

Basic Psychological Needs Predicting Physical Activity Participation among Young Adults

By Joseph O. Adelusi^{*}, Solomon B. Oguntuase[‡] & Oluwatoyin M. Jaiyeoba[°]

It is alarming that despite the numerous accrued benefits of physical activity participation, many young adults in tertiary institutions engage in inactive and sedentary lifestyles, which can be linked to many cases of morbidity and mortality. However, according to the self-determination theory (SDT), individuals have three basic psychological needs (BPNs) that are essential for healthy growth, development and well-being. The necessity to fulfill these BPN's can stimulate and encourage young adults to engage in regular physical activity and enhance their well-being. Therefore, this study examined the role of BPN's in predicting physical activity participation among young adults in Nigerian private university. A total of 735 students, comprising 408 males (55.5%) and 327 females (44.5%), with ages ranging from 16 to 35 years (mean = 22.8; SD = 5.42), were randomly selected from a private university in the South-west, of Nigeria. The Basic Psychological Needs in Exercise Scale (BPNES) and the International Physical Activity Questionnaire–Short Form (IPAQ-SF) were used to collect data. Data analysis was conducted using descriptive statistics, correlation and multiple linear regression analysis. The results of the study showed that the BPN's of autonomy ($r = 0.233$, $p < 0.05$); competence ($r = 0.188$, $p < 0.05$), and relatedness ($r = 0.477$, $p < 0.05$) positively correlated with physical activity participation. Additionally, the results found that 25% had low, 57.1% had moderate and 17.8% had high levels of physical activity participation among the participants. There was a significant gender difference between males and females' in their levels of participation in physical activity ($t = 2.866$, $p < 0.05$), with males reporting higher mean scores than their female counterpart. Regression analysis showed that BPN's predicted physical activity participation among young adults ($F(3,731) = 73.968$, $p < 0.05$) with 23% of its variance accounted for by the independent variables. Furthermore, autonomy ($\beta = 0.071$, $t = 1.970$, $p < 0.05$) and relatedness ($\beta = 0.478$, $t = 12.589$, $p < 0.05$) were predictors of physical activity participation with relatedness being reported as the most potent predictor. These findings provide an insight into focus the importance of satisfying the relatedness and autonomy aspects of BPN's in young adults. Developing interventions that target these identified indices can promote continuous and regular participation in physical activity.

Keywords: basic psychological needs, relatedness, autonomy, physical activity, young adults

^{*}Chief Lecturer, Department of Physical and Health Education, Adeyemi College of Education, Ondo, Nigeria.

[‡]Doctoral Student, Department of Sport Psychology, School of Physical Education and Sport Science, Tianjin University of Sport, China.

[°]Senior Lecturer, Department of Human Kinetics, Faculty of Education, University of Ibadan, Nigeria.

Introduction

“It has been well established that physical activity participation provides numerous positive health benefits encompassing physical, psychological, and social aspects, leading to enhanced health, improved life satisfaction, and optimum well-being (Lahart et al. 2019, Malm et al. 2019, Vagetti et al. 2014, Ponce de León and Sanz 2014)”. Despite these numerous accrued positive health benefits of physical activity participation, many young adults in tertiary institutions engage in an inactive and sedentary lifestyle, which can be linked to various cases of morbidity and mortality. The World Health Organization (WHO) (2018) indicated that two-thirds of premature mortalities in adults are linked to young age conditions and behaviors, including smoking, heavy drinking, and physical inactivity, with a higher number of young adults not getting enough physical activity. The self-determination theory posits that the satisfaction and fulfillment of an individual’s basic psychological needs can stimulate, predict, influence, and increase physical activity participation and encourage active behavior (Vansteenkiste et al. 2019, Springer et al. 2013, Deci and Ryan 2000). Therefore, there is a crucial and persistent need to motivate young adults to continuously participate in physical activity in order to promote healthy behaviors from young age to older age.

The Basic Psychological Needs Theory (BPNT, Deci and Ryan 2002) is a sub-theory within the self-determination theory (SDT) framework, which posits that the growth, integration, active lifestyle, and optimal functioning of humans are grounded in the satisfaction of three basic psychological needs: autonomy, competence, and relatedness. Autonomy refers to an individual’s ability to make decisions in choosing and performing different tasks and behaviors (Vansteenkiste et al. 2020, Ryan and Deci 2017). Competence is the ability of an individual to master or efficiently relate to the environment and have confidence in achieving positive outcomes on assigned tasks. Lastly, relatedness reflects the extent to which an individual experiences interpersonal relationships, a sense of belonging in society, and connection with significant others (Vansteenkiste et al. 2020, Ryan and Deci 2017). When these three basic psychological needs are fulfilled, individual gains the impetus to maintain optimal well-being, adopt a healthy lifestyle, and experience a high level of happiness by engaging in physical activity (Junior et al. 2019, Ryan and Deci 2017). However, the inability to fulfill these three basic psychological needs may hinder the energy to grow, develop, and maintain healthy habits and resulting into physical inactivity.

