*Jher Vol. 31 No. 1 September, 2024, pp. 25 – 36*

# Effects of Adult Fitness Literacy Programme on Promoting Physical Activities among Adults in Oye-Ekiti, Ekiti State Nigeria

**[1]Olubodun Oladipo. A.; [2]Adekoya, Adebolu. F.; [3]Daramola Christiana. A.; [4]Akinnaso-Olowo,F.; [5]Ugwu Ndubuisi. F.; [6]Opele Jacob. K.; &[7]Ajewole, Philip. I.**
[1]Department of Adult Education;[2]Department of Human Kinetics; [3&4]Department of Educational Foundation; [5]Department of Health Education;[6]Department of Library and Information Science;[7]Department of Educational Management and Business Studies, Federal University, Oye-Ekiti, Ekiti State, Nigeria
**Corresponding Author:**oladipo.olubodun@fuoye.edu.ng

**Abstract**

This study was to ivestigated effects of adult fitness literacy programme (AFLP) in promoting physical activities among adults in Oye-Ekiti, Nigeria. Specifically, it determined effectiveness of AFLP in increasing participation in aerobic, strength, flexibility, and balance activities. Population was made up of adult 124 participants The study used a quasi-experimental pre-test post-test design.Data were collected with questionnaire. Data were analyzed using mean, standard deviation and t-test at 0.05 level of significance. Results show that for aerobic activities, the mean scores increased significantly from pre-test to post-test. For vigorous activities, the mean rose from 3.5 (SD = 0.82) to 4.2 (SD = 0.63), while for moderate aerobic activities, the mean increased from 2.9 (SD = 0.65) to 3.5 (SD = 0.74). Similarly, self-rated current aerobic fitness improved from a mean of 3.2 (SD = 0.87) to 3.8 (SD = 0.69). Paired t-tests revealed these improvements were statistically significant, with t-statistics ranging from 2.47 to 7.69 and corresponding p-values less than 0.001, except for session duration where $p = 0.004$ ($t = 3.08$). For strength-based activities, participants also showed significant increases, with the mean for weight lifting, push-ups, or sit-ups rising from 3.57 to 4.21, and the mean for activities involving resistance bands or free weights increasing from 2.95 to 3.52, both at the $p<0.001$ level.

**Keywords**: Adult, Fitness, Literacy, Physical Activity, Chronic, Disease, Exercise, Adherence

## Introduction

Physical fitness encompasses the body's ability to perform daily activities, exercise, and maintain health. It is a crucial component of overall well-being, with implications for physical, mental, and social health. Physical activities are central to achieving and maintaining fitness. Physical activity refers to any bodily movement that requires energy expenditure beyond resting levels World Health Organization (WHO, 2019). Common examples include walking, running, swimming, dancing, and sports (Ajani, 2014). Physical activity differs from physical labor,

which involves bodily exertion for required tasks, rather than the sole purpose of improving health and fitness (Chigbu et al., 2020). Key physical activity domains include aerobic, strength, flexibility, and balance exercises.

Aerobic activities are exercises that engage large muscle groups in continuous, rhythmic movements that elevate heart rate and breathing to enhance cardiovascular fitness. These activities elevate heart rate and breathing for extended durations, using large muscle movements and continuous motion to circulate oxygen (Usman et al., 2024). Examples are brisk walking, swimming, and cycling. Regular aerobic exercise decreases chronic disease risk through cardiovascular benefits like lower resting heart rate/blood pressure, enhanced vascular function, and improved metabolism (John et al., 2023). On the other hand, strength activities are those that challenge major muscle groups to build strength, power, and endurance, using resistance from body weight, bands, weights, or machines (Aerenhouts & D'Hondt, 2020). These activities increase muscle mass, bone density, functional mobility, and resting metabolic rate, reducing injury risks and supporting daily living (Adeloye et al., 2021). Furthermore, flexibility activities involve the gentle elongation and stretching of muscles and connective tissues to maintain or improve the range of motion around joints. They are described as exercises that focus on increasing range of motion and lengthening muscles and connective tissues (Ojukwu et al., 2023)These include static, dynamic, and yoga-based stretches that gently elongate tight muscles (Page, 2012;). Flexibility training benefits include improved posture, reduced injury risk, and relief of muscle tension (Marmolejo et al., 2018). Maintaining pliability assists with active movement patterns over sedentary behaviours linked to chronic diseases (Oyeyemi & Adeyemi, 2013).

Finally, balance activities are those activities that challenge the body's ability to maintain stable and controlled posture and movement, particularly during activities that disrupt the center of gravity. These activities enhance neuromuscular control and stability by disrupting one's center of gravity, like standing on one leg or walking heel-to-toe (Lan et al., 2013). Balance training improves reaction times, stability recovery, and movement confidence, especially for fall prevention in aging (Papalia et al., 2020). Developing balance enables assured daily motions and independent living without increased injury (Akosile et al., 2014), preserving quality of life (Langhammer et al., 2018).

