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Factors Predisposing to Weight Gain in Young Adults during COVID-19 Home Confinement

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Abstract

Introduction: Home confinement during the COVID-19 pandemic reduced the physical activity level and exacerbated other unhealthy behaviours such as vices and eating disorders. This study analyses the risk factors predisposing to weight gain in young adults during COVID-19 home confinement. *Material and method:* Four hundred thirty-three students, aged between 19 and 25, participated in an online survey to understand the factors associated with weight gain. The following lifestyle dimensions were investigated in a regression model: physical activity, personal experiences, occupation, risk of vices. *Results:* We have found significant associations between weight gain (as a dependent variable), and frequency of physical activity ($p = 0.009$), occupational performance ($p = 0.002$), and alcohol consumption ($p = 0.002$). Male respondents are more likely to have gained weight during isolation. For an increase of one unit in the frequency of playing sports, we expect an odd of 0.25 ($p = 0.048$) for the respondents' weight loss. Moreover, if the occupational performance increases by one unit, a weight decrease by a rate of 0.52 ($p = 0.02$) is expected. *Conclusion:* In conclusion, young adults less engaged in physical activity, who assessed their occupational performance as lower, and who consumed alcohol more often during home confinement are the most likely to have gained weight.

Keywords: *weight gain, home confinement, physical activity, alcohol consumption, COVID-19*

Rezumat

Introducere: Izolarea la domiciliu în timpul pandemiei COVID-19 a redus nivelul de activitate fizică și a exacerbat alte comportamente nesănătoase, cum ar fi viciile și tulburările alimentare. Acest studiu analizează factorii de risc care predispun la creșterea în greutate în timpul izolării la domiciliu, în cazul adulților tineri. *Material și metodă:* Patru sute treizeci și trei de studenți, cu vârste cuprinse între 19 și 25 de ani, au participat la un sondaj online care a avut ca scop identificarea factorilor asociați creșterii în greutate. Următoarele dimensiuni ale stilului de viață au fost investigate într-un model de regresie: activitatea fizică, experiențele personale, ocupația și riscul de comportamente vicioase. *Rezultate:* Am găsit asociații semnificative între creșterea în greutate (ca variabilă dependentă) și frecvența activității fizice ($p = 0,009$), performanța profesională ($p = 0,002$) și consumul de alcool ($p = 0,002$). Respondenții de gen masculin au fost mai predispuși la creșterea în greutate în timpul izolării. Pentru o creștere cu o unitate a frecvenței activităților sportive, ne așteptăm la o cotă de 0,25 ($p = 0,048$) pentru pierderea în greutate a respondenților. Mai mult, dacă performanța profesională crește cu o unitate, se așteaptă o scădere a greutății cu o rată de 0,52 ($p = 0,02$). *Concluzie:* În concluzie, adulții tineri mai puțin angajați în activitate fizică, care și-au evaluat performanța profesională ca fiind mai scăzută în această perioadă și care au consumat alcool mai des în timpul izolării la domiciliu, au fost cei mai susceptibili la creșterea în greutate.

Cuvinte cheie: *creștere în greutate, izolare la domiciliu, activitate fizică, consum de alcool, COVID-19*

