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PhD THESIS SUMMARY

CREATION AND EVALUATION OF ONLINE INNOVATIVE METHODS FOR MAINTAINING A HEALTHY LIFESTYLE DURING PANDEMIC SITUATIONS

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Hăisan, A.A., Grosu, V.T., 2022. *Perceived Changes in College Freshmen's Lifestyle, Physical Appearance, Self-Esteem and Eating Habits in the Context of the Covid-19 Pandemic*, INTED2022 Proceedings of the 16th annual International Technology, Education and Development Conference, pp. 3401-3408, Valencia: IATED, ISBN: 978-84-09-37758-9, https://library.iated.org/view/HAISAN2022PER (ANEXA 2)

Hăisan, A.A., Grosu, V.T., 2022. *Asynchronous and Synchronous Human Body Evaluation and Effectiveness of Online Fitness Intervention Program During the Covid-19 Pandemic*, INTED2022 Proceedings of the 16th annual International Technology, Education and Development Conference, pp. 3392-3400, Valencia: IATED, ISBN: 978-84-09-37758-9, https://library.iated.org/view/HAISAN2022ASY (ANEXA 3)

Hăisan, A.A., Grosu, E.F., 2021. *Mining Student's Satisfaction Towards Innovative Methods for Teaching Physical Education Online During the Covid-19 Pandemic*, ICERI2021 Proceedings of the 14th annual International Conference of Education, Research and Innovation, pp. 3494-3503, Seville: IATED, ISBN: 978-84-09-34549-6, https://library.iated.org/view/HAISAN2021MIN (ANEXA 4)

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KEYWORDS: *educational system, online education, physical education and sport, lifestyle, pandemic situation, habit dynamic.*

INTRODUCTION

The potential of critical situations emergence worldwide is quite low in contemporary existence, but the discovery of the group of people in the city of Wuhan on 12.12.2019, who exhibited atypical symptoms of pneumonia and did not respond according to standardized treatment, represented the beginning of the largest global crises since World War II, as Antonio Guterres, Secretary General of the United Nations, would state (United Nations, 2023).

The start of the courses at the UBB was set for 28.09.2020 and although it was desired to be started in physical format, the method of conducting the courses was left to the discretion of the management of each faculty according to pre-established scenarios.

Decision of the board of directors of UBB no. 15104 from 12.10.2020 approved the change in the method of carrying out the didactic activities carried out by the Faculty of Physical Education and Sport (FEFS) from the Hybrid 2 scenario to the Online one, until new regulations. With this decision, not only the FEFS courses were moving to the online scenario, but also the physical education courses of all the faculties within UBB.

In the absence of an institutional guide on how to carry out didactic activities for physical education courses, each teacher had the freedom to organize his activity according to his own knowledge and desire of involvement. Given that physical meetings were ruled out, even outside the official schedule, the only option that could be resorted to was to conduct online activities synchronously or asynchronously.

In this context, the difficulties encountered in the first month of courses in the delivery of the educational act, mainly generated by the lack of basic knowledge regarding the field of physical activities of students and their involvement, led me to develop a method, based on the one tested at the beginning of the pandemic, which came as a response to the new situation imposed by the COVID-19 pandemic.

The essential condition in its development was the fulfillment of the purpose of physical education seminars, namely, to contribute to raising the educational level of students, by

improving theoretical and practical knowledge in relation to the field of physical activities, based on scientific foundations and without the need of additional investments of any kind from the students or the university. We also wanted the seminar activity to help create a habit of exercising and allow us to identify how the pandemic has influenced certain aspects of life.

Creation and implementation of the entire endeavor was based on my professional training, which, in addition to a bachelor's and master's degree in physical education and sports, includes a bachelor's degree in economics and a doctorate in sociology, as well as a post doctorate in socioeconomics. Thus, it can be explained the multitude of data collection tools used, which extend the interest in knowledge beyond the initial domain.

The originality of the work is given by the unprecedented context in which the research was carried out in conjunction with the targeted field. The lack of protocols in these critical situations for certain areas made this research possible.

The need to find immediate solutions to new problems is the engine of applied research, and in these conditions, identifying a way to interact with students, to transmit knowledge, to quantify the work done, to provide support, becomes urgent and any person involved in his field of activity will realize that anything is better than nothing. So, instead of going for the easy option, I wanted to take the opportunity and develop new methods.

The biggest gain of this approach was the creation of a community around a subject, in our case physical education, which helped to create a sense of belonging and provide unconditional support in a critical period for the people involved and in an apart context.

PART I – SCIENTIFIC FOUNDATION

1. The effects of the pandemic on the educational system

We are living times in which we need to plead for physical activity. Movement became crucial for modern individuals, who unfortunately tend to experiment a slightly active towards sedentary lifestyle. Education still is and hopefully will always represent the foundation necessary to assure a diversity and balance in one's life.

Acquisition and development of gross and fine motor skills are a crucial part of individual's growth and a prerequisite for the transition from a healthy baby to a healthy functional adult. Physical education courses, being present in the curricula of all educational levels, bear an extremely important role into this matter.

Long term speaking, through educating present generations and raising awareness on the importance of balancing workload with activities that imply physical movement, that are correctly conducted, we will have a better chance to live a healthier and more rewarding life.

The present COVID-19 pandemic affected the way different activities were carried out, among them the physical activities domain as well, both at an institutional and private levels. Schools and other educational facilities have been closed and physical education courses had to be held online. Private owned sport facilities were also forced to close or to reduce the number of participants. All these restrictions reflected upon the amount of physical activity general population did.