Basic psychological needs have been shown to influence physical activity participation, exercise adherence, autonomous regulation toward CrossFit participation, and enjoyment in physical education indirectly enhancing physical health, life satisfaction, relieving stress, and reducing burnout (Gholidahaneh et al. 2020, Fraguera-Vale et al. 2020, Martinez et al. 2013, Kang et al. 2019, Teixeira et al. 2018, Rodrigues et al. 2018, Davies et al. 2016, Mefferd, 2021, Lovell et al. 2016, Matosic et al. 2016, Leisterer and Gramlich 2021). Additionally, a plethora of studies have demonstrated a positive relationship between the three basic psychological needs and physical activity behaviors (McDonough and Crocker

2007, Sánchez and Núñez 2007, Taylor et al. 2010, Peres et al. 2012, Erdogdu and Öz 2021), enjoyment in physical education (Leisterer and Gramlich 2021), and sportsmanship (Cosma et al. 2021).

Physical activity participation has continued to decline globally, especially among young persons from late adolescence to older adults (Hallal et al. 2012). In Nigeria, the overall physical activity levels of young adults seem to be declining (Adeniyi et al. 2016) and not meeting the recommendation of engaging in at least 150–300 minutes of moderate-intensity PA (MPA) or 75–150 minutes of vigorous-intensity PA (VPA) per week for those aged 18 years or older (World Health Organization (WHO) 2020). Studies have shown that only 37% of young adults participated in 60 minutes of (MVPA) daily, with 59% involved at moderate levels, 3.8% involved in low levels, and 72% participated in PA at least once in a month (Odunaiya et al. 2010, Adeniyi et al. 2011, Senbanjo and Oshikoya 2010). This declining level of PA in the country and the world can be linked to recent technological advancements, modern lifestyles, automation of daily activities, motorization, urbanization, and unhealthy diets, which enhance sedentary lifestyles, unhealthy behaviors, and underline the necessity to address the growing malaise of physical inactivity (Knuth and Hallal 2009, Institute of Medicine 2013, Onyiriuka et al. 2016).

The transition of young adults from adolescence into adulthood that, from secondary school into university, is a stage encompassed with many challenges, including physical and mental health demands, academic stress and difficulties, a lack of time due to cumbersome lesson schedules and assignments, financial burdens, change in residence, and other school environment-related factors (Glascoe 2023, Ting 2009, Hiester et al. 2009, Oluyinka and Endozo 2019, Jaiyeoba 2018, Fawzy and Hamed 2017, Arnett 2000). These challenges affect young adults' overall well-being and behaviors. While the university environment offers substantial opportunities for all-round development and healthy lifestyles for young adults (Niedermeier et al. 2018), there is also a menace of reduced PA participation and increased sedentary lifestyles (Kann et al. 2018, Nelson et al. 2007), making university students vulnerable to many illnesses such as mental health issues, cardiovascular disease, cancer, osteoporosis later in life, overweight and obesity, tiredness, and exhaustion (McMahon et al. 2017, Fawzy and Hamed 2017, Bonevski et al. 2013, Sandu et al. 2018).

Research evidence suggests that gender differences exist and affects participation in physical activities, with males' involvement greater than females in most studies, with males having higher participation records in moderate to vigorous physical activities (Towne et al. 2017, Beltrán et al. 2017, Fraguera-Vale et al. 2020, Ugwueze and Agbaje 2022). Few studies have indicated no gender difference in PA participation (Manzano-Sánchez and Valero-Valenzuela 2018). Studies have shown that fulfilling BPNs increases individuals' impetus to engage in PA with greater commitment and determination, which in turn promotes overall well-being and active lifestyles in various countries (Fraguera-Vale et al. 2020, Gholidahaneh et al. 2020). While most of the studies on PA in Nigeria have focused on sociodemographic, personal, physical, psychological, and environmental factors that influence and associate with PA among different populations,

especially among adolescents (Oluwasanu and Oladepo 2017, Oguntuase et al. 2021, Adeniyi et al. 2016, Adeniyi et al. 2011, Ugwueze et al. 2021, Oyeyemi et al. 2016), there is no evidence of a study on BPNs predicting PA participation among young adults in Nigeria. Therefore, this study investigates basic psychological needs predicting physical activity participation among young adults in Nigeria. The current study aims to: (1) examine the relationship between BPNs and PA among young adults in Nigeria, (2) examine whether BPNs would predict PA, and (3) examine whether BPN components would relatively predict PA.