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Introduction

According to the WHO Timeline-COVID-19, in December 2019, the Wuhan Municipal Health Commission, China, reported a cluster of pneumonia cases in Wuhan, Hubei Province, and a novel coronavirus was identified [1]. The virus spread got out of control, and on 11 March, WHO announced that COVID-19 could be characterized as a pandemic [1]. The COVID-19 pandemic involves a novel coronavirus characterized by a respiratory illness that results from a severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection, with an increased intra-community transmission rate, and with low to moderate (estimated 2%–5%) mortality rate [2]. There are almost 170 million cases of COVID-19 confirmed globally, including more than 3.5 million deaths [1]. To reduce the spread of COVID-19, the World Health Organization and the majority of governments have recommended that the entire human population 'stay-at-home' [3]. It is estimated that close to 4 billion people lived in social isolation during this pandemic [4]. By April 2020, about half of the world's population was under a lockdown or home confinement, with more than 3.9 billion people in more than 90 countries or territories having been asked or ordered to stay at home by their governments [4]. Schools, universities, and colleges have closed either on a nationwide or local basis in 80 countries, affecting approximately 62% of the world's student population [5]. Home confinement is a measure that can prevent, or at least minimize, the impact of infectious disease outbreaks. However, it is often an unpleasant experience due to loss of freedom, uncertainty over disease status, and lack of daily routine. The potential benefits of mandatory mass home confinement need to be weighed carefully against the possible long-term adverse effects on health status and physical activity behaviours, social and psychological aspects of life [5,6]. The novelty and unpredictability of the situation determined an increased level of stress and anxiety, leading to modified eating and vicious behaviours, reduced physical activity, sleep problems, and consequently, weight gain [7]. Students are one social category significantly influenced by the restrictions imposed during home-confinement, mainly due to limited social interactions related to work, study, and recreational activities. Many studies have been conducted to

investigate COVID-19 restrictions' impact on different aspects of student's life. According to previously published studies, students suffered a moderate to severe psychological impact during the first weeks of the COVID-19 pandemic, being negatively influenced even compared to university staff [8]. Increased stress and anxiety levels were also noticed among French university students; those who did not relocate to live with their parents being more vulnerable [9].

A tendency towards an unhealthy lifestyle was noticed among the student population compared to before the COVID-19 pandemic. Increased sitting time was reported by most of the studies enrolling students. However, data regarding physical activity are inconstant in the published literature: while some reported high time spent performing physical activity among students [10], others reported significantly decreased level of physical activity during home confinement [11]. Eating habits were also reported to be healthier during confinement [12]. Some positive changes due to pandemic restrictions were also noticed, such as improved learning strategies to a more continuous habit [13], improved sleep duration, and reduced alcohol consumption [14].

A great amount of literature has highlighted the diet's impact on weight gain and has illustrated how specific diets can affect weight variation. In the same time, it was previously demonstrated that subjective factors such as the perceived stress level, emotional status (sadness, anger, self-confidence, optimism) [15,16], sleep quantity and quality [17,18], vicious behaviour [19,20], professional and educational activities [21] have an impact on eating behaviours and predispose to weight gain. Still, there are fewer studies that talk about the direct relation between these latent factors that can influence diet and the weight gain. Recent research has demonstrated that subjected factors have been highly influenced by home confinement during the COVID-19 pandemic [5-9]. In this respect, our study aims to analyse to what extent risk factors predispose to weight gain in young adults during COVID-19 home confinement. We hypothesized that weight gain is influenced by: (1) professional and educational activities; (2) vicious behaviours; (3) sleep pattern; (4) physical activity; (6) perceived stress and emotional status; (7) sociodemographic data.

Since forced home confinement was expected to lead to a detrimental impact on all lifestyle habits, mental health, and social performance, our research highlights how risk factors influence weight gain in a specific population, highly impacted due to social and physical activity limitations. Surveying students in a multidisciplinary university could help better understand and identify the pandemic's consequences among student population and initiate positive behavioural changes, the ultimate objective being to better educate and promote healthy lifestyles among young adults.

Materials and Methods

Participants

At the West University of Timisoara, Romania, a cross-sectional study was conducted on 433 students to understand the factors associated with weight gain during COVID-19 home confinement. Out of the 1135 targeted population, 433 students completed the survey (participation rate = 38%). Participants were young adults (aged between 19 and 25, 64% female). Most respondents come from urban areas (70.4%). Half of the participants live in an apartment and share their living space (with an average of 3.7 ± 1.7 rooms) with others (average number of persons per household: 2.5 ± 1.4) (Table I).