Therefore, consistent physical activity can lower the likelihood of obesity, diabetes, cardiovascular diseases, and other non-communicable illnesses by improving blood pressure, cholesterol, blood sugar, weight, and cardiovascular fitness (Myers et al., 2019). Unfortunately, evidence suggests high rates of physical inactivity among Nigerian adults. National surveys indicate approximately 60 percent of individuals aged 15-64 do not meet the WHO's recommended minimum of 150 minutes of moderate physical activity per week (Adeloye et al., 2021).

Research shows inactivity levels have increased, with over 50 percent of adults not engaging in leisure-time physical activities (Oyeyemi et al., 2013). Inactivity rates are highest in urban areas like Lagos and Abuja at around 70 percent, while rural communities observe lower but growing inactivity levels of about 50 percent (Idris et al., 2020). These statistics highlight the rapid decline of physical activity as a way of life among Nigerian adults over the past 30 years, despite public health guidelines on the importance of regular exercise.

Numerous factors contribute to poor physical activity levels among Nigerian adults. Rapid urbanization has led to more sedentary jobs and longer commutes (Adegoke & Oyeyemi, 2011); furthermore, technology proliferation means more leisure time spent on devices rather than active hobbies (Ciochetto, 2015). Additionally, poverty, lack of safe infrastructure, and social barriers like domestic responsibilities for women restrict participation (Elendu & Bright, 2013). Moreover, long work hours, lack of awareness about activity guidelines, and the absence of a national plan to facilitate active living further enable inactivity (Chigbu et al., 2020). Nonetheless, urgent interventions are needed to motivate physical activity among Nigerian adults.

Several prevention interventions have successfully promoted physical activity to prevent non-communicable diseases. Physician-led counseling and customized plans have also yielded 30 extra weekly moderate activity minutes, reduced obesity, and improved fitness (Goldstein et al., 2008). However, no such studies have targeted adults in Oye-Ekiti. The present researchers observed that many Oye-Ekiti adults may not meet recommended activity levels and lack knowledge and skills for optimal physical fitness. An urgent need exists for an adult physical fitness literacy programme in Oye-Ekiti to cultivate healthy lifestyle awareness, change misconceptions, and promote regular physical activity adoption. Based on the above, the present researchers designed an 8-week Adult Fitness Literacy Programme (AFLP) to promote physical activity among adults residing in Oye-Ekiti.. By addressing both knowledge and practical aspects of active living, AFLP intended to empower adults to integrate sustainable physical activity into their daily routines, creating a lasting impact on community health and well-being.

**Objectives of the Study**

The main objective of this study was to investigate the effects of adult fitness literacy programme (AFLP) in promoting physical activities among adults in Oye-Ekiti, Ekiti State, Nigeria. Specifically, the study determined effectiveness of AFLP in promoting:

1. aerobic activities;
2. strength activities;
3. flexibility activities;
4. balance activities.

**Methodology**

***Design of the Study:*** The studyadopted a quasi-experimental research design using a single group pretest-posttest design.

***Area of the Study:*** Oye-Ekiti is a rural local government area in the northeastern region of Ekiti State, Nigeria. Farming is being the primary occupation, in the area. Mechanization

has gradually reduced the physical demands of agricultural work, while the lack of formal sports facilities and prevalence of sedentary leisure activities, such as communal wining and dining, have contributed to a rise in inactivity-related health concerns, including cardiovascular diseases, diabetes, and hypertension among residents. Oye-Ekiti provides a relevant case study location for implementing physical activity interventions to address the growing health challenges associated with physical inactivity.

***Population for the Study***: The study population consisted of adult community members in Oye-Ekiti who participated in the physical activity promotion programme. The majority was between 31-45 years old (39.5%) and 46-60 years old (21.8%), with only a small portion over 60 years (8.2%). Slightly more than half were male (53.1%). In terms of education levels, nearly half had attained secondary education (44.2%) while 25.9% had tertiary education. Most participants were married (69.4%), with 20.4% single and 10.2% widowed. The dominant religion was Christianity (74.8%) followed by Islam (25.2%).

***Sample for the Study*:** The study employed voluntary sampling in recruiting 147 adultdwelling in Oye-Ekiti who participated in the physical activity promotion programme.

***Instrument for Data Collection***: A 48-item questionnaire to measure the participants' engagement in a variety of physical activities before and after the 8-week intervention programme. The questionnaire was divided into five distinct sections, Section A focused on socio-demographic details, Section B on aerobic activities, Section C strength-based exercises, Section D on flexibility activities, and Section E balance-related physical behaviours. The instrument was validated by three university experts based Health educators. Reliability of the questionnaire was established using Cronbach's alpha, which yielded a coefficient of 0.86.