Methods

Participants

A total of 735 university students, comprising 408 males (55.5%) and 327 females (44.5%), whose ages ranged from 16 to 35 years (mean = 22.8; SD = 5.42), were randomly selected from a private university in the South-west, Nigeria. These participants represented various departments across different faculties within the university spanning from 100 Level to 500 Level students. It's worth noting that all participants were registered full-time undergraduate students of the university. Exclusions from the study were made for students with physical or mental (learning) disabilities and those taking medications that limited their participation in physical activity.

Measures

The measures completed by the participants include:

Basic Psychological Needs

The English version (Vlachopoulos et al. 2011) of the Basic Psychological Needs in Exercise Scale (BPNES) (Vlachopoulos and Michailidou 2006) was utilized to assess the extent to which participants' fulfilled the basic psychological needs for autonomy, competence, and relatedness in their physical activity participation. The BPNES consists of 11 – items divided into three subscales: autonomy (4 items, e.g., “The way I exercise is in agreement with my choices and interests”), competence (4 items, e.g., “I am able to meet the requirements of my exercise program”), and relatedness (3 items, e.g., “My relationships with the people I exercise with are very friendly”). Participants rated the BPNES items on a 5 - point Likert-type scale (1 = strongly disagree to 5 = strongly agree). The Cronbach alpha coefficients obtained in this study for the three subscales of BPN were 0.78 for autonomy, 0.73 for competence, and 0.84 for relatedness.

Physical Activity (PA) Participation

The participants' physical activity levels were assessed using the International Physical Activity Questionnaire–Short Form (IPAQ-SF). This self-reported questionnaire measures the duration of various levels of physical activity over the past seven days or one week. The short form of the questionnaire is organized by dimensions and is structured to capture physical activity in four primary domains: vigorous, moderate, low (walking), and sedentary (sitting). The questions inquire about an individual's physical activity participation in the preceding seven days. The total weekly physical activity level is quantified as metabolic equivalent of task (MET) per hour per week, and it is categorized as high ($\geq 3,000$ MET-min/week), moderate (600 to 3,000 MET-min/week), or low (less than 600 MET-min/week), serving as an indicator for physical activity, (Craig et al. 2003, WHO 2010). The IPAQ-SF has been validated in a previous Nigerian study (Oyeyemi et al. 2013). In the current study, the Cronbach alpha coefficient for the IPAQ-SF scale was 0.81.

Procedure

Various departments across different faculties were approached to seek permission to access students for the study. The leaders of the students from each level and department were briefed about the research. Participants were randomly selected either as they entered the lecture rooms before the classes or when classes were in progress. Some classes responded after the lectures had started once their consent was obtained. The participants completed self-administered questionnaires. The questionnaire took approximately 10-15 minutes to complete. Participants were assured of the confidential treatment of the collected data. Students from the Department of Physical and Health Education (PHE) at the university were excluded from the study due to their regular participation in various physical activities, exercises, sports, and games. The study achieved a 95.6% completion rate, with 735 out of 769 participants (100%) providing complete responses. Only 34 participants (4.4%) did not provide complete information.

Data Analysis

Data analysis was carried out using descriptive statistics, including frequency counts, percentages, means, and standard deviations. Inferential analysis involved correlation analysis to ascertain the relationship between the dimensions of basic psychological need and physical activity participation, t-test analysis was employed to assess gender differences in levels of physical activity participation, and multiple regression analysis was performed to determine the predictive capability of basic psychological needs and its individual dimensions on physical activity participation.

Results

Descriptive Statistics and Correlation Matrix

Table 1 displays the positive correlations between basic psychological needs of autonomy (r=0.233), competence (r=0.188), and relatedness (r=0.477) with PA participation. This suggests that an increase or enhancement in autonomy, competence, and relatedness would positively influence the physical activity participation among the participants. However, it's important to note that the correlation coefficients for autonomy, competence, and relatedness were relatively weak.

Additionally, the results presented in Table 2 indicate that 25% of the participants had low, levels of physical activity participation, while 57.1% had moderate levels, and 17.8% had high levels. There was significant gender difference levels of participation in physical activity (t = 2.866, p < 0.05) with males reporting a higher mean score (15.99) compared to their female counterparts, who had mean score of (14.83).