Table I. Sample characteristics

Parameter	Category	Percentage or mean \pm SD
Gender	male (%)	36
	female (%)	64
Age (years)		21.4 ± 1.6
Residential characteristics	urban (%)	70.4
	rural (%)	29.6
	number of persons per household	2.5 ± 1.4
	number of rooms per household	3.7 ± 1.7
	living alone (%)	4.85
Occupation	online education (%)	100
	working (%)	51.7
	unemployed (%)	48.3
Physical activity	less than 2 training sessions/week (%)	30.8
	2-3 training sessions /week(%)	36.5
	more than 3 training sessions/week(%)	32.7
Smoking	smokers (%)	26.8
	non-smokers (%)	73.2
Alcohol consumers	abstainers (%)	51
	occasional consumers(%)	47

The research was conducted following the Helsinki Declaration. Ethics approval was obtained from the West University of Timisoara, Romania (code: UVT 015/2020).

Survey

We designed an original questionnaire that could facilitate the analyse of how risk factors impact on weight. We piloted the survey on 45 people to evaluate any unforeseen problems in question design and response collection. All the participants completed the online survey consisting of 30 questions divided into the next sections:

(1) Weight trend (maintained, increased, decreased);

(2) Professional and educational activities: how were carried out the professional or educational activities (online/at work/hybrid); job loss, technical unemployment; self-assessment of occupational efficiency (improved/preserved/reduced);

(3) Vicious behaviours:

– smoking status (non-smoker/smoker); quit/start smoking; number of cigarettes/day (increase/constant/decrease);

– alcohol consumption (increase/constant/decrease);

(4) Sleep duration (hours) and quality (altered, preserved, improved);

- (5) Physical activity: type of activity, duration, frequency (increased/preserved/decreased);
- (6) Perceived stress (reduced, usual, amplified) and emotional status - frequency of perceived sadness, irritability, confidence measured with Likert scale from never to always.
- (7) Sociodemographic data: gender, age, residential characteristics.

The survey was created on the Question Pro® platform and was completed in approximately 5 minutes. The survey it was disseminated through institutional and private social networks (Facebook and WhatsApp) and institutional mailing lists. The answers were collected anonymously, in a specific file, without any individual reference.

Participation was entirely voluntary, and no economic incentive was provided for response. All participants were enrolled between 24 April and 17 May 2020. One week after analysing the survey results, a reminder email was sent with the study results.

Data Analyses

To analyse the association between weight gain and independent variables we used the bivariate correlation. We used the Spearman method for the relation with the dichotomous variables, and for the relation with the ordinal variables, we used Kendall's tau-b method. Following this analysis, the variables

related to weight gain were used as explanatory variables to predict the outcome of weight gain. Specifically, we used ordinal regression to analyse the relationship between independent variables and the dependent variable.

For all analyses, we used SPSS (Statistical Product and Service Solutions) version 22.0 software for Windows, and statistical tests were conducted using a 0.05 alpha level and a 95% confidence interval.

Results

In the analysed group, 27% lost weight, 46% maintained body weight, and 27% gained weight. The main changes in weight and risk factors during isolation are presented in Table II.

Below, we will present the relationship between the dependent variable (weight gain) and the independent variables related to the following criteria: *physical activity, emotional status and perceived stress, professional activity, vicious behaviours, sleep pattern and factual data.*

Regarding physical activity, we found a correlation between weight gain and the frequency of physical activities. There is a negative correlation $\tau_b = -0.108$, $p = 0.009$ between the respondents' weight gain and frequency of physical activities.

Table II. Descriptive statistics of the variables

Parameter	Maintained (%)	Increased (%)	Decreased (%)
Weight gain	46	27	27
Physical activity*	51.1	26.5	22.4
Stress level	43.9	36.7	19.4
Sleep quality	48.3	21	30.7
Occupational performance	48.7	17.3	34
Alcohol consumption**	21.7	6.5	13.7

* Physical activity: increased = more frequent or increased volume; decreased = less frequent or decreased volume.

**Alcohol consumption - only 41.8% of participants declared they consume alcohol.

The less often students were engaged in physical activities, the more weight they gained. None of the variables regarding the emotional status and perceived stress were associated with weight gain during home confinement. Concerning professional factors, only occupational performance was related to weight gain or loss. There was a negative correlation $\tau_b = -0.138$, $p = 0.002$ between weight changes and occupational performance. The lower

the respondents' occupational performance was, the more weight they gained. Within the vicious behaviours, only alcohol consumption was associated with weight gain. We found a positive correlation between weight gain and the quantity of alcohol intake $\tau_b = 0.209$, $p = 0.002$. The more alcohol the respondents consumed during home confinement, the more weight they gained. We have obtained significant results between gender and the

respondents' weight gain. There was a negative correlation $r_s = -0.098$, $p = 0.041$ between weight changes and gender. Male respondents were more likely to have gained weight during home confinement.

