, and cultural or familial beliefs about food and body weight. Item means in this domain were moderate, exemplified by "Lack of nutritional knowledge" (M = 3.29, SD = 1.25, rank 12) and "Cultural and family values about food and body weight" (M = 3.21, SD = 1.36, rank 14).

Biological and psychological vulnerabilities, which explained 11.82% of the variance (α = .86), formed the third component. Five items captured factors such as depression, low self-esteem, and a genetic or metabolic predisposition to weight gain. Among these, "Lack of self-esteem" (M = 3.32, SD = 1.31, rank 10) and "Depression" (M = 3.30, SD = 1.34, rank 11) received relatively higher endorsement compared to "Slow metabolism" (M = 3.01, SD = 1.30, rank 22).

Finally, the self-control and motivation component (7.43% of the variance; α = .77) consisted of three items describing issues like laziness, limited willpower, and insufficient personal drive. Notably, "Lack of willpower/self-control" (M = 4.31, SD = 0.89, rank 1) emerged as the highest-rated barrier item overall, followed closely by "Laziness" (M = 4.12, SD = 1.04, rank 2) and "Lack of motivation" (M = 4.06, SD = 1.02, rank 3).

A one-way repeated measures ANOVA confirmed significant differences in overall endorsement across these four components F(2.71,941.09)=146.86,p<.0001,η2=.30F(2.71, 941.09) = 146.86, p < .0001, η^2 = .30F(2.71,941.09)=146.86,p<.0001,η2=.30. Self-control and motivation yielded the highest mean (4.18, SD = 0.81), surpassing the other three components (all p < .0001). Limited resources/access followed, ranking above nutritional knowledge and biological and psychological vulnerabilities (all p < .005). There was no significant difference between the latter two components.

Eight additional items—such as "Low availability of healthy snack food options (e.g., fruits, vegetables)" and "Lack of family/social support"—were excluded due to similar loadings on two or more components. The final set of items exhibited strong internal consistency within their respective factors, as demonstrated by Cronbach's α values in Table 3.

4.4. Hierarchical Regression Analyses Predicting Body Mass Index (BMI)

The hierarchical multiple regression models were conducted to explore whether participants' beliefs about weight gain—encompassing causal attributions, prevention strategies, and perceived barriers—predict their measured Body Mass Index (BMI). Demographic factors were entered first (Step 1), followed by further demographic refinements (Step 2, including dummy-coded variables such as education, socioeconomic status, and geographic location), and finally, relevant belief components were introduced (Step 3).

In the first model testing five causal belief components, the overall result was not statistically significant after accounting for demographic variables (F(10, 314) = 0.946, p > 0.05). This indicates that causal beliefs alone did not explain additional variance in BMI [35].

In contrast, the prevention strategies model became significant once the five belief components were added at Step 3 (F(13, 314) = 1.75, p = 0.05; total R^2 = .068). Two belief components emerged as significant predictors of BMI: access to education/exercise (β = −0.161, p < 0.05) and healthier eating (β = 0.240, p < 0.01). Endorsement of the access to education/exercise component was associated with lower BMI, as indicated by the negative beta coefficient. By comparison, stronger endorsement of healthier eating corresponded to higher BMI levels [34].

Table 4.
Results of the hierarchical multiple regressions examining whether beliefs about prevention strategies against weight gain predict BMI.

Predictor	**Step 1**	**Step 2**	**Step 3**
Gender (1 = Male, 2 = Female)	−0.014	−0.004	−0.014
Age	0.136	0.137	0.104
High school education vs vocational training		0.007	0.028
High school education vs university education		−0.011	0.009
Middle SES vs low SES		0.111	0.096
Middle SES vs high SES		−0.055	−0.064
Inner-regional vs major city		0.051	0.081
Inner-regional vs outer-regional/Remote		−0.120	−0.104
Belief: Access to education/Exercise			−0.161**
Belief: Healthier eating			0.240**
Belief: Physical activity			−0.041

Predictor	Step 1	Step 2	Step 3
Belief: Medication/dietary Supplements			0.015
Belief: Reduced serving size			0.030
R	0.137	0.167	0.260
R^2	0.019	0.028	0.068
ΔR^2	0.019	0.009	0.040
F	$F(2, 325) = 3.12$*	$F(8, 319) = 1.14$	$F(13, 314) = 1.75$*

Note: Standardized regression coefficients are presented in the table.
*$p = 0.05$. **$p < 0.05$.

Table 5 displays the model examining four barriers to weight management. Once these barrier beliefs were added in Step 3, the model became significant (F(12, 303) = 3.09, p < 0.0001; total R^2 = .109). Three specific barrier components significantly predicted higher or lower BMI: limited resources/access (β = 0.252, p < 0.01), nutritional knowledge (β = −0.378, p < 0.0001), and biological and psychological vulnerabilities (β = 0.157, p < 0.05).