Table 1. Correlation Matrix, Mean and Standard Deviation of Basic Psychological Needs and Physical Activity Participation

	Variables Mean	SD	PA participation	Autonomy	Competence	Relatedness
Participation	15.47	5.51	1			
Autonomy	23.46	4.68	0.233**	1		
Competence	21.42	5.18	0.188**	0.365**	1	
Relatedness	23.00	4.94	0.477**	0.387**	0.467**	1
N=735 Sig.(2-tailed): Autonomy=0.000 Competence=0.000 Relatedness=0.000						

**Correlation is significant at 0.05 alpha level (p<0.05)

Table 2. Levels of Physical Activity Participation

Levels of Participation	n	%
Low	184	25.0
Moderate	420	57.1
High	131	17.8
Total	735	100.0

Table 3. Summary of t-test Analysis on Gender Difference in Physical Activity Participation

	Gender	N	Mean	Std. Dev.	t	df	P
Physical activity participation	Male	408	15.99	5.98	2.866	733	0.004
	Female	327	14.83	4.80			

Table 4. Results of Regression on Joint Prediction of Basic Psychological Needs on Physical Activity Participation

R=.483 R ² =.233 Adj. R ² =.230 Std. Error=4.83793					
Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	5193.762	3	1731.254	73.968	0.000
Residual	17109.471	731	23.406		
Total	22303.233	734			

As shown in Table 4, it was observed that the linear combination of basic psychological needs (autonomy, competence, and relatedness) had a significant impact on physical activity participation among young adults ($F(3,731)=73.968$, $p < 0.05$). The results yielded a multiple regression coefficient of $R=0.483$ and a multiple R^2 of 0.233. Furthermore, the adjusted R^2 was calculated to be 0.230; indicating that approximately 23.0% of the variance was explained by the independent variables. This implies that, there was a significant collective predictive effect of basic psychological needs including autonomy, competence, and relatedness, on physical activity participation among young adults.

Table 5. Results of Regression on Relative Prediction of Basic Psychological Needs on Physical Activity Participation

Variables	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	2.661	1.085		2.452	0.014
Autonomy	0.084	0.042	0.071	1.970	0.049
Competence	-0.066	0.040	-0.062	-1.643	0.101
Relatedness	0.533	0.042	0.478	12.589	0.000

Table 5 displays information on autonomy, competence, and relatedness, including the unstandardized regression weight (β), the standardized error of estimate (SEE), the standardized coefficient, the t-ratio, and the significance level of the t-ratio. As indicated in Table 5, autonomy ($\beta=0.071$, $t=1.970$, $p < 0.05$) and relatedness ($\beta = 0.478$, $t=12.589$, $p < 0.05$) were found to be independently significant predictors of physical activity participation among young adults. However, competence ($\beta=-0.062$, $t=-1.643$, $p<0.05$) did not emerge as a significant predictor. This indicates that autonomy and relatedness were significant relative predictors of physical activity participation among young adults, while competence was not.

Discussion

The present study investigated the prediction of physical activity participation among young adults based on their basic psychological needs. Additionally, the

study examined the relationship between these BPNs and physical activity participation. The results revealed a positive correlation between the components of basic psychological needs and physical activity participation. This finding aligns with previous research (McDonough and Crocker 2007, Taylor et al. 2010). Leisterer and Gramlich (2021) also found that the three components of basic psychological needs were associated with enjoyment in physical education. Regarding gender differences, this study finding are consistent with Towne et al. (2017), indicating that male college students engage more in moderate-to-vigorous physical activity than their female counterparts, who tend to be more involved in heavy sedentary technology use activities, primarily driven by smartphone use. Similarly, Ugwueze and Agbaje (2022) found that boys more likely to meet the total physical activity requirements recommended by the WHO compared to their female peers. Fraguela-Vale et al. (2020) suggested that young girls prefer non-structured types of physical activity, while boys prefer organized forms.

Furthermore, the study demonstrated that BPNs predict physical activity participation among young adults, highlighting the importance of satisfying these needs for healthy growth, development, and well-being (Vansteenkiste et al. 2020, Ryan and Deci 2017). According to self-determination theory, fulfilling BPNs including autonomy, competence, and relatedness is crucial in motivating and encouraging young adults to engage in regular physical activity, promoting desired healthy behaviors (Fragueta-Vale et al. 2020). Kang et al. (2019) also found that these three BPNs components were significant predictors of exercise adherence among recreational sports participants, while Junior et al. (2019) indicated that BPNs contribute to physical development, functional level, and happiness in competitive games among futsal players. The study's results align with Leisterer and Gramlich (2021), who found that autonomy, competence, and relatedness increased students' enjoyment in physical education class, particularly among lower grades