For a better understanding of the impact that the factors of interest had on the respondents' weight gain, we analysed them using the ordinal logistic regression. The predictor variables were tested a priori to verify there was no violation of the assumption of no multicollinearity. Our dependent variable (weight gain) was measured at the ordinal level (decreased, maintained, increased). The independent variables were also measured at the ordinal level. To perform an ordinal regression, we dummied every independent variable (that correlates with the weight gain: frequency of performing physical activities, occupational performance, the quantity of alcohol intake, and gender). Except for the gender (which will be excluded from now on), every variable passed the multicollinearity tests (value tolerance was not < 0.1 , Variance Inflation Factor < 10 , and Condition Index was less than 15).

The next variables contributed to the model: frequency of performing physical activities, occupational performance, and the quantity of alcohol intake. Overall Goodness-of-Fit: from the result of the Model Fitting Information, we noticed a significant improvement for the final model over the null model $\chi^2(9) = 27.835$, $p = 0.001$. In the Goodness-of-Fit analysis we found out that both chi-square $\chi^2(115) = 110.331$, $p = 0.606$ and the deviance test $\chi^2(115) = 125.065$, $p = 0.245$ were not significant, so the results suggested good model fit. In Table III, each variable was analysed in relation to a reference one: for weight gain – increased; for the frequency of performing physical activity – performing 6-7 times a week; for occupational performance – increased; the alcohol intake – increased. We could see that it was more likely that people who performed physical activities every few weeks, once a week, or 2 to 3 times a week to gain weight more than people who performed physical

activities 6 to 7 times a week. Compared to those who exercised 4-5 times a week, there was no additional benefit in those who exercised more. Students who performed physical activities every few weeks had 3.275 (95% CI, -0.220 to 2.548) times more odds to gain weight than students who performed physical activities 6-7 times a week, confirmed by the statistically significant effect, Wald $\chi^2(1) = 2.840$, $p = 0.04$. The odds of gaining weight were 5.834 (95% CI, 0.378 to 3.110) times greater for students who performed physical activities once a week than students who performed physical activities 6-7 times a week, confirmed by the statistically significant effect, Wald $\chi^2(1) = 6.459$, $p = 0.005$. The odds of gaining weight by students who performed physical activities 2-3 times a week were 2.726 (95% CI, -0.166 to 2.100) times greater than students who performed physical activities 6-7 times a week, by Wald $\chi^2(1) = 3.112$, $p = 0.03$.

Occupational performance is not statistically significant in our model; people whose performance had decreased or stayed the same did not report weight gain. The decrease of occupational performance on students (95% CI, -0.291 to 1.663) did not have a statistically significant effect on their weight gain, Wald $\chi^2(1) = 1.875$, $p = 0.085$. The results were not statistically significant (Wald $\chi^2(1) = 0.248$, $p = 0.309$) even among students whose occupational performance had stayed the same (95% CI, -1.144 to 0.703).

Respondents who reported lower alcohol consumption or unchanged alcohol consumption were less likely to gain weight than respondents who reported increased alcohol consumption. The odds of students consuming less alcohol gaining weight was 0.253 (95% CI, 0.096 to 0.663) times than students drinking more alcohol, a statistically significant effect, Wald $\chi^2(1) = 7.615$, $p = 0.003$. Similarly, the odds of students consuming the same amount of alcohol and gaining weight was 0.485 (95% CI, 0.119 to 1.184) times than students drinking more alcohol, as the marginal effect Wald $\chi^2(1) = 2.430$, $p = 0.05$.

