



Model for Predicting Physical Activity Barriers among College Students

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ABSTRACT

This study was conducted to describe physical activity levels and motivators and barriers of university students in humanitarian and health colleges. A descriptive-analytical investigation was carried out on 335 students from the University of Ha'il, Saudi Arabia and included information about lifestyle patterns in terms of age, sex, BMI, study field and year of study. The results showed that university students exercise a little and the females of the health colleges are the lowest, but students of the normal weight exercise more than others, while there is a highly statistically significant difference with a P-value of < 0.001 in favor of the physical activity when joining the university compared with the physical activity at university. Nagelkerke R^2 revealed that almost one-third of the variance in the dependent variable of low physical activities could be explained by the 12 independent variables in the model. Knowledge deficit as a barrier; Low perception of physical health evaluation, low perception of a healthy diet and eating more than three times a day came out to predict low physical activity at a significant level less than 0.05.

Key Words: Physical activity, university students, barriers.

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INTRODUCTION

Despite young People lifestyle awareness becomes clear that has beneficial effects on health, they do not have healthy life habits [1]. People's lifestyles have changed from active daily movement and good dietary consumption to sedentary and inactive mobility and elevated intake of fat and sugar[2, 3].

There is an increase in chronic diseases in developing countries that emphasize the significance of health services which should be done in a manner that protects endures and improves health[4-6]. Many chronic diseases could be caused due to an immobile lifestyle, where healthy lifestyle habits can decrease diseases [7-9]. Avoiding lifestyle-related illnesses and health promotion originates from keeping away from sedentary behavior targeting and promoting physical activity, which assumes a significant role in this [10]. All around, there is a need to support more noteworthy investment in physical activity, reliable with rules, to accomplish higher wellness levels, decline illness

chance factors [11]. Physical activity is thus a recommended behavioral regimen empirically proven to mitigate life-threatening conditions associated with sedentary lifestyles and obesity[12]. Having a healthy lifestyle such as exercise, have a great role in the prevention of obesity, diabetes, cardiovascular diseases and some types of cancer[13-15]. Physical activity is considered a healthy lifestyle habit that individuals need to do regularly to optimize better performance status [16, 17]. It is probably much more prevalent in ordinary social circumstances that students lack physical activity as a consequence of extended studying hours, difficulties in organizing rest and activity time and watching TV for lengthy moments [18]. University is a basic period for undesirable changes in vitality related practices in students [19]. Students at universities are the population most probable to suffer from lack of mobility and increasing the incidence of smoking. Bad behavior changes are critical in protecting and improving student health. Scientific research conducted in the Gulf region indicates the growing chronic diseases among students as

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a result of incorrect health practices and lifestyle modifications owing to many modifications in the socioeconomic status in this region [20].

There are explicit barriers face students that limit their engagement in physical activity. Determination of these barriers is the initial phase in creating far-reaching socially applicable ways to deal with advance physical activity and help settle physical activity related to wellbeing variations [21]. It stays to be built up which factors may act as helpers towards physical activity. To conquer these barriers and upgrade motivators more effectively, the development of an intervention should consolidate an appropriate distinguishing proof of determinates of behavior change which can recognize the reasons for physical inactivity[22]. Various studies have described the determinants and barriers of physical activity at the level of university students, yet those are identified with numerous variables (e.g, socio-demographic, psychological, and environmental).

The Kingdom of Saudi Arabia propelled its vision in what was called *Saudi Vision 2030*, which recognized 12 programs to achieve the strategic objectives of that vision, including the quality of life program that incorporated the improvement of the individual's lifestyle by upgrading the individual physical activity practicing and expanding the proportion of people practicing physical activities weekly. This is by offering opportunities to exercise routinely, which will significantly influence health, economy and social cohesion. It will, therefore, be of public health relevance and one that also resonates with healthy vision 2030 of Saudi Arabia to measure the factors potentiating and mitigating this valued preventive behavioral regimen needed to eradicate obesity among college students in Hail city of Saudi.

Hence, we will explore the data set obtained from 335 participants in a study called Student Healthy Lifestyle and identify various potential and empirically established factors causally associated with physical activity behavior among college students.

The significance of the research is due to reports showing greater chronic disease hazards among university students. Therefore, the research aimed to describe physical activity levels and motivators and barriers of university students in humanitarian and health colleges to profit from the research outcomes to conduct educational programs and rising the health awareness at the university levels.