In addition, the study revealed that both autonomy and relatedness were significant predictors of physical activity, with relatedness being the most potent factor. This finding corresponds with Davies et al. (2016), who reported that autonomy and relatedness within BPNs were significant predictors of autonomous participation in CrossFit. Relatedness plays a unique role in physical activity participation as individuals require the presence and involvement of significant others to meet the WHO's physical activity requirements for young adults. The need for relatedness is associated with a sense of belonging and acceptance by others, contributing to overall well-being within the community (Sánchez and Núñez 2007). It serves as a significant motivator for young adults to engage in regular physical activity (Peres et al. 2012). Quality friendship and relatedness were found to be associated with greater enthusiasm for participation in physical activity among adolescent girls (Gholidahaneh et al. 2020). Additionally, the need for relatedness significantly predicted respect for social conventions and opponent's elements of sportsmanship (Cosma et al. 2021).

Regarding the autonomy component of BPNs, the results are consistent with Kang et al. (2019), who reported that autonomy had a stronger impact on predicting longer-term exercise participation and exercise adherence compared to

the relatedness component of BPNs. Individuals with a strong sense of autonomy within BPNs were more likely to adhere to and maintain continuous participation in physical exercise. Similarly, Leisterer and Gramlich (2021) found a moderate to strong association between autonomy and enjoyment in physical education students. They suggested that changes in autonomy support may also impact competence and relatedness in physical education students. Additionally, Fraguera-Vale et al. (2020) noted that the fulfillment of autonomy within BPNs was significantly associated with engagement in unstructured activities in a first-year higher secondary education class.

Overall, these findings underscore the importance of addressing and satisfying basic psychological needs, especially relatedness and autonomy, to promote and sustain physical activity participation among young adults.

Limitations

This study has several limitations. Firstly, it utilized a cross-sectional design which does not allow for the establishment of causal relationships between basic psychological needs and physical activity participation variables. Consequently, the generalizability of the study's findings may be limited. Future research could employ intervention or longitudinal studies to investigate how fulfilling basic psychological needs can positively impact physical activity participation among young adults.

Secondly, data collection took place during the first three weeks of the second semester of the 2021/2022 academic session. This timing might have influenced the study's results, as students may have been particularly motivated to engage in physical activity, make new friends, and establish a sense of belonging by participating in both structured and unstructured activities at the beginning of the school year.

Thirdly, physical activity participation was assessed using self-report questionnaires, which rely on subjective data. This subjectivity limits the conclusions that can be drawn from the research, as they are based on participants' own opinions and perceptions. Future studies could consider incorporating objective measures, such as pedometers and accelerometers, to provide a more and objective assessment of energy expenditure in alignment with the physical activity recommendations outlined by the World Health Organization for young adults.

Conclusion

The present study revealed that the level of participation in physical activity was moderate among young adults in the university. There was a significant gender difference in physical activity participation among young adults, with males' involvement being higher than that of their female counterparts. The findings demonstrated a significant association between Basic Psychological

Needs (BPNs) and physical activity participation. Furthermore, BPNs were found to predict physical activity participation among young adults. Specifically, the study suggested that both relatedness and autonomy play a principal role in predicting physical activity participation.

This study provides valuable insights into the theoretical framework of BPNs (Deci and Ryan 2002), highlighting that the satisfaction of basic psychological needs may serve as a promising motivator for increased participation in physical activity among young adults. These findings are particularly relevant for professionals in the fields of exercise science and public health including sport and exercise psychologists, exercise physiologists, physical educators, health educators, school counselors, and university authorities. It underscores the importance of developing interventions that promote physical activity participation and enhance the overall well-being of university students.

Acknowledgments

The authors would like to express their gratitude to the authorities of the private university that facilitated this study, as well as the various Heads of departments, lecturers, students' course leaders, and the students who actively participated in the research. Your cooperation and support were greatly appreciated.