The global COVID-19 pandemic forced rethinking in a lot of sectors of the way activities were carried out, including in education. Along with the relocation to the online environment, a duality has been created in terms of approach to the delivery of the educational act.

The transposal of the physical context into the virtual one reshaped the way authority is perceived and if in many cases, mainly for those who already relied onto an equitable spread of responsibility between the participants, the transition was facile and without repercussions, in some cases the physical disappearance of an authority figure created the premises for the decay of the system.

2. Habits and their importance for a healthy lifestyle

Habits, whether they are healthy or toxic, are an undisputable component of modern's human personality and from a socio-psychological perspective represent the appropriated repetitive response to a situation or stimuli of the environment in which we activate

Habit formation is a concept that has been studied by many researchers and the consensus is that an action can be considered habitual if it is repetitive during time, is done automatically and is cued by a situation in a stable contexts (Bargh, 1994) (Aarts, Paulussen, & Schaalma, 1997) (Gardner, Lally, & Wardle, 2012) (Orbell & Verplanken, 2015) (Wood & Rünger, 2016) (Smith & Graybiel, 2016) (Weyland, Finne, Krell-Roesch, & Jekauc, 2020).

Researchers have reported that on average approximately 66 days are needed to form a habit (Lally, Van Jaarsveld, Potts, & Wardle, 2010). Habit strength is interdependent, as it relies on prior experience with the habit in question (Aarts, Paulussen, & Schaalma, 1997) and although habits are done automatically, habit slips can occur due to stress, age or multitasking (Wood & Rünger, 2016).

International organizations try to raise awareness, through releasing comprehensive reports, upon the importance of physical activity (World Health Organization, 2018) (European Commission, 2010) (OECD, 2019). Evolution brought changes to the way we live and if in hunting or agricultural societies a good physical condition was mandatory, in industrial and postindustrial ones it become optional. Trading physical activity to a stationary position in front of a machinery or PC came with its downsides and we are starting to experience its effects.

World Health Organization (WHO) recommends adults, situated in the interval 18 to 64 years old, doing at least 150 minutes weekly of physical activities of moderate intensity for a healthy life, meaning that they must conduct physical activities that will facilitate maintaining their heart rate in the interval 64%-76% of their maximum heart rate (World Health Organization, 2010) (Riebe, Ehrman, Liguori, & Magal, 2018). To define levels of physical activity, WHO uses concepts like type, duration, frequency, intensity and volume.

3. The effects of the pandemic on students' lifestyles

Covid-19 pandemic raised many difficulties in all life's domains across the globe. Activities which until then were taken for granted, like travelling, going to work, going to school, meeting with friends, procuring groceries, walking in the park, etc. suddenly became hard or even impossible to do because of the restrictions imposed by authorities. The need to adapt was omnipresent and accelerated the emergence of novelty or innovative approaches

In the context of the current pandemic situation, college freshmen have been confronted with a double adaptation scenario, an evolutionary ordinary one, transition from one education form to another which always had its challenges (Gold & Beasley, 2021) (Li, Xu, & Zhong, 2021) (Xu, Gu, Zhang, & Jing, 2013) (Pritchard, Wilson, & Yamnitz, 2007) and a contextual uncommon one, generated by the outburst of the COVID-19 pandemic. This meant double coping effort from their behalf, which in turn generated for some high levels of distrust and reluctance (Ray, et al., 2021).

Lifestyle of freshmen students can variate (Pop, Iorga, Șipoș, & Iurcov, 2021) (Olfert, et al., 2019), but we can generally define it as a complex period, mainly centered on experimenting and self-discovery (Clark, 2005), which does not necessarily mean it is a period of mostly good decisions

Switching to an online scenario meant less physical activity, which in turn contributed to higher depression symptoms for students (Coughenour, Gakh, Pharr, Bungum, & Jalene, 2021), but also the need for social media self-presentation, which can be positive only for those with high self-esteem and an identity clarity (Yang, Holden, & Carter, 2017) (Yang & Brown, 2016).

Online education and interdiction of physical interaction in public spaces with peers has managed to create an isolated individual. Cases of depressive symptoms started to surface for students (Liu, et al., 2022) (Monte, Ang, & Tsai, 2022) (Ray, et al., 2021). Sitting in front of a screen meant less physical activity which in turn has been correlated with higher depression rates (Coughenour, Gakh, Pharr, Bungum, & Jalene, 2021).

PART II – PRELIMINARY RESEARCH

4. Aim, objective and hypothesis

4.1. Aim and objectives

The aim of the current demarche was to perform, both in physical format and online on Skype, measurements of simple anthropometric parameters: height, weight, waist circumference, hip circumference and for some of the components of fitness in relation to the state of health: flexibility, muscular endurance and cardiovascular endurance, to see if the results obtained show significant differences and if they could be applied in the eventuality of the entire educational system moving into the online environment.

The objective established for this demarche was the statistical testing of the differences recorded between the values of the measurements carried out during the sessions in physical format and those online on Skype, for the anthropometric parameters and the fitness components chosen.