MATERIALS AND METHODS

A cross-sectional/descriptive and analytical approach was used to suit the study in which 335 students from the University of Ha'il, Saudi Arabia participated while the study conducted using a valid survey. A questionnaire

was prepared and applied to evaluate the physical activity levels and barriers. Data was conducted from March 2018 to May 2019 with the aid of the web application. The prepared questionnaire contains general questions about the students (age, sex, BMI, study field and year of study). Of the 335 eligible participants, 192 (57.31%) were answered by male students while 143 (42.69%) were answered by female students. The survey is accompanied by two lists (20 questions of each) which were prepared from previous studies [1, 5, 16, 18, 23, 24]. The questionnaire contained questions of multiple choices that were calculated based on a three-point Likert scale. The mean values of 1 to 1.67 were regarded as undesirable, 1.67 to 2.34 were deemed semi-desirable, whereas mean values of 2.34 to 3 were deemed desirable. The survey was used to assess the difference between male and female in physical activity promoting lifestyle in the University of Ha'il, to determine the effect of socioeconomic factors, to assess the difference in physical activity behaviors among university students in first and last year and students of health colleges and humanitarian colleges, and to predict the significance barriers. The age of the research participants ranged from 16-26 years old and participants should be registered as a student at the University of Ha'il.

The SPSS 21.0 software was used for the statistical analysis of the compiled data through surveys. Binary logistic regression using SPSS statistical package at the level of 0.05 significance with confidence was employed to predict barriers preventing students from engaging in the recommended physical activity as a way of generating empirically grounded intervention needed to promote healthy behavior lifestyles among college a student. This will also offer an opportunity to offer evidence-based information to policymakers enough to generate traction needed to politically support physical activity behavior among citizens. Hence, health policymakers may be able to benefit immensely from this research output towards fulfilling the 2030 health Vision of Saudi Arabia.

A categorical dependent variable was identified from the questionnaire using the question: "Last week, how many days were you physically active for a total of 30 minutes or more?" This was recoded into Low physical activity and high physical activity with those participants who responded by saying "Yes" to option 0 through 2 as those who are classified under "Low physical activity" categorical variable. While those participants who responded by saying "Yes" to the second option "3-4" was classified under "Moderate physical activity categorical variable, those who said "Yes" to the third option was classified under the "High physical activity" variable. Dummy variables were employed to classify each variable into a group class.

Using previous and extant research output in the study of physical activities, relevant and empirically grounded factors associated with physical activities were identified from the questionnaire. They were recorded and dummy variables were created from them to fit into the analytical test-binary logistic regression. The independent variables were strategically selected to represent cognitive and psychological factors with a propensity to predict the behavioral outcome-physical activity: Intention to be physically active; Knowledge deficit of physical activity perceived as a barrier; Time constraint as a perceived barrier towards physical activity; Fitness as a perceived barrier towards physical activity; Cost as a perceived barrier towards physical activity; Low perception of health evaluation; Low perception of a healthy diet; Number of times (more than three times a day) in a day each participant eats; Number of times (once a day meal) in a day each participant eats; Other non-psychologically-based independent variables were identified such as demographic variable Gender; Low and high consumption of vegetables; Comfort eating habit.

RESULTS AND DISCUSSION

The predictable model with the classification table without imputation of variables showed 86.9 predictability. Variables in the equation are highly explanatory with a propensity to predict the outcome variable of interest-low physical activity with Wald Test Statistics significant at Exp(B) 6.625. Nagelkerke R^2 revealed that almost one-third of the variance in the dependent variable of low physical activities could be explained by the 12 independent variables in the model. Hosmer/Lemeshow test was significant at 0.773 at p less than 0.05(table 1). This shows a high level of goodness of fit for the model.

Table 1:Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	4.857	8	.773

The university aims at spreading knowledge, developing it and contributing to the advancement of thought as well as carrying out scientific research, encouraging it and employing it in facing the challenges of society and solving its problems. One of the goals of the university is to build the personality of the students, develop their skills and launch their potential to take responsibility and serve the community. Therefore, it requires the building of a true university student physically, mentally,

psychologically and socially as they are the main axes of health. The university has a role to play in pushing for a healthy life for the student to encourage him to unleash his energies to achieve the required responsibilities, as university youth are the tools of change towards the sustainable development of society.