References

- Adeniyi AF, Odukoya OO, Oyeyemi AL, Adedoyin RA, Ojo OS, Metseagharun E, et al. (2016) Results from Nigeria's 2016 report card on physical activity for children and youth. *Journal of Physical Activity & Health* 13(11 Suppl 2): S231–S236.
- Adeniyi AF, Okafor NC, Adeniyi CY (2011) Depression and physical activity in a sample of Nigerian adolescents: levels, relationships, and predictors. *Child and Adolescent Psychiatry and Mental Health* 5(May): 16.
- Arnett JJ (2000) Emerging adulthood. A theory of development from the late teens through the twenties. *American Psychologist* 55(5): 469–480.
- Beltrán Carrillo VJ, Sierra AC, Jiménez Loais A, González-Cutre D, Martínez Galindo C, Cervelló E (2017) Diferencias de género en el tiempo de ocio de adolescentes en actividad sedentaria y actividad física en diferentes segmentos horarios del día. (Gender differences in the time spent by adolescents in sedentary activity and physical activity in different time segments of the day.) *Retos* 31: 3–7.
- Bonevski B, Guillaumier A, Paul C, Walsh R (2013) The vocational education setting for health promotion: a survey of students' health risk behaviours and preferences for help. *Health Promotion Journal of Australia: Official Journal of Australian Association of Health Promotion Professionals* 24(3): 185–191.
- Cosma GA, Chiracu A, Stepan AR, Gatzel R, Iancu A, Cosma A (2021) Sportsmanship and basic psychological needs in sports students. *Baltic Journal of Health and Physical Activity* 13(6): 53–65.

- Craig CL, Marshall AL, Sjöström M, Bauman A. E, Booth ML, Ainsworth BE, et al. (2003) International physical activity questionnaire: 12-country reliability and validity. *Medicine and Science in Sports and Exercise* 35(8): 1381–1395.
- Davies MJ, Coleman L, BabkesStellino M (2016) The relationship between basic psychological need satisfaction, behavioural regulation, and participation in Cross Fit. *Journal of Sport Behavior* 39(3): 239–254.
- Deci EL, Ryan RM (2000) The “what” and “why” of goal pursuits: human needs and the self-determination of behaviour. *Psychological Inquiry* 11(4): 227–268.
- Deci EL, Ryan RM (2002) *Handbook of self-determination research*. Rochester: University of Rochester Press
- Erdogdu M, Öz ND (2021) Evaluation of participation in recreational exercise with basic psychological needs and happiness parameters during the COVID-19 pandemic process. *Turkish Journal of Sport and Exercise /Türk SporveEgzersiz Dergisi* 23(2): 178–184.
- Fawzy M, Hamed SA (2017) Prevalence of psychological stress, depression and anxiety among medical students in Egypt. *Psychiatry Research* 255(Sep): 186–194.
- Fraguela-Vale R, Varela-Garrote L, Varela-Crespo L (2020) Perfiles de ocio deportivo en jóvenes españoles (15-20 años): un análisis de género. *Retos Nuevas Tendencias Educ. (Sports and leisure profiles in young Spaniards (15-20 years): a gender analysis. New Challenges Educ Trends .) Fís. DeporteRecreación* 37: 419–426.
- Fraguela-Vale R, Varela-Garrote L, Carretero-García M, Peralbo-Rubio EM (2020) Basic psychological needs, physical self-concept and physical activity among adolescents: autonomy in focus. *Frontiers in Psychology* 11(Mar): 491.
- Gholidahaneh M, Ghorbani S, Esfahaninia A (2020) Effects of basic psychological needs satisfaction in the physical education on leisure-time physical activity behavior of primary school students: mediating role of autonomous motivation. *International Journal of School Health* 7(2): 46–53.
- Glascoe GR (2023) *A causal comparative study of the effects of physical activity course enrollment on college students' perceived wellness, mental health, and basic psychological needs*. Doctoral Dissertation. University of South Carolina.
- Hallal PC, Andersen LB, Bull FC, Guthold R, Haskell W, Ekelund U, (2012) Lancet physical activity series working group. Global physical activity levels: surveillance progress, pitfalls, and prospects. *Lancet (London, England)* 380(9838): 247–257.
- Hiester M, Nordstrom A, Swenson LM (2009) Stability and change in parental attachment and adjustment outcomes during the first semester transition to college life. *Journal of College Student Development* 50(5): 521–538.
- Institute of Medicine (2013) *Educating the student body: taking physical activity and physical education to school*. Washington, DC: The National Academies Press.
- Jaiyeoba OM (2018) Unpleasant life occurrences as determinants of mental health status among undergraduates of the University of Ibadan. *Ibadan Journal of Education Studies* 15(2): 33–42.
- Junior JR, Granja T, Silva AA, Fortes LD, Gonçalves MP, Oliveira DV, et al. (2019) Association between basic psychological needs of the self-determination theory and perception of group cohesion among high-performance futsal athletes. *Brazil. J. Kinanthropometry Hum. Perform.* 21: 57369.
- Kang S, Lee K, Kwon S (2019) Basic psychological needs, exercise intention and sport commitment as predictors of recreational sport participants' exercise adherence. *Psychology & Health* 35(8): 916–932.
- Kann L, McManus T, Harris WA, Shanklin SL, Flint KH, Queen B, et al. (2018) Youth risk surveillance - United States, 2017. *Surveillance Summaries* 67(8): 1–114.