4.2. Hypothesis

The hypothesis of this research was that anthropometric measurements and health-related fitness tests can be conducted online and that there are no statistically significant differences between physical and online measurements

5. Methodology

5.1. Research methods used

To complete the present demarche, we statistically processed and graphically analyzed the quantitative data from the recording of the values for the chosen measurements

5.2. Duration of research and investigated sample

The preliminary research consisted of two measurement sessions, one physical and the other online, of the anthropometric parameters and health-related fitness components mentioned above. All measurements were carried out during the *"Scientific Research Methods"* seminars, the physical ones being carried out on 27.02.2020 and the online ones on Skype on 03.05.2020. A total of 16 students were measured, from the specializations

"Kinesiotherapy and special motor skills" and *"Physical education and sports"*, from the *Department of Physical Education and Sports* of the *Faculty of Law and Social Sciences, "1 Decembrie 1918" University of Alba Iulia*.

5.3. Measurements and tests used in research

The anthropometric parameters targeted were height, weight, waist circumference and hip circumference. For the health-related fitness components, I chose for flexibility the "Sit & Reach" test, for muscular endurance the "Push-Up Test", and for cardiovascular endurance the "YMCA 3 Minute Test", to which I added "Borg Scale" to check if the subjects measured their heart rate correctly.

6. Analysis and interpretation of the results obtained

To process the data, the values obtained from the previously detailed measurements were centralized in a table. Then, with the help of IBM SPSS Statistics 23, we ran a descriptive analysis followed by a paired t-test to test the hypothesis of this pilot study

6.1. Descriptive analysis

At first, with the purpose to get familiar with the study group, we performed a descriptive analysis of it, using the gender of the participants as a differentiating factor. Female participants in the pilot study were older, with a median of 32 years, compared to males, for which it was 21.5 years

In the end we tested the correlation between the values obtained for the "YMCA 3 Minute Test" and the "Borg Scale". There were strong correlations between YMCA and Borg scores for both physical, $r=.648$, $p<.007$, and online, $r=.794$, $p<.000$

6.2. Paired t-test

None of the pairs of tested variables were significantly different from a statistical point of view, so we can say that there was no difference between the values measured by the two modalities, physical and online, thus confirming the hypothesis of this pilot study.

PART III – PERSONAL CONTRIBUTIONS

7. Importance, aims, objectives and hypotheses

7.1. Importance and aims of research

Applied research is oriented towards finding a solution to a problem generated by a specific situation that affects a population or group. Although only a small part of the problem, we consider that the pandemic situation that affected the ability to carry out physical education seminars for students, represents a research topic of major importance, especially if we place it in the context generated by the countless reports drawn up by prestigious organizations regarding physical activity or the degree of obesity facing our country. The importance of the present research is high as it is applicable to all educational levels, and the import and implementation of a system developed outside the country's borders, without considering the social and economic particularities of the environment, leads to incompatibilities that in the end they will alter the expected result.

The main aim of the present research was to develop and test the effectiveness of an online teaching method of physical education seminars in university education in pandemic situations.

The secondary aims were to identify the respondents' satisfaction with the developed method and if the physical activity carried out according to it during the pandemic influenced certain aspects of their lives.

7.2. Objectives of research

- the development of an online teaching method that includes a measurement, an experimental and an evaluation component;
- testing the effectiveness of the exercise program proposed and carried out by the experimental group;
- identifying students' satisfaction with the method used and how it contributed to the development of a habit regarding physical activities, to increasing awareness of the importance of physical movement, to developing knowledge regarding physical activities and with satisfaction of physical appearance;

- identifying the dynamics of students' habits during the 93 days of monitoring regarding physical exercises;
- identifying the dynamics of students' habits during the 93 days of monitoring regarding food;
- identifying the positive and negative aspects of students' lives generated by the pandemic situation.

7.3. Hypotheses of research

- The developed exercise program will lead for the experimental group recording better values than the control group at the final assessment regarding the components of fitness in relation to health;
- The developed method will show a high degree of satisfaction on the part of the students and will contribute to the perception that it helped them in developing a habit regarding the practice of physical exercises and in raising their opinions on the importance of physical movement and knowledge about physical activities;
- The initial values of SRHI and the number of days recorded have an influence on the final score of SRHI, and students who will have at least 66 daily reports will develop a habit in terms of physical exercise;
- Lifestyle, satisfaction with physical appearance, self-esteem and eating habits of the students underwent changes during the 93 days of monitoring;
- The positive aspects generated by the pandemic situation in students' lives have a greater weight than the negative ones.

7.4. Research stages

The present research represents an immediate adaptation to the realities of the contemporary world, trying to find innovative ad hoc solutions in response to the challenges created by the pandemic situation. Thus, the theme originally proposed for the doctoral studies, *"eSports and traditional sports. Differences and similarities regarding the development of interpersonal skills in performance athletes in the context of the quality of life paradigm"*, was replaced by the current one, due firstly to the impossibility of completing it in time and secondly to the desire to respond to immediate challenges. For these reasons, the phasing was

atypical, the study of the specialized literature on the initial subject from September 2019 - January 2020 becoming irrelevant, thus having to start directly with testing the measurements.

8. Methodology

The developed methodology was used exclusively online on the Microsoft Teams (MT) platform, without even having the option of face-to-face meetings, for the evaluation and monitoring of 155 students enrolled in the study programs Business Administration in Hospitality Services, romanian and english study lines and Business Administration, english study line, within the Business Faculty of UBB

It included two assessments, an initial one between October 27 and November 3, 2020 and a final one between January 30 and February 6, 2021. The monitoring period was between November 9, 2020 and February 9, 2021, representing 93 days, which spanned three different moments in students' lives: the course period, the winter holiday period and the exam period

Weekly online meetings were held synchronously until the initial assessments were completed and asynchronously thereafter according to their schedule, but additional support was provided 24/7 via the internal chat option. A key criterion in choosing the tests and exercise program for this method was that it should be easy to self-administer with minimal prior knowledge and be carried out in the comfort of one's own home with one's own body weight, without the need for additional equipment.