Table 5.
Results of the hierarchical multiple regressions examining whether beliefs about barriers to weight management predict BMI.

Predictor	Step 1	Step 2	Step 3
Gender (1 = Male, 2 = Female)	−0.026	−0.012	−0.038
Age	0.092	0.093	0.055
High school education vs vocational training		0.008	0.005
High school education vs university education		−0.022	−0.002
Middle SES vs low SES		0.132	0.118
Middle SES vs high SES		−0.046	−0.058
Inner-regional vs major city		0.072	0.084
Inner-regional vs outer-regional/remote		−0.116	−0.092
Belief: Limited resource/access			0.252**
Belief: Nutritional knowledge			−0.378***
Belief: Biological & psychological			0.157*
Vulnerability			
Belief: Self-control & motivation			−0.005
R	0.098	0.142	0.330
R^2	0.010	0.020	0.109
ΔR^2	0.010	0.011	0.089
F	$F(2, 313) =$	$F(8, 307)$	$F(12, 303) =$
	1.051	= 0.795	3.09***

Note: Standardized regression coefficients are presented in the table.
*$p < 0.05$. **$p < 0.01$. ***$p < 0.0001$.

The positive coefficient for limited resources/access indicates that greater perceived costs or difficulties in using services are linked to higher BMI, whereas the strong negative coefficient for nutritional knowledge suggests that individuals who perceive a lack of nutritional understanding as a barrier tend to have lower BMI. Biological and psychological vulnerabilities, including depression or slow metabolism, also displayed a positive relation to BMI. The self-control and motivation component did not significantly predict BMI once demographics and the other three barrier components were included in the model (β = −0.005, p > 0.05).

Subsequent binary logistic regression analyses were performed by classifying participants according to whether they met the criteria for overweight or obesity and controlling for the same demographic variables. Participants who strongly endorsed the access to education/exercise component were significantly less likely to be classified as overweight (Wald = 7.00, p < 0.01), whereas stronger endorsement of the healthier eating component raised the odds of overweight status (Wald = 12.74, p < 0.0001). None of the four barrier belief components significantly predicted overweight or obesity status in these logistic models. When all predictors were included in a single step, the results remained unchanged.

5. Discussion

The primary objective of this study was to explore in greater detail how students perceive the causes of weight gain, the strategies they find most helpful for preventing it, and the challenges they regard as most significant for effective weight management. By focusing on university students—a demographic often marked by irregular schedules, academic pressures, and evolving social contexts—this investigation sought to understand how beliefs formed during this formative period may influence longer-term health outcomes.

5.1. Predominance of Self-Control in Causal Beliefs

The results show that most participants consistently considered self-control to be the leading cause of weight gain. Items related to this factor (e.g., eating more food than needed, lacking self-control, and engaging in insufficient physical activity) attained the highest average ratings (ranging from 3.84 to 4.50 on a six-point scale). The strong emphasis on personal responsibility and willpower echoes prior research on obesity beliefs [10-12], underscoring a persistent view that individuals largely shape their weight trajectory by making "good" or "bad" lifestyle choices. For students, these findings reinforce a narrative in which time management, motivation, and healthy eating habits are seen as key hurdles, particularly in the face of academic stresses and social pressures.

Although lifestyle limitations, psychological issues, biological/medical conditions, and modern living were also acknowledged, no significant differences emerged among these four components. In other words, while the student sample recognized that factors beyond self-control—such as stress, depression, and hormonal issues—play a role, such reasons did not eclipse the overarching belief that personal discipline is paramount. This outlook aligns with a broader public tendency to prioritize behavioral over structural or biological explanations.

5.2. Endorsement of Prevention Strategies

Turning to participants' views on the best ways to prevent weight gain, the data revealed that most favor strategies involving direct behavior changes in diet and physical activity. Specifically, the component labeled physical exercise/activity earned the highest endorsement (overall mean of 4.44), further validating the idea that students see individual lifestyle adjustments—particularly regular exercise and balanced diets—as essential. The healthier eating component followed closely behind, with items including "eating more healthy foods" achieving some of the top individual ratings.

Notably, the medication/dietary supplements component received a mean rating below the midpoint of the scale (all items ranged from approximately 2.07 to 2.42), indicating a general reluctance among students to endorse pharmacological or supplementary interventions. This finding suggests that, within this population, weight-related challenges are primarily perceived as behavioral rather than strictly medical.

The access to education/exercise component garnered moderate support, averaging 3.64. Although participants recognized the potential benefits of improved nutritional education and subsidized exercise facilities, these strategies ranked lower than straightforward behavioral changes such as increased physical exercise or healthier eating. This result may reflect students' preference for immediate, personally controlled actions over more system-level interventions that depend on policy or organizational changes—an attitude that mirrors patterns reported in earlier studies on public obesity beliefs.[12].