When the study sample was asked about the level of physical activity appropriate to them, most of the results were that they do not exercise any sport, and the female students of health colleges were the lower in the average physical activity with a mean value of 1.580 ± 0.56 , which is undesirable based on the three points Likert scale (table2). The results indicate that there are no statistically significant differences in terms of the gender variable ($P > 0.05$). These results indicate that this category is dependent on the lack of physical activity and this is a risk indicator that increases the likelihood of diseases, where several studies considered that lack of physical activity and Exercise is a dangerous indicator[25, 26]. These findings are comparable to previous research [5, 27, 28]

On the other hand, the results showed, According to BMI, that the normal weight students practiced exercise at a semi desirable level. On the contrary, underweight, overweight and obese students are less active with undesirable scale (table 3). As for the physical activity when joining the university, the results showed that there are no statistically significant differences between students of humanitarian and health colleges, and all the results at a semi desirable level (table 2). However, when comparing the responses of all students in all colleges regarding the physical activity when joining the university and the physical activity at university, the results showed high statistical significant differences with a P -value of < 0.001 (table4). This confirms the decline in the time management of students and the planning to invest in their health, and this may be due to the lack of awareness programs and motivational and revitalization aimed at increasing the rates of physical activity. The results also demonstrated that the degree of student agreement for physical activity was generally high and with a desirable scale and without statistically significant differences. This affirms the university students' responses to any programs that will be proposed and will expect to increment physical activity as a major aspect of the healthy lifestyle that students wish to accomplish [29, 30]. This demonstrates the need to monitor earmarked budgets for delivered healthy lifestyles intervention targeting first-year university students [31].

Table 2: The level of physical activity between Humanitarian and Health Colleges

		Gender	N/%	Mean	Std. Deviation	P-value
Physical activity	Humanitarian Colleges	Female	110	1.7000	.71099	.351
		Male	64	1.7813	.76571	
	Health Colleges	Female	33	1.5758	.56071	
		Male	128	1.6094	.71248	
Physical activity when joining the university	Humanitarian Colleges	Female	110	2.1455	.84415	.222
		Male	64	1.9219	.87839	
	Health Colleges	Female	33	1.8485	.90558	
		Male	128	2.0000	.88736	
The desire to be physically active	Humanitarian Colleges	Female	110	2.8545	.40266	.932
		Male	64	2.8906	.36153	
	Health Colleges	Female	33	2.8788	.41515	
		Male	128	2.8828	.40898	

Student participation in physical activity faces numerous barriers that limit their involvement. Identification and basic assessment of these barriers are one of the primary perspectives that researchers ought to think about when creating interventions to an inclination to physical activity

a significant everyday practice, and it is the initial phase in creating far-reaching social-related approaches to deal with upgrade physical activity and help in explaining the associated health disparities [21].

Table 3: The level of physical activity with a different body-mass index

	BMI	N	Mean	Std. Deviation	P-value
Physical activity	Underweight	27	1.5556	.69798	.314
	Normal	147	1.7483	.69088	
	Overweight	91	1.6044	.68116	
	Obese	69	1.6232	.78780	
Physical activity when joining the university	Underweight	27	2.2222	.84732	.151
	Normal	146	2.0959	.89696	
	Overweight	91	1.8901	.88758	
	Obese	70	1.9286	.80436	
The desire to be physically active	Underweight	26	2.7308	.53349	.002
	Normal	146	2.8836	.39845	
	Overweight	89	2.8764	.39371	
	Obese	69	2.9130	.33162	

Table 4: The level of physical activity with different study year

		Gender	N	Mean	Std. Deviation	P-value
Physical activity	first year students	Female	36	1.5278	.65405	.233
		Male	23	1.9130	.79275	
	last year students	Female	33	1.7576	.79177	
		Male	105	1.6571	.73155	
Physical activity when joining the university	first-year students	Female	36	2.0278	.90982	.801
		Male	22	1.8182	.90692	
	last year students	Female	34	2.0000	.81650	
		Male	105	2.0190	.89851	
The desire to be physically active	first year students	Female	35	2.7714	.49024	.001
		Male	23	2.6522	.64728	
	last year students	Female	33	2.8485	.44167	
		Male	103	2.9709	.21946	

This investigation, which was applied to a large sample of university students in Saudi Arabia, indicated that there is a certain set of elements that can comprise a barrier to practicing physical activity. The physical activity barriers distinguished in the study seem to assume a comparative role for the residents of the area. Knowledge deficit as a barrier; Low perception of physical health evaluation, low perception of a healthy diet and eating more than three times a day came out to predict low physical activity at a significant level less than 0.05 (table 5).