Table III. Weight gain's ordinal logistic model

Parameter		Estimate	SE	exp (β)	Wald	p value (unidirectional)
Threshold	decreased weight	-1.478	0.760	0.228	3.776	0.02
	maintained weight	1.240	0.761	3.454	2.652	0.05

Location	performing physical activities every few weeks	1.186	0.704	3.275	2.840	0.04
	performing physical activities once a week	1.764	0.694	5.834	6.459	0.005
	performing physical activities 2-3 times a week	1.003	0.568	2.726	3.112	0.03
	performing physical activities 4-5 times a week	0.686	0.581	1.986	1.393	0.11
	performing physical activities 6-7 times a week	0	.	1	.	.
	decreased occupational performance	0.682	0.498	1.978	1.875	0.08
	maintained occupational performance	-0.234	0.470	0.791	.248	0.30
	increased occupational performance	0	.	1	.	.
	decreased alcohol intake	-1.374	0.496	0.253	7.670	0.003
	maintained alcohol intake	-0.723	0.464	0.485	2.430	0.05
	increased alcohol intake	0	.	1	.	.

Discussion

Our cross-sectional study aimed to analyse the risk factors predisposing to weight gain in young adults during the COVID-19 home confinement. The results showed that the individuals who perform physical activities less often, who assessed their occupational performance as lower, and/or who consumed alcohol more often during home confinement were the most likely to have gained weight during this period.

The impact of home confinement during the COVID-19 pandemic on weight gain represents an area of concern. It is known that even relatively short periods of lifestyle changes can lead to significant weight and fat mass accumulation, with overweight and obese individuals being at significant risk. Home confinement involved the loss of daily routine (e.g., regular activities at home and work), increased screen-time, gym closure, and physical activity limitations, which led to significantly reduced daily energy expenditure [22,23].

In our study group, only 27% reported weight gain, and 46% did not report any weight changes, while 27% loss weight. In terms of gender distribution, weight gain was noticed mainly in male participants (31.4%), while for women, the percentage was only 24.5%. Studies conducted on the general population found that home confinement was associated with weight changes during the COVID-19 pandemic. A survey of 700 participants aged between 18 and 62 years from Chile analysed the weight gain risk factors during home confinement due to the COVID-19 pandemic; 25.67% of men and 38.1% of women reported weight gain during home confinement. The body weight gain was negatively correlated with active breaks ($p = 0.04$) and physical activity four times per week ($p = 0.001$) [24].

The Lithuanian COVIDiet Study, which assessed health behaviours during home confinement, found that one-third of the participants gained weight, especially those who were previously overweight. A positive correlation was found between weight gain and older age, female gender, overeating, decreased physical activity and increased alcohol consumption [25]. Weight gain was noticed mainly in overweight and obese participants [26]. A trend towards weight gain was also identified in 22% of 173 young adults (average age 28.1 ± 12.5 years), who completed an online survey about weight gain related risk factors during the COVID-19 pandemic [27].

Despite these findings, there are also studies that did not identify weight gain during home confinement. Most participants in a study conducted on 4379 Spanish citizens did not report any weight gain [28]. The impact of the pandemic on lifestyle was also analysed on young adults (especially students). The knowledge about the pandemic and the lifestyle habits adopted during the lockdown was investigated in 2125 students from 3 universities in Italy. The lifestyle habits of the students in life sciences were compared to those of students from other specialties. Regarding dietary habits, most life sciences students declared no change in their diet, while the most significant part of the others reported an improvement thereof [29]. Similar to these findings, we found that the students in sports science had a greater awareness regarding lifestyle habits, and they were more conservative in maintaining dietary habits and weight [30].

A study from Spain, which evaluated lifestyle habits, was conducted on 213 health science students before and during the COVID-19 home confinement, showing an increased adherence to the Mediterranean diet among Spanish students, mainly

among those who did not follow this diet before ($p < 0.001$). This study also showed that students who adopted the Mediterranean diet during the pandemic were more likely to be physically active, proving increased awareness regarding a healthy diet and weight control [10].

Physical activity is an essential factor in maintaining physical and mental health. Home confinement harmed all physical activity intensity levels (vigorous, moderate, walking and overall). Additionally, daily sitting time increased from 5 to 8 h [31]. Regular exercise has many health status benefits, being fundamental to energy balance and weight control [32].