- Knuth A.G, Hallal PC (2009) Temporal trends in physical activity: a systematic review. *Journal of Physical Activity and Health* 6(5): 548–559.
- Lahart I, Darcy P, Gidlow C, Calogiuri G (2019) The effects of green exercise on physical and mental wellbeing: a systematic review. *International Journal of Environmental Research and Public Health* 16(8): 1352.
- Leisterer S, Gramlich L (2021) Having a positive relationship to physical activity: basic psychological need satisfaction and age as predictors for students' enjoyment in physical education. *Sports* 9(7): 90.
- Lovell GP, Gordon JA, Mueller MB, Mulgrew K, Sharman R (2016) Satisfaction of basic psychological needs, self-determined exercise motivation, and psychological well-being in mothers exercising in group-based versus individual-based contexts. *Health Care for Women International* 37(5): 568–582.
- Malm C, Jakobsson J, Isaksson A (2019) Physical activity and sports-related health benefits: a review with insight into the public health of Sweden. *Sports* 7(5): 127.
- Manzano-Sánchez D, Valero-Valenzuela A (2018) Differences between students according to physical activity and their motivation, basic psychological needs and responsibility. *Journal of Human Sport and Exercise* 13(2proc): S221–S230.
- Martinez J, Oberle CD, Nagurney AJ (2013) Basic psychological needs in predicting exercise participation. *Advances in Physical Education* 3(1): 20–27.
- Matosic D, Ntoumanis N, Quested E (2016) Antecedents of need supportive and controlling interpersonal styles from a self-determination theory perspective: a review and implications for sport psychology research. *Sport and Exercise Psychology Research* 145–180.
- McDonough MH, Crocker PR (2007) Testing self-determined motivation as a mediator of the relationship between psychological needs and affective and behavioral outcomes. *Journal of Sport and Exercise Psychology* 29(5): 645–663.
- McMahon EM, Corcoran P, O'Regan G, Keeley H, Cannon M, Carli V, et al. (2017) Physical activity in European adolescents and associations with anxiety, depression and well-being. *European Child & Adolescent Psychiatry* 26(1): 111–122.
- Mefferd DL (2021) *Organizational fit, teammate interactions, and psychological needs: why some athletes experience burnout*. Master's Thesis. Texas State University.
- Nelson TF, Gortmaker SL, Subramanian SV, Wechsler H (2007) Vigorous physical activity among college students in the United States. *Journal of Physical Activity and Health* 4(4): 495–508.
- Niedermeier M, Frühauf A, Kopp-Wilfling P, Rumpold G, Kopp M (2018) Alcohol consumption and physical activity in Austrian college students - A cross-sectional study. *Substance Use & Misuse* 53(10): 1581–1590.
- Odunaiya NA, Ayodele OA, Oguntibeju OO (2010) Physical activity levels of senior secondary school students in Ibadan, Western Nigeria. *The West Indian Medical Journal* 59(5): 529–534.
- Oguntuase SB, Sun Y, Apata TC, Ogunsanya JO (2021) Socio-demographic and psychological determinants of leisure time physical activity among adolescent in Nigeria. *European Journal of Physical Education and Sport Science* 7(4): 1–20.
- Oluwasanu MM, Oladepo O (2017) Effects of a multi-level intervention on the pattern of physical activity among in-school adolescents in Oyo state Nigeria: a cluster randomised trial. *BMC Public Health* 17(Oct): 833.
- Oluyinka S, Endozo A (2019) Factors affecting physical activity participation among university students. *Journal of Social Science Research* 14: 3161–3170.
- Onyiriuka AN, Umoru DD, Ibeawuchi AN (2013) Weight status and eating habits of adolescent Nigerian urban secondary school girls. *The South African Journal of Child Health* 7(3): 108–112.