Several previous studies have detailed recognizing the lack of knowledge as a barrier to practicing physical

activity[21, 32, 33], whereas their insight was related to that they thought that they are taking their sufficient amount of exercise during daily activities [34] and they are not aware of the appropriate amount that must be done to accomplish positive health benefits, or they realize that they should practice through athletic gear or machines and they need information on utilizing them, which favored their concept of not trying to exercise [35]. Strikingly, the lack of knowledge did not discover as a barrier to physical activity among any of the quantitative studies, while lack of time to exercise was the most intermittently perceived barrier among studies [21].

Table 5: The level physical activity with different barriers

Barriers	B	S.E.	Wald	df	Sig.	Exp(B)
Physical Activity Intention	1.402	.758	3.423	1	.064	4.064
Knowledge Deficit	-1.168	.473	6.089	1	.014	.311
Time	-.345	.431	.641	1	.423	.708
Fitness	1.139	.693	2.696	1	.101	3.122
Support	-.433	.495	.765	1	.382	.649
Cost	.165	.446	.137	1	.711	1.180
Gender Male Dummy	-.042	.434	.009	1	.923	.959
Low Physical Health Evaluation	-1.074	.447	5.765	1	.016	.342
Low Perception Healthy Diet	-1.298	.556	5.459	1	.019	.273
More Than Three Times Daily Meal	-1.287	.458	7.894	1	.005	.276
Once Daily Meal	-1.064	.654	2.651	1	.104	.345
Low Consumption Vegetables	-.155	.506	.094	1	.760	.856
High Consumption Vegetables	-.255	.551	.214	1	.643	.775
Comfort eating habit Recoded	.357	.518	.475	1	.491	1.429
Constant	1.986	1.034	3.690	1	.055	7.283

a. Variable(s) entered on step 1: Intention_Physical_Activity, Knowledge Deficit as Barrier, Time as Barrier, Fitness as Barrier, Support as Barrier, Cost as Barrier, Gender Male Dummy, Low Physical Health Evaluation, Low Perception Healthy Diet, More Than Three Times Daily Meal, Once Daily Meal, Low Consumption Vegetables, High Consumption Vegetables, Comfort eating habit Recoded.

CONCLUSION

The outcomes of this study demonstrated that university students that exercise a little and the females of the health colleges are the most minimal, however students of the normal weight exercise more than others, while there is a highly statistically significant difference with a P-value of < 0.001 in favor of the physical activity when joining the university compared with the physical activity at university. Nagelkerke R² revealed that almost one-third of the variance in the dependent variable of low physical activities could be explained by the 12 independent variables in the model. Knowledge deficit as a barrier; Low perception of physical health evaluation, low perception of a healthy diet and eating more than three times a day came out to predict low physical activity at a significant level less than 0.05.

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Conflict of Interest

All authors declare that there is no conflict of interest.

Ethical Approval

This study does not involve any human or animal testing; this study was approved by the Scientific Research Ethics Committee, University of Ha'il; this study conforms to the Declaration of Helsinki, US.