In our study group, 80.8% of the participants reported that they performed physical exercises to maintain their fitness level during home confinement. The high percentage of physically active students from our study group may explain why 73% of participants maintained or even reduced their weight during home confinement. Compared to the pre-pandemic period, the proportion of participants who never or rarely exercise decreased from 30.8% to 19.2%, and the proportion of participants who were frequent exercisers increased from 69.2% to 80.8%. Based on our study results, only the physical activity frequency from the exercise-related parameters seemed to have an influence on the participants' weight ($p=0.009$).

Studies analysing students' behaviour during home confinement showed different physical activity results compared to those obtained at the general population level. Romero-Blanco et al. analysed physical activity and sedentary behaviour before and during the coronavirus lockdown in a group of 213 health science students. An increased physical activity was found, but also an increased sitting time compared to the pre-pandemic period [10].

A study investigating physical activity in Italian students showed that physical activity levels decreased in about half of the sample during home confinement; however, some participants maintained or increased the usual physical activity level. Some of the students from life sciences courses also showed a higher awareness of infection and control measures [29]; we can assume that they were more informed about the importance of weight control through diet and physical activity during home confinement.

The tracking of 30 million users' daily physical activity using wearable devices showed a substantial reduction (ranging from 7% to 38%) in the average step counts in almost all countries during the week ending March 2020 compared to the same period last year. The study suggested that home confinement may have provoked a substantial decline in physical activity levels, similar to that observed in other confined conditions, such as incarceration [33].

A cross-sectional online survey on 13696 respondents from 18 countries during the COVID-19 pandemic showed that two-thirds of those who never or rarely exercised before home confinement might have adopted an exercise behaviour or increased their exercise frequency, and those who were frequent exercisers before home confinement tended to maintain it [34]. These results are consistent with our findings.

Trabelsy et al. used an international Google online survey to investigate population mental health and lifestyle habits of the COVID-19 pandemic. The study enrolled 5056 responders from Europe (46.4%), Western-Asia (25.4%), America (14.8%), and North-Africa (13.3%). They found significant alterations in physical-activity levels: time spent engaged in all physical-activity, and the metabolic equivalent of the task in each physical-activity category (i.e., vigorous, moderate, walking) decreased significantly during COVID-19 home confinement ($p < 0.001$). The number of hours of daily-sitting increased by ~2 hours/days during home confinement ($p < 0.001$) [11].

Even short periods of isolation and loneliness can have adverse effects on physical and mental health [35]; moreover, such a situation, unprecedented so far in the lives of many of us, has hugely complex consequences that are very difficult to fully appreciate at the moment.

In our study, 36.7% of the participants reported an increased stress level during home confinement. A persistent state of irritability and nervousness was reported by 13.6% of the respondents, while 12% experienced sadness or depression symptoms. Only 12% of the respondents declared that they did not meet their job expectations and daily tasks. These findings suggest that emotional disturbances are common during home confinement and need special attention. Optimism and physical activity seemed to

act as "protective elements"; therefore, they should be promoted [28].

Social isolation associated with all pandemic-specific restrictions is related to feelings of uncertainty about the future, loss of control over one's life, panic, loneliness, frustration, stress, specific and uncontrolled fear of this still insufficiently known infection, obsessive-compulsive behaviours related to infection prevention etc. [36-38]. Many studies confirmed that anxiety and depression had an increased incidence during this period [36-40].

Students are generally a mentally vulnerable population due to the changes specific to the transition from adolescence to adulthood and their often uncertain economic, professional and social situation [41]. The changes imposed by the pandemic in daily routine, the uncertainties regarding health status, the quality of online education, the lack of practical training, passing exams and graduation, have brought more concern in students' lives [37,39,40,42]. Therefore, it can be said that, although students (as young adults) do not seem to be so vulnerable to this viral infection [43,44], the psychological impact on them is not negligible. Of the approximately 7,000 students surveyed in China, nearly a quarter have developed various forms of anxiety. Urban residence, family and financial stability have been confirmed as protective factors against anxiety; in contrast, the existence of SARS-CoV-2 virus-infected individuals among their acquaintances is a potent anxiety generating factor [45]. A similar study conducted in France showed that over 60% of the students showed an increase in anxiety and stress. The primary protective factor was their relocation to live with family in rural areas. The non-relocated students had increased stress levels, especially on the financial and health status [42].