For data processing, we used data mining techniques, with the help of the IBM SPSS Text Analytics for Surveys software and statistical processing, with the help of the IBM SPSS Statistics 23 software, in which we performed hierarchical linear models, MANOVA analysis, paired t-test, chi-square test , correlations, descriptive analysis.

8.1. General considerations

Although the semester was scheduled to start on 28.09.2020, my account and implicitly the access to the MT platform were finalized only after the middle of October, the administrative staff of the faculty creating the groups for me and mediating the dialogue between me and the students during this period. Considering that we had students from the romanian and english study lines, the entire activity was carried out in both languages

We had the first synchronous online meeting with the students on 20.10.2020, during which we finalized the schedule and discussed how to conduct the activities within the physical education and sports seminars

We also created a survey to obtain consent to record the seminars and assessment sessions and although some expressed their consent to it, in the end, even though they were synchronously online, we could not record the initial testing of the health-related fitness components, because many did not consent to it. It was probably due to the newness of the whole situation and a lack of confidence in the safety of the technology, which fortunately changed by the end of the semester when we were able to record all the tests.

8.2. Stages of data collection – measurements and tests used

8.2.1. Initial evaluation

It was conducted between October the 27th and November the 3rd online synchronously or asynchronously on three components: anthropometric measurements, testing the components of fitness in relation to health and an opinion questionnaire. All measurements and tests were discussed synchronously online in advance in the meeting on 20.10.2020

a) *Asynchronous anthropometric measurements* - based on the positive results recorded after conducting the pilot study, we opted for the inclusion in this part of the research of the same parameters: height, weight, waist circumference and hip circumference. An asynchronous assignment was specially allocated for them to be able to enter the obtained values.
b) *Testing synchronous the components of fitness in relation to health* - as in the case of anthropometric measurements, based on the positive results obtained following the pilot study, we used the same tests for this part of the research: “Sit & Reach” for flexibility, “Push-Up Test” for muscular endurance and the “YMCA 3-Minute” test for cardiovascular endurance to which we added the 'Borg Scale' to check that the subjects measured their heart rate correctly.

   Muscle strength was the only parameter we could not measure due to the high risk of injury and the need for specialized equipment and for body composition BMI was calculated

based on anthropometric measurements to capture all 5 components of fitness in relation to health.

The tests were conducted synchronously, but without video recording, in accordance with the wishes of most of the students.

c) *Asynchronous opinion questionnaire* - the questionnaire was drawn up on the Microsoft Forms (MF) platform and contained 39 questions grouped into 6 sections, including in one of them the Self-Reported Habit Index (SRHI). The administration of the questionnaire was done, as in the case of the anthropometric measurements, through an assignment on the MT platform and informing the students about its existence was done through an announcement on the general chat of each channel.

- *The first section* was about students' ability to exercise and was a closed question with two possible answers.
- *In the second section,* as in the first one by means of two closed questions with an answer option, the students had to assume the veracity of the data provided and give their consent to the processing of the collected data for their use in scientific purpose.
- *In the third section,* also through a closed question but with 4 answer options, students could choose a way to participate in physical education seminars.
- *The fourth section* was reserved for identity data, comprising 6 questions, 3 closed and 3 open.
- *The fifth section* was intended to make an anamnesis, including 5 open questions.
- *The sixth section* was the most comprehensive and sought to find out some particularities of the students. Of the 24 questions that this section contained, 21 were closed type with multiple answer options, 2 were open type and one in which we integrated the 12 questions of the Self-Reported Habit Index (SRHI) indicator, which has a five-point Likert scale.

  As with the first component of the initial assessment, creating the questionnaire on the MF platform and distributing it as an assignment in MT helped me to compile the databases and to automatically generate some graphs to understand the data more quickly.

8.2.2. Experimental period

The experimental period was between 09.11.2020 and 09.02.2021, representing 93 days that spanned various moments in a student's life:

- teaching activity, between 09.11.2020 and 20.12.2020, totaling 42 days;
- vacation, between 21.12.2020 and 03.01.2021, totaling 14 days;
- teaching activity, between 04.01.2021 and 17.01.2021, totaling 14 days;
- exam session, between 18.01.2021 and 09.02.2021, totaling 23 days

Although the present research can be considered predominantly quantitative based on the research methods used, the methodology was a hybrid one, including both qualitative and quantitative data, obtained both through tools such as the opinion questionnaire or standardized indicators, as well as through experiment. Thus, the testing of each hypothesis, out of the 5 proposed ones, was done with a different number of participants, as we will be able to see in the subsections of chapter 9, depending on the hypothesis tested and the number of participants who recorded data for a test

The exercise program recommended to students who opted for this option was developed specifically for this research and was based on the WHO minimum physical activity recommendations for the general adult population, lasting 30 minutes. A key criterion in the selection of exercises for this program was that they directly target the health-related fitness components tested in the second component of the initial evaluation stage. Also, the exercises had to be able to be performed in the comfort of everyone's home with their own body weight, without the need for additional equipment. For maximum convenience and accessibility, the program was created based on existing video materials available online and was distributed through a post on the general chat of each channel on November the 8th.

To implement the monitoring part over the entire experimental period, we had to identify a tool that would include the determinants of fitness in relation to health and have a time component to align it with WHO requirements. It also had to be easily implemented online with short completion times given that parameters were reported daily.