- Oyeyemi AL, Ishaku CM, Oyekola J, Wakawa HD, Lawan A, Yakubu S, et al. (2016) Patterns and associated factors of physical activity among adolescents in Nigeria. *PloS one* 11(2): e0150142.
- Oyeyemi AL, Oyeyemi AY, Jidda ZA, Babagana F (2013) Prevalence of physical activity among adults in a metropolitan Nigerian city: a cross-sectional study. *Journal of Epidemiology* 23(3): 169–177.
- Peres JM, Cid LF, Marinho JA, Vlachopoulos SP (2012) Validation of the basic psychological needs in exercise scale in a Portuguese sample. *Spanish Journal of Psychology* 15(1): 399–409.
- Ponce de León A, Sanz E (2014) Predictores de la actividad física de tiempo libre en una población universitaria española. (Predictors of free-time physical activity in a Spanish university population.) *Pedagog. Soc. Rev. Interuniv.* 24: 183–197.
- Rodrigues F, Bento T, Cid L, Neiva H, Teixeira DS, Moutão J, et al. (2018) Can interpersonal behaviour influence the persistence and adherence to physical exercise practice in adults? Systematic review. *Frontiers in Psychology* 9(Nov): 2141.
- Ryan RM, Deci EL (2017) *Self-determination theory: basic psychological needs in motivation, development, and wellness*. New York: Guilford Publishing.
- Saleem F, Bashaar M, Hassali MA (2018) Assessment of barriers to physical activities among university students in Malaysia. *Phar Pharmacol Int J.* 6(6): 468–473.
- Sánchez JM, Núñez JL (2007) Análisis preliminar de las propiedades psicométricas de la versión española de la escala de necesidades psicológicas básicas en el ejercicio físico. (Preliminary analysis of the psychometric properties of the Spanish version of the scale of basic psychological needs in physical exercise.) *Revi. Iberoam. Psicol. Ejercicio Deporte* 2: 83–92.
- Senbanjo IO, Oshikoya KA (2010) Physical activity and body mass index of school children and adolescents in Abeokuta, Southwest Nigeria. *World Journal of Pediatrics* 6(Jun): 217–222.
- Springer JB, Lamborn SD, Pollard DM (2013) Maintaining physical activity overtime: the importance of basic psychological need satisfaction in developing the physically active self. *American Journal of Health Promotion* 27(5): 284–293.
- Taylor IM, Ntoumanis N, Standage M, Spray M (2010) Motivational predictors of physical education students' effort, exercise intentions, and leisure-time physical activity: a multilevel linear growth analysis. *Journal of Sport and Exercise Psychology* 32(1): 99–120.
- Teixeira DS, Silva MN, Palmeira, AL (2018) How does frustration make you feel? A motivational analysis in exercise context. *Motivation and Emotion* 42(Mar): 419–428.
- Ting S (2009) Impact of non-cognitive factors on first year academic performance and persistence of NCAA Division I student athletes. *Journal of Humanistic Counseling* 48(2): 215–228.
- Towne Jr SD, Ory MG, Smith ML, Peres SC, Pickens AW, Mehta RK, et al. (2017) Accessing physical activity among young adults attending a university: the role of sex, race/ethnicity, technology use, and sleep. *BMC Public Health* 17(Sep): 721.
- Ugwueze FC, Agbaje, OS (2022) Physical activity domains, levels, and health-related quality of life among Nigerian adolescents during the coronavirus disease 2019 pandemic. *SAGE Open Medicine* 10(Mar): 1–13.
- Ugwueze FC, Agbaje OS, Umoke PCI, Ozoemena EL (2021) Relationship between physical activity level and psychological well-being among male university students in South East, Nigeria: a cross-sectional study. *American Journal of Men's Health* 15(2): 1–17.

- Vagetti GC, Barbosa VC, Moreira NB, De Oliveira V, Mazzardo O, De Campos W (2014) Association between physical activity and quality of life in the elderly: a systematic review, 2000-2012. *Revista Brasileira de Psiquiatria* 36(1): 76–88.
- Vansteenkiste M, Ryan RM, Soenens B (2020) Basic psychological need theory: Advancements, critical themes and future directions. *Motivation and Emotion* 44(Jan): 1–31.
- Vlachopoulos SP, Michailidou S (2006) Development and initial validation of a measure of autonomy, competence and relatedness in exercise: the basic psychological needs in exercise scale. *Measurement in Physical Education and Exercise Science* 10(3): 179–201.
- Vlachopoulos SP, Ntoumanis N, Smith AL (2010) The basic psychological needs in exercise scale: translation and evidence for cross-cultural validity. *International Journal of Sport and Exercise Psychology* 8(4): 394–412.
- World Health Organisation – WHO (2010) *Global recommendations on physical activity for health*. WHO. Available at: http://apps.who.int/iris/bitstream/10665/44399/1/9789241599979_eng.pdf.
- World Health Organisation – WHO (2018) *Global coordination mechanism on the prevention and control of NCDs: NCD and Youth*. WHO. Available at: <http://www.who.int/global-coordination-mechanism/ncd-themes/ncd-and-youth/en/2018>.
- World Health Organisation – WHO (2020) *Facts sheets on daily physical activity*. WHO. Available at: <https://www.who.int/news-room/fact-sheets/detail/physical-activity>.