Sleep was another aspect influenced by home confinement. Participants of our study reported a mean duration of sleep within the normal range, of 7.4 ± 1.4 hours; 69.3% reported preserved or improved sleep quality, and only 30.7% declared worse sleep quality.

A study conducted on 5056 participants showed poor sleep quality during COVID-19 home confinement due to sleep disturbances and latency, daytime dysfunction and sleep medication use. [11]. Another study that compares sleep patterns in

students vs. administrative staff during COVID-19 lockdown found an increase in bedtime hour, sleep latency, wake-up time, a decrease of sleep quality, and insomnia symptoms more pronounced in students [46].

Vicious behaviours can also influence weight gain. Our results suggest that more than half of the young adults (58.2%) in our study did not consume alcohol, while 28.2% maintained or increased alcohol consumption during home confinement. Moreover, according to our results, alcohol consumption was one of the main predictors of weight gain during the pandemic. Our concern should be even more significant since an increase in alcohol consumption in the last decade in Eastern Europe (including Romania) has been shown compared to other countries from Southern and Western Europe [47,48].

Several recent studies highlighted changes in alcohol consumption during this period [49-55]; the global analysis of these studies shows, in most cases, an increase in alcohol consumption correlated with the psychological changes caused by the pandemic. In a survey conducted by Chodkiewicz et al. (2020), alcohol was identified as the most commonly used psychoactive substance (73%); the pandemic made more than 30% of the respondents change their drinking habits - 16% drank less (the younger ones), while 14% drank more [49]. In Germany, an increase of 6.1% in alcohol-related expenditure was reported, and 34.7% of the surveyed population acknowledged increased alcohol consumption during isolation [52]. A study conducted in a US university campus showed that the amount and frequency of alcohol consumption among students increased significantly compared to the period before isolation in the first week of isolation. The amount of alcohol consumed was directly correlated with the intensity of the signs of anxiety and depression, and vice versa, with the students' perception of social support [53]. In the province of Hubei in China, there has also been an increase in anxiety and depression, decreased mental well-being, and increased alcohol consumption, especially among those aged 21 to 40 years [54].

In a study made in 2019, it was found that in our county we had 31.1% smoker and 67.5% nonsmoker students [56]. In our study, 26.8% were smokers; only less than 10% reduced or quit smoking during

home confinement, and 15.2% maintained or increased the number of cigarettes smoked per day. Vanderbruggen et al. reported a significant increase in the number of cigarettes smoked per day by 13% compared to the pre-pandemic period. The odds of smoking cigarettes during home confinement were significantly associated with younger age, current living situation and working situation related to COVID-19 [57].

We consider that our study has the following strengths: 1. it is addressed to a specific population, highly impacted by home confinement during the COVID-19 pandemic; the young adults are a population category who suffered significant lifestyle changes, dominated by social and physical activity limitations; 2. our study provides a comprehensive analysis of risk factors influencing weight gain among young adults; 3. since the pandemic has not been eradicated yet, it is essential to identify the risk factors which influence health in the COVID-19 pandemic in order to be able to address them.

This research has also a few limitations: 1. we did not use a validated questionnaire for the survey; a pilot-study was performed to evaluate any unforeseen problems in question design and response collection; 2. self-reported data cannot be independently verified; when sensible questions are addressed, such as those related to vicious behaviours, answers can be altered; 3. the number of respondents (433) was influenced by the population addressed and the small participation rate (38%).

Conclusions

Home confinement induced behavioural changes which favour weight gain. Young adults less engaged in physical activity, who assessed their occupational performance as lower and who consumed alcohol more often during home confinement are most likely to have gained weight. Therefore, to prevent weight gain during home confinement, it is recommended to cope with stress, avoid increasing alcohol consumption and increase physical activity.

Author contributions: We declare that all authors contributed equally to the present article.

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