I used the F.I.T.T. fitness monitoring system, which stands for Frequency, Intensity, Time (duration), and Type. To find out the intensity we used the Borg scale, with which they were familiar from the initial evaluation. Throughout the experimental period, rankings were created based on the time declared by each student, thus adding a feedback component and creating a competitive environment. The database was automatically generated as in the previous cases.

8.2.3. Final evaluation

It was conducted between January the 30th and February the 6th, 2021 online synchronously or asynchronously on three components, like the initial evaluation: anthropometric measurements, testing of health-related fitness components, and opinion questionnaire. All measurements and tests were synchronously discussed online in advance

a) *Asynchronous anthropometric measurements* – we used the same parameters as in the initial evaluation: height, weight, waist and hip circumference. The assignment notification was made on January 30th and was extended twice, the first time until February 4th and the second time until February 5th, so that it could be completed by all students. The assignment had the same interface as the initial one, so the generated database was also comparable.

b) *Testing synchronous the components of fitness in relation to health* – we used the same tests as in the initial evaluation: "Sit & Reach" for flexibility, "Push-ups" for muscular endurance and the "3-minute YMCA" test for cardiovascular endurance, to which we added the "Borg Scale" to check that the subjects measured their heart rate correctly
As for the initial assessment, muscle strength was not measured and for body composition BMI was calculated based on final anthropometric measurements, thus touching on all 5 components of health-related fitness.
The tests were performed synchronously, but this time they were video-recorded and the results were manually centralized in tables specially prepared for this test

c) *Asynchronous opinion questionnaire* - was drawn up, as in the case of the initial one, on the MF platform but, unlike the initial one, contained 30 questions, 19 closed type with multiple answer options, 10 open and one that integrated SRHI, grouped into 4 sections. The assignment notification was made on January 30th and was extended 3 times, the first

time until February 4th, the second time until February 5th and the third time until February 6th, so that it could be completed by all students . The administration of the questionnaire was done, as in the case of the initial one, through a theme on the MT platform.

- *The first section* was identical to the second section of the initial questionnaire and through two closed questions with one answer option, the students had to assume the veracity of the data provided and give their consent for the processing of the collected data to use them for scientific purposes.
- - *The second section* of the final questionnaire, by means of a closed question but with 10 answer options, the students could declare whether or not they kept the method of participation in physical education seminars originally chosen.
- - *The third section* of the final questionnaire contained three questions, one with multiple answer options and two open. All referred to health-related issues.
- - *The fourth section* of the final questionnaire contained 24 questions, of which 15 were closed type with multiple answer options, 8 were open and one that integrated SRHI.

  As with the initial evaluation, creating the questionnaire on the MF platform and distributing it as an assignment in MT helped us to compile the databases and to automatically generate some graphs to understand the data more quickly.

8.3. Final database

The multitude of tools and ways through which we collected the data generated in turn many databases, which required consolidation to obtain the final one, which recorded a number of 126 variables.

9. Own original research

9.1. Effectiveness of the intervention program

The present analysis was carried out with the aim of testing the first proposed hypothesis, namely: *"the developed exercise program will lead for the experimental group recording better values than the control group at the final assessment regarding the components of fitness in relation to health"*.

After data validation, 72 students registered data on all initial and final health-related fitness tests, being drawn for the present study from the 155 students who attended the physical education and sport seminars.

A MANOVA analysis was performed in IBM SPSS to test the effectiveness of the intervention exercise program and the type of monitoring device chosen by students to participate in the physical education seminar.

The results of the MANOVA analysis showed that there was no statistically significant effect for the independent variable *"type of participation"*, Wilk Λ=.860 F (12.172)=.840, p =.610, η_p^2 =.049, but for the "*evaluation"* one there was a statistically significant effect, Wilk Λ=.526 F (4,65)=14.659, p <.001, η_p^2 =.474.

Repeated contrasts showed that while the variables *"BMI" F* (1,68)=.645, p=*.425* , η_p^2 =*.009* și "*YMCA" F* (1,68)=.430, p= .514, η_p^2 =.006 were not influenced by the independent variable, *"V_SIT" F* (1,68)=42,82, p<*.001* , η_p^2 =*.386* și *"PUSH_UP" F* (1,68)=16,87 , p<*.001* , η_p^2 =*.199* were.

These results certify that neither the intervention program, nor the type of device used to monitor the activity for the physical education seminar, was more effective than the other, as they did not produce statistically significant differences between the studied groups.

9.2. Student satisfaction with the teaching method used

The present analysis was carried out to test the second proposed hypothesis, namely: *"the developed method will show a high degree of satisfaction on the part of the students and will contribute to the perception that it helped them in developing a habit regarding the practice of physical exercises and in raising their opinions on the importance of physical movement and knowledge about physical activities"*.

Out of the 155 students enrolled in the four groups on the MT platform, 121 provided an answer to the last question included in the final questionnaire: *"Finally, I would like to thank you and give you the opportunity to provide me with feedback on to the activity within our course or regarding any other aspects that you consider important and on which you would*

like to express your opinion" and of these, following data validation, 105 were included in this research and the question was coded *"course_satis"*.