REFERENCES

- [1] Sanchez-Ojeda, M.; De, E. L.-B., Healthy lifestyles of the university population. In 2015.
- [2] Al-Sejari, M. M., Physical Activity and Dietary Habit Among Sample of Kuwaiti University Students A Sociocultural Study. *Annals of Arts & Social Sciences/Hawliyyat Kulliyyat al-adab* 2019, (517).
- [3] Antony VC, Azeem K. HealthRelatedQuality of Life amongSaudiUndergraduateStudentswithDifferentCate gories of Body Mass Index. *Int. J. Pharm. Res. AlliedSci.* 2019;8(2):15-21.
- [4] Bryant, H.; Shin, H. R.; Forman, D.; Stevanovic, V.; Park, S.; Burton, R.; Varghese, C.; Ullrich, A.; Sutcliffe, C.; Sutcliffe, S., Managing population health to prevent and detect cancer and non-communicable diseases. *Asian Pac J Cancer Prev* 2012, 13, (4 Suppl), 13-22.
- [5] Alkabas, A. S. A.;AlSaeed, A. A. A.; Alfozan, K. S.; Algeffari, M., Attitudes amongQassimUniversityMedicalStudents, SaudiArabia. *The Egyptian Journal of HospitalMedicine* 2018, 71, (2), 2477-2483.
- [6] Alba, L. H.;Badoui, N.; Gil, F., Attitude towardpreventive counseling and healthy practices amongmedicalstudents at a Colombianuniversity. *Frontiers of medicine* 2015, 9, (2), 251-259.
- [7] Costanzo, C.; Walker, S. N.; Yates, B. C.; McCabe, B.; Berg, K., Physical activity counseling for olderwomen. *Western journal of nursing research* 2006, 28, (7), 786-801.
- [8] Redland, A.;Stuifbergen, A., Strategies for maintenance of health-promotingbehaviors. *The Nursing Clinics of NorthAmerica* 1993, 28, (2), 427-442.
- [9] Mathialagan AG, JA JA, Dinesh M, Azra N, Selvaganapathi G, Harikrishnan T, Kohila JR, Suriya PN, Fathy I, Ramalinggam R, Vikneswaran S. Patient attitudes and health information features as predictors of health promotion in Malaysia. *J. Adv. Pharm. Educ. Res.* 2018;8(2):43-8.
- [10] Verschuren, O.; Peterson, M. D.; Balemans, A. C.; Hurvitz, E. A., Exercise and physicalactivityrecommendations for people withcerebralpalsy. *DevelopmentalMedicine& Child Neurology* 2016, 58, (8), 798-808.
- [11] Shuval, K.;Finley, C. E.; Barlow, C. E.; Gabriel, K. P.; Leonard, D.; Kohl III, H. W. In *Sedentarybehavior, cardiorespiratory fitness, physicalactivity, and cardiometabolicrisk in men: the cooper center longitudinal study*, Mayo ClinicProceedings, Elsevier: 2014; 1052-1062.
- [12] Pate, R. R.; Pratt, M.; Blair, S. N.; Haskell, W. L.; Macera, C. A.; Bouchard, C.; Buchner, D.; Ettinger, W.; Heath, G. W.; King, A. C., Physical activity and public health: arecommendationfrom the Centers for Disease Control and Prevention and the American College of Sports Medicine. *Jama* 1995, 273, (5) : 402-407.
- [13] Soriguer, F.;Rubio-Martín, E.; Rojo-Martínez, G., Prevención de la diabetesmellitustipo 2. *MedicinaClinica* 2012, 139, (14) : 640-646.
- [14] Béjar, L. M.; Gili, M.; Infantes, B.; Marcott, P. F., Efectos de cambios en Los patronesdietéticos Sobre la incidencia de cáncercolorrectal en veintepaíses de cuatro continentes durante 1971-2002. *RevistaEspañolade EnfermedadesDigestivas* 2011, 103, (10), 519-529.
- [15] Eddy, L.; Moral, I.; Cuixart, C. B.; Frutos, E.; Terrades, C. C.; Aguilà, N. C., Hábitos de estilo de Vida en adolescentes con sobrepeso y obesidad (EstudioObescat). *RevistaPediatriade AtenciónPrimaria* 2012, 14, (54), 4.
- [16] Bozlar, V.;Arslanoglu, C., Healthy Life Style Behaviors of UniversityStudents of School of Physical Education and Sports in Terms of Body Mass Index and Other Variables. *Universal Journal of EducationalResearch* 2016, 4, (5), 1189-1195.
- [17] Nodehi D, Abarghuei MA, Azizi A. Providing A Mental Health Concept Based on HumanHealth Indexes in Quran. *Mental health. Pharmacophores.* 8(2);2017:64-82.
- [18] Janečková, D.;Dostál, D.; Plháková, A., Kvalitaspánku, cirkadiánnípreferenc a zdravýživotnístyl u vysokoškolskýchstudentů. *Praktickýlékař* 2013, 93, (3), 114-120.
- [19] Deliens, T.;Deforche, B.; De Bourdeaudhuij, I.; Clarys, P., Determinants of physicalactivity and sedentarybehavior in universitystudents: a qualitative studyusing focus group discussions. *BMC public health* 2015, 15, (1), 201.
- [20] Musaiger, A. O.; Hassan, A. S.; Obeid, O., The paradox of nutrition-relateddiseases in the Arab countries: the need for action. *International journal of environmentalresearch and public health* 2011, 8, (9), 3637-3671.
- [21] Joseph, R. P.; Ainsworth, B. E.; Keller, C.; Dodgson, J. E., Barriers to physicalactivityamongAfrican American women: an integrativerereview of the literature. *Women&health* 2015, 55, (6), 679-699.
- [22] Sutherland, S.; Penfold, R.; Doherty, A.; Milne, Z.; Dawes, H.; Pugh, C.; Boulton, M.; Newton, J. L., A cross-sectionalstudyexploringlevels of physicalactivity and motivators and barrierstowardsphysicalactivity in hemodialysis patients to inform intervention development. *Disability and rehabilitation* 2019, 1-7.
- [23] Gallardo-Escudero, A.;MuñozAlfárez, M. J.; PlanellsdelPozo, E. M.; LópezAliaga, I., La