5.3. Salience of Self-Control and Motivation as Barriers

When asked about barriers to effective weight management, students once again pointed to the role of individual agency. The self-control and motivation component attained the highest mean rating among barriers (4.18), surpassing limitations in resources, nutritional knowledge, and biological or psychological vulnerabilities. This echoes the causal belief finding in which self-control was highlighted as a pivotal factor in weight gain. For students balancing academic demands, social activities, and financial constraints, sustaining a consistent exercise schedule or dietary plan often requires both mental resolve and effective time management [35, 36].

Nonetheless, the limited resources/access component also emerged as a significant barrier, with items related to the cost of gyms, healthy foods, and dieticians attracting ratings near or above 3.50. Although the data do not show these financial barriers as overtaking self-control, they do imply that many students perceive cost as an obstacle. This resonates with the sociocultural landscape of Kazakhstan, where the affordability and availability of health-related services can vary greatly among different regions [22, 37].

5.4. Predictive Value of Beliefs for BMI

A notable outcome from the regression analyses is that students' beliefs about the causes of weight gain alone did not predict actual BMI values. Instead, beliefs about prevention strategies and barriers accounted for a modest but statistically significant percentage of the variance in BMI. Specifically, the access to education/exercise component ($\beta = -0.16$, $p < 0.05$) was associated with a lower BMI, while the healthier eating component ($\beta = 0.24$, $p < 0.01$) was linked to a higher BMI. This seemingly counterintuitive result might reflect the challenges facing students who already recognize their dietary struggles but find it difficult to implement long-term changes, especially if they have previously experienced repeated cycles of weight gain.

Barriers related to limited resources/access ($\beta = 0.25$, $p < 0.01$), nutritional knowledge ($\beta = -0.38$, $p < 0.0001$), and biological/psychological vulnerabilities ($\beta = 0.16$, $p < 0.05$) also significantly explained variance in BMI. However, none of these barriers significantly predicted whether a participant would be classified strictly as overweight or obese. This finding suggests that while certain barriers can influence incremental changes in body weight, crossing the threshold from normal weight to overweight or obesity may hinge on more complex or less frequently measured factors, including family history, genetics, or personal health events.

5.5. Comparison with Previous Literature

These results diverge somewhat from those of McFerran and Mukhopadhyay [13],who found that individuals attributing obesity primarily to insufficient exercise tended to have higher BMIs. In the present study, the absence of a direct "exercise vs. diet" dichotomy—replaced instead by broader components such as self-control and lifestyle—may have obscured distinctions captured in that earlier work. Nonetheless, the high endorsement of self-control resonates with Jackson, et al. [16], who noted that people often point to undefined personal shortcomings—rather than explicit, measurable behaviors—when explaining weight challenges.

Additionally, although the majority of participants met the criteria for overweight or obesity, there remained a disconnect between stated awareness of healthier eating habits and the adoption of those practices. Mussurov and peers [22] similarly reported that knowledge does not necessarily equate to action, particularly when environmental or cultural drivers reinforce less healthful behaviors. For Kazakhstani students, the cost of healthy foods, time constraints, and family traditions around meal portions may all interplay with personal motivation in ways that hinder effective behavior change.

6. Conclusion

The study underscores that community-level interventions emphasizing personal responsibility—particularly through lifestyle and dietary modifications—are likely to garner strong support among students. Nonetheless, exclusive reliance on individual willpower may overlook broader structural and psychological factors influencing weight management. Initiatives that highlight genetic and biological influences could promote greater acceptance of population-level strategies targeting prevention beyond those who are already overweight or obese. The findings thus point to the importance of integrating both individual and systemic approaches in public health programs and educational campaigns.

6.1. Limitations

Although the questionnaire covered a wide range of weight-related beliefs, these belief components explained only a modest portion of the variance in Body Mass Index (BMI). Such a result aligns with the complex etiology of body weight, shaped by biological, environmental, psychosocial, and behavioral factors extending beyond conscious beliefs. In addition, reliance on self-reported weight and height may introduce inaccuracies, while demographic skew—particularly with more female respondents and a concentration of participants from inner-regional areas—limits the study's broader generalizability. Students from remote or large urban areas may encounter distinct challenges related to financial constraints, family expectations, or exercise resources.

6.2. Future Research Directions

Further investigations should explore how educational programs, coaching services, and peer support interventions might reshape student attitudes and facilitate sustained healthful behaviors. Moreover, expanding the sample to include more male, rural, and urban participants would improve the representativeness of the findings. Subsequent studies could also delve deeper into the specific facets of "healthier eating" or "modern living" that correlate most strongly with BMI, thereby identifying more precise targets for intervention and potentially leading to more effective, contextually tailored solutions.

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