In addition to the 105 students' responses to the above question, we included in the database for this research their responses to four other supporting questions on which the main question had a direct impact to verify the main findings:

a) *"Do you consider that the method of online assessment and performance monitoring of your physical activities, proposed by the physical education teacher, helped you develop a habit regarding regularity of practicing physical activities?"* coded *"method_habit_form"*;
b) *"Do you consider that your knowledge database regarding physical activity and sport has improved due to our interaction?"* coded *"method_improv_know"*;
c) *"Do you feel more conscious about the importance of movement in a person's life after our activity at this course?"* coded *"method_import_move"*;
d) *"Did your satisfaction, regarding your physical appearance, changed during this online semester and period of monitoring your physical activity?"* coded *"phys_satis"*.

To process the data, we used data mining techniques, with the help of the *IBM SPSS Text Analytics for Surveys 4.0.1. (TAS)* software.

9.2.1. Satisfaction/dissatisfaction in conjunction with the method

The method used for data processing offered us the opportunity to extract from uncategorized large quantities of text concepts and based upon them to create categories. These findings helped us to determine that our model was a positive one rather than negative and that the method of evaluation and monitorization that we have used for our respondent's activity for the physical education course was satisfactory for them. Moreover, it helps us to determine that they found not only our method satisfactory, but also the support and motivation that we have offered them during the period of 93 days of monitoring.

The negative categories had very small numbers of respondents and those included into the "online+<Negative>" were dissatisfied mainly by the pandemic situation which created the

premises for an online education, also a motive of dissatisfaction. The ones included into the "method+<Negative>" category were dissatisfied by the fact that they have been monitored daily, during weekends and holidays or because log in of daily data could be done only between certain time intervals.

9.2.2. Effects of the method

Our previous section permitted us to establish if our respondents were satisfied or dissatisfied in conjunction with the method that we have used to evaluate and monitor their activity for the physical education course. Once this aspect was established, we wanted to further investigate and see if this satisfaction had any influence on aspects that are closely tied to the physical activities domain and more important if it produced any effects.

The questionnaire that was applied in the final evaluation stage included a variety of questions regarding to a broad range of aspects in our respondent's lives. From those we have selected for this part of our research four supporting questions, which were coded, as we detailed in the methodology section, as it follows: *"method_habit_form"*, *"method_improv_know"*, *"method_import_move" and "phys_satis"*.

9.2.2.1. Results for the "method_habit_form" question

This question was intended to find out if after all the carried out activities for the course of physical education, that took place following the method described and our respondents perceived that they were helped by into developing a habit regarding the regularity of practicing physical activities.

9.2.2.2. Results for the "method_improv_know" question

This question was intended to find out if our respondent's knowledge data base regarding physical activities improved thanks to our interaction within the courses and the results indicate that thanks to our course activity, that took place according to the method described, their knowledge about physical activities has improved.

9.2.2.3. Results for the "method_import_move" question

This question was intended to find out if our course activity, carried out in accordance with the method described, elevated the level of consciousness regarding the importance of movement of our respondents and the results indicate that we can affirm that our method raised awareness for our respondents in terms of importance of movement.

9.2.2.4. Results for the "phys_satis" question

Because it was a question that didn't make any references to our method, we can't affirm that it had any influence upon the results, but the positive results reported by our respondents, sustain the idea that our method made an impact.

9.2.3. Feedback AcademicInfo

The results obtained by the present study can be supported by those of the evaluation of the activity of the teaching staff during the physical education and sports seminars, carried out by the students on the AcademicInfo platform of UBB.

9.3. Dynamic of the habit of practicing physical exercises

The present analysis was carried out to test the third proposed hypothesis, namely: *"the initial values of SRHI and the number of days recorded have an influence on the final score of SRHI, and students who will have at least 66 daily reports will develop a habit in terms of physical exercise"*.

After data validation, 96 students completed both the initial and final questionnaires, isolated for the present study from the 155 students who attended the physical education and sport seminars, extracting only the question that referred to the SRHI and the indicator that referred to the number of daily diaries in which the students declared that they carried out physical activities by completing the daily assignment.

The monitoring period of 93 days allowed us to follow the dynamics of habits during the pandemic and based on the data obtained we proposed to test in the first instance if the initial values of the SRHI and the number of days they completed the F.I.T.T. predict the final value of SRHI and secondly test whether the theory that it takes a minimum of 66 days to form

a habit (Lally, Van Jaarsveld, Potts, & Wardle, 2010) was true for our students in terms of forming a habit to practice physical exercises

For data processing we have used SPSS statistics software and we have employed a hierarchical linear model (Anderson, 2012) (Woltman, Feldstain, Mackay, & Rocchi, 2012) (Wech & Heck, 2004), which permitted us to test how exactly each variable fitted our model.

The dataset for this study was comprised out of three variables: *"SRHI_initial"*, which represented the values obtained for the SRHI at the beginning of the study; *"SRHI_final"*, which were the values obtained for the SRHI in the final stage and *"no_days_log"*, which represented the number of daily logs each student has completed during the 93 days period.

9.3.1. Variables predicting SRHI final values

In terms of fitting to the data, the second model produced the best output and will be used for the present study. The independent variables account for 57,2% of the variance in the dependent variable. The overall regression model was significant, $F(2, 93)= 62,18$, $p<.001$, $R2=.572$. Both predictor variables *„SRHI_initial"* și *„no_days_log"* were found statistically significant, with p values for the first one $p<.001$ and for the second one $p<.05$. This translates in our case that each one unit increase in the SRHI initial values will dictate an increase with .728 units of the SRHI final values and an increase with a day for the number of days logged means .059 units increase to the values of the final SRHI.

9.3.2. Habit dynamics

The two values of the SRHI scale, initial and final, helped us to determine whether our respondents had a positive or negative habit evolution during the 93 days period of monitoring.