- Etapa Universitaria no favorece el Estilo de Vida saludable en las Estudiantes granadinas. *Nutrición Hospitalaria* 2015, 31, (2), 975-979.
- [24] Mousavi, Z. S.; Ehsanpour, S.; Kazemi, A., Survey of lifestyle and its relationship with health value of mid-aged women referring to comprehensive health centers of Isfahan in 2016. *Journal of education and health promotion* 2018, 7.
- [25] Haase, A.; Steptoe, A.; Sallis, J. F.; Wardle, J., Leisure-time physical activity in university students from 23 countries: associations with health beliefs, risk awareness, and national economic development. *Preventive medicine* 2004, 39, (1), 182-190.
- [26] Navarro-Prado, S.; Schmidt-Rio Valle, J.; Montero-Alonso, M. A.; Fernández-Aparicio, Á.; González-Jiménez, E., Unhealthy Lifestyle, and Nutritional Habits Are Risk Factors for Cardiovascular Diseases Regardless of Professed Religion in University Students. *International journal of environmental research and public health* 2018 ; 15, (12), 2872.
- [27] Majra, J., Do our medical colleges inculcate health-promoting lifestyles among medical students: A pilot study from two medical colleges from Southern India. *International journal of preventive medicine* 2013 ; 4, (4), 425.
- [28] Chouhan, S., Analysing health-promoting lifestyles of medical students in Bhopal, Madhya Pradesh, India by HPLP-II. *International Journal of Community Medicine and Public Health* 2016 ; 4, (1), 195-199.
- [29] Pérez-López, I. J.; Rivera García, E.; Delgado-Fernández, M., Mejora de hábitos de Vida saludables en alumnos universitarios mediante Una propuesta de gamificación. *Nutrición hospitalaria* 2017 ; 34, (4), 942-951.
- [30] Allom, V.; Mullan, B.; Cowie, E.; Hamilton, K., Physical activity and transitioning to college: The importance of intentions and habits. *American journal of health behavior* 2016 ; 40, (2), 280-290.
- [31] Brown, D. M.; Bray, S. R.; Beatty, K. R.; Kwan, M. Y., Healthy active living: a residence community-based intervention to increase physical activity and healthy eating during the transition to first-year university. *Journal of American College Health* 2014, 62, (4), 234-242.
- [32] Brown, S. A., Measuring perceived benefits and perceived barriers for physical activity. *American journal of health behavior* 2005; 29, (2), 107-116.
- [33] Nahar, V. K.; Sharma, M.; Catalano, H. P.; Ickes, M. J.; Johnson, P.; Ford, M. A., Testing multi-theory model (MTM) in predicting initiation and sustenance of physical activity behavior among college students. *Health promotion perspectives* 2016 ; 6, (2), 58.
- [34] Pekmezi, D.; Marcus, B.; Meneses, K.; Baskin, M. L.; Ard, J. D.; Martin, M. Y.; Adams, N.; Robinson, C.; Demark-Wahnefried, W., Developing an intervention to address physical activity barriers for African-American women in the deep south (USA). *Women's Health* 2013; 9, (3), 301-312.
- [35] Im, E.-O.; Ko, Y.; Hwang, H.; Yoo, K. H.; Chee, W.; Stuifbergen, A.; Walker, L.; Brown, A.; McPeck, C.; Chee, E., "Physical Activity as a Luxury" African American Women's Attitudes Toward Physical Activity. *Western Journal of Nursing Research* 2012 ; 34, (3), 317-339.