Upon analyzing the data, we could not distinguish any significant changes in the percentages of those who had and those who didn't had a habit at the end of the initial and final SRHI scoring, recording only the transition of a person from those who did not have, to those who created a habit of exercising. Thus, if 59 of our respondents initially registered a habit, for the final score 60 were in the same situation, and if 37 of the respondents did not initially register a habit, for the final score 36 were in the same situation.

Having in mind these results do not explain very well the internal dynamics of the evolution of the exercise habit, we decided to go further with a detailed analysis by matching for each study participant the SRHI initial and final values, as well as number of days logged

9.3.2.1.Results for respondents who had a habit

The study participants who scored higher than 24 points for the initial SRHI and were implicitly considered to have had a habit regarding practicing physical exercises were 59 and of these 48 managed to and maintain the habit and 11 lose it during the 93 days monitoring period.

9.3.2.2.Results for respondents who did not have a habit

There were 37 study participants who scored less than 24 points on the initial SRHI and by default were considered to have no habit regarding practicing physical exercises and of these only 12 achieved to develop a habit during the 93 days of monitoring.

9.4. Perceived changes in lifestyle

The present analysis was conducted with the aim of testing the fourth proposed hypothesis, namely: *"lifestyle, satisfaction with physical appearance, self-esteem and eating habits of the students underwent changes during the 93 days of monitoring"*.

After validating the data, 72 students recorded values for all targeted parameters and these were drawn for the present study from the 155 students who participated in the physical education and sports seminars

The analysis was comprised of two parts, one that employed statistical analysis with the help of IBM SPSS Statistics and another one that aimed analyzing the text of the answers offered by our respondents by mining it with the help of IBM SPSS Text Analytics for Surveys.

To be able to establish if the 93 days period has brought upon our respondent's lifestyle, satisfaction regarding physical appearance, perceived self-esteem and eating habits modifications, we've extracted from the main database eight variables referring to the problems in question:

- lifestyle at the beginning of the monitoring period coded *"lifestyle_I"* and at the end of the period coded *"lifestyle_F"*;
- physical appearance satisfaction at the beginning of the monitoring period coded *"phys_app_I"* and at the end of the period coded *"phys_app_F"*;
- perceived self-esteem at the beginning of the monitoring period coded *"self_esteem_I"* and at the end of the period coded *"self_esteem_F"*;
- eating habits at the beginning of the monitoring period coded *"eat_habit_I"* and at the end of the period coded *"eat_habit_F"*.

The results will be presented in two subsections, based upon the method for data processing. The first one will address the results obtain using the IBM SPSS software and the second one the results obtained using the IBM SPSS TAS software.

9.4.1. Lifestyle, physical appearance and self-esteem differences

A chi-square goodness of fit test was used to test whether the initial options for each of the following variables: satisfaction regarding lifestyle, perceived physical appearance and self-esteem, differed from randomness. Expected frequencies in all cells were greater than five:

- those who considered their lifestyle moderately active (24) differed statistically significant from the ones that considered it sedentary (3), slightly active (15), active (17), very active (11) and extremely active (2), χ^2 (5, N=72)=30,00, p=.000;
- those who were satisfied with their physical appearance (46) differed statistically significant that the ones that weren't (26), χ^2 (1, N=72)=5,55, p=.018;
- those who perceived their self-esteem as being neither high, nor low (32) differed statistically significant from the ones that considered it low (6), high (24) and very high (10), χ^2 (3, N=72)=24,44, p =.000.

These results indicate that our respondents were during our initial evaluation moderately active in terms of lifestyle, satisfied with their physical appearance and had a neither high, nor low self-esteem.

A second chi-square goodness of fit test was used to test whether the final options for each of the following variables: perceived lifestyle, physical appearance and self-esteem, differed from randomness. Expected frequencies in all cells were greater than five:

- those who said their lifestyle remained the same (36) differed statistically significant from the ones that said it got worse (13) and those who said it got better (23), χ^2 (2, N=72)=11,08, p=.004;
- those who said their satisfaction towards own physical appearance got better (34) differed statistically significant from the ones that said it got worse (6) and those who said it remained the same (32), χ^2 (2, N=72)=20,33, p=.000;
- those who said their self-esteem remained the same (46) differed statistically significant from the ones that said it got worse (3) and those who said it got better (23), χ^2 (2, N=72)=38,58 , p=.000.

These results indicate that after 93 days, our respondent's perception upon lifestyle remained the same, the perception upon physical appearance got better and the perceived self-esteem remained the same.

9.4.2. Eating habits differences

Initially our respondents had a preference towards meat, concept encountered within the answers of 49 respondents, vegetables, concept encountered within the answers of 44 respondents, fast food, concept encountered within the answers of 32 respondents and sweets, concept encountered within the answers of 21 respondents.

For the final evaluation 33 of our subjects declared that their eating habits did not change during the period of 93 days, so the analysis we are witnessing represents the responses of the remaining 39 respondents. Our remaining respondents had a preference towards sweets, concept encountered within the answers of 15 respondents, the other categories sharing a similar number of occurrences.

9.5. Pandemic consequences upon college freshmen's lives

The present analysis was carried out with the aim of testing the fifth proposed hypothesis, namely: *"the positive aspects generated by the pandemic situation in students' lives have a greater weight than the negative ones"*.

After validating the data, 72 students registered values for all the targeted parameters, thus they were extracted for the present study from the 155 students who participated in the physical education and sports seminars. We have extracted from the database the answer to the question: *"Thinking about the way you carried out your professional/educational/family/social activities in the current pandemic situation generated by the COVID-19, please tell me what you consider that are the most worthy to mention positive and negative aspects"*.

The aim of the present research was to identify how pandemic influenced aspects of our college freshman's life and if they differentiated between positive and negative. The research method used was text mining and data processing, to respond the problematic in question, was done with the help of IBM SPSS Text Analytics for Surveys software.

As probably expected, the worst aspect was lack of social interaction. Humans are a social species, we need to physically interact to establish durable relations, because our behavior is based on senses, which cannot be replicated in the online environment.

Times of isolation could be good opportunities for introspection, return to inner self and reconsideration of relationships. Some of our respondents regarded the pandemic as an opportunity to self-discovery, otherwise, in normal cohabiting conditions, being hard to achieve. Family support remains important regardless age and our results show that.

Mental health was, is and will always be a hot topic regardless of contextual events, as it sits at the very core of us, but the prolonged isolation state has stretched its manifestation intervals for some of us. Insomnia, stress, anxiety or depression are only some of the mental health concerns which our respondents reported that they've experienced.

CONCLUSIONS

The five hypotheses proposed to be tested had mixed results, in line with the difficult period in which the research was conducted.

- After testing the first hypothesis: *"the developed exercise program will lead for the experimental group recording better values than the control group at the final assessment regarding the components of fitness in relation to health"*, we can conclude that simple anthropometric measurements and fitness tests can be integrated into an online asynchronous and synchronous evaluation system, but their validity must be further studied.

  Although only two out of four of the tested dependent variables have proven to be statistically significant and improved their values from the initial evaluation till the final one, we must bear in mind that they address parameters that aren't so easy to improve and require longer periods of time to do it. At the same time, the volatile nature of the measurements that proved to be significant and their predisposition to a high manipulation from the subjects, due to the conjuncture and method, with all the caution we have taken during our online measurements sessions, require wariness in interpretation.

  Also, these results in a normal context may seem disappointing, but considering that many people gained extra pounds during the pandemic, the fact that the students managed to maintain their results around the initial parameters represents from our point of view a win due to the method.

- After testing the second hypothesis: *"the developed method will show a high degree of satisfaction on the part of the students and will contribute to the perception that it helped them in developing a habit regarding the practice of physical exercises and in raising their opinions on the importance of physical movement and knowledge about physical activities"*, we can conclude that the online method used by us to evaluate and monitor student's activity for the physical education course represented a source of satisfaction for them.

Along with the appreciation for the method, they've also offered positive feedback for the support and motivation given by us, during the monitoring period. Isolated negative feedback was identified in conjunction with the pandemic situation, online education or method, students included in this category being dissatisfied with daily, weekend and holiday monitoring or the limited time they had daily to log in their data.

Also, the method made an impact upon their believes regarding certain aspects of their personality and culture, like creating a habit, improving knowledge database regarding physical activity or raising awareness upon the importance of movement. Even though the satisfaction upon physical appearance can't be tied directly to our method, the high number of positive responses and the pattern shared with the other three variables, might denote a correlation, which could represent a future direction of study.

- After testing the third hypothesis: *"the initial values of SRHI and the number of days recorded have an influence on the final score of SRHI, and students who will have at least 66 daily reports will develop a habit in terms of physical exercise"*, we can conclude that although a high percentage of our respondents perceived that the method we have used for evaluation and monitoring of their activity for the physical education seminars helped them into developing a habit regarding physical exercises, the data states otherwise.

  Although the number of those who changed their habit registered almost no difference at first sight, the habits of our respondents, in terms of physical exercise, registered an interesting dynamic within the two groups, those who had and those who did not have a habit

  The 66 days for developing a habit theory wasn't valid for our respondents. This pandemic period meant a time of changes, in regards of physical exercises habit, for them, most of those who had a habit managed to keep it, but also a large percentage of them diminished or even lost it. Interestingly, most of those that did

not had a habit managed to improve it, but only about half of them could be accounted for developing one.

- After testing the fourth hypothesis: *"lifestyle, satisfaction with physical appearance, self-esteem and eating habits of the students underwent changes during the 93 days of monitoring"*, we can conclude that our respondents perceived changes upon two out of four targeted parameters over the 93 days period.

  The initial evaluation profile of our respondents, based upon the four variables studied, revealed that they perceived themselves as moderately active persons in terms of lifestyle, satisfied with their physical appearance, with a neither high, nor low self-esteem and their main eating habits revolved around meat, vegetables, fast food and sweets.

  In contrast the final evaluation profile revealed that perception upon lifestyle remained the same, the one upon physical appearance got better, the perceived self-esteem remained the same and eating habits for 45,83% of them remained the same, while for the rest of them changed, the main concept encountered being sweets, but as well as efforts in eating less fast food or eating healthier with more fruits and vegetables.

- After testing the fifth hypothesis: *"the positive aspects generated by the pandemic situation in students' lives have a greater weight than the negative ones"*, we can conclude that our respondents faced numerous negative aspects in this period of their lives due to the pandemic, but the worst of them referred to social, psychological and educational aspects.

  The positive side of this period from the perspective of our respondents was time, which was used to consolidate connections with family, friends and self.

  The presence of a pronounced negatively triangle between the general state, social interaction and psychological risks and existence of eight positive categories with a low density of answers, in contrast to nine negative ones with a high density, makes

us believe that the effects of this pandemic upon our respondents were rather negative than positive.

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