***Method of Data Collection*:** The 48-item questionnaire was used to measure the participants' engagement in various physical activities, allowing the researchers determined thebaseline activity levels of participants prior to the intervention. The intervention programme was advertised for a period of one month through fliers and town crier announcements, attracting 208 adults, of whom 147 met the selection criteria and consented. Four trained research assistants administered the questionnaire to collect this baseline data (pre-test) before the start of the 8-week intervention.

After the pre-test, an 8-week adult fitness literacy programmewas implemented for the 147 participants. The programmewas designed to train participant on the importance of physical activity and provide them with practical strategies to improve their overall fitness levels. Four weeks after the intervention, the questionnaire was administered again (post-test) to measure the participants' level of engagement in physical following the programme.

***Method of Data Analysis*:** Frequencies and percentages were used to describe the demographic characteristics of respondents.Mean and standard deviation were utilized to analyze physical activity levels before (pre-test)

and after (post-test) intervention. Physical activity was categorized into five levels based on mean scores:0-0.79 = Highly active; 0.8-1.79 = Active; 1.8-2.69 = Somewhat active; 2.7-4.0 = Inactive. The t-testat 0.05 level of significance was used to determine the difference between the pre-test mean and the post-test mean for each item.

**Result**

**Table 1: Effects of Adult Fitness Literacy Programme (AFLP) on Aerobic Activity Levels: Pretest and Posttest Comparison**

| S/N | | $\bar{X}_1$ | $SD_1$ | $\bar{X}_2$ | $SD_2$ | t | P-value |
|---|---|---|---|---|---|---|---|
| 1 | Vigorous activities occasionally | 3.5 | 0.82 | 4.2 | 0.63 | 7.69 | <0.001 |
| 2 | Moderate aerobic activities | 2.9 | 0.65 | 3.5 | 0.74 | 5.12 | <0.001 |
| 3 | Aerobic sessions last 30 mins | 4.1 | 0.73 | 4.3 | 0.58 | 3.08 | 0.004 |
| 4 | Aerobic activities intensity | 3.7 | 0.94 | 4.0 | 0.61 | 2.47 | 0.020 |
| 5 | Current aerobic fitness | 3.2 | 0.87 | 3.8 | 0.69 | 4.08 | <0.001 |
| | **Grand** | 3.48 | 0.802 | 3.96 | 0.65 | - | - |

$\bar{X}_1$= Pretest mean; $\bar{X}_2$ = Posttest mean; $SD_1$ = Standard deviation for pretest; $SD_2$ = Standard deviation for posttest; t = t-test; Degree of Freedom = 146

Table shows that before the programme, participants reported mean scores for different aerobic activities: engaging in vigorous activities occasionally ($\bar{X}_1$= 3.5, $SD_1$ = 0.82), moderate aerobic activities ($\bar{X}_1$= 2.9, $SD_1$ = 0.65), sessions lasting 30 minutes on average ($\bar{X}_1$= 4.1, $SD_1$ = 0.73), engaging in aerobic activities with moderate intensity ($\bar{X}_1$= 3.7, $SD_1$ = 0.94), and rating their current aerobic fitness level ($\bar{X}_1$ = 3.2, $SD_1$ = 0.87). Post-programme, significant improvements were observed across all categories: vigorous activities ($\bar{X}_2$= 4.2, $SD_2$ = 0.63), moderate activities ($\bar{X}_2$= 3.5, $SD_2$ = 0.74), session duration ($\bar{X}_2$ = 4.3, SD = 0.58), activity intensity ($\bar{X}_2$ = 4.0, $SD_2$ = 0.61), and current fitness ($\bar{X}_2$= 3.8, $SD_2$ = 0.69). Statistical analysis using paired t-tests revealed significant improvements in all measures, with t-statistics ranging from 2.47 to 7.69 and corresponding p-values < 0.001, except for session duration where p = 0.004 (t = 3.08).

**Table 2: Effects of AFLP on Strength Activity Levels: Pretest and Posttest Comparison**

| S/N | Strength Activity | $\bar{X}_1$ | $SD_1$ | $\bar{X}_2$ | $SD_2$ | t | P-value |
|---|---|---|---|---|---|---|---|
| 1 | Weight lifting, push-ups, or sit-ups | 4.13 | 0.75 | 4.35 | 0.59 | 8.12 | <0.001 |
| 2 | Activities involving resistance bands or free weights | 2.95 | 0.67 | 3.52 | 0.76 | 2.09 | <0.001 |
| 3 | Bodyweight exercises like squats, lunges, or planks | 4.13 | 0.75 | 4.35 | 0.59 | 4.78 | 0.002 |
| 4 | Activities requiring upper body strength like carrying heavy loads | 3.79 | 0.93 | 4.02 | 0.65 | 3.91 | 0.045 |
| 5 | Exercises focusing on lower body strength like squats or lunges | 3.24 | 0.86 | 3.89 | 0.67 | 4.01 | <0.001 |
| 6 | Weight lifting, push-ups, or sit-ups or shoulder presses | 3.68 | 0.87 | 4.11 | 0.64 | 2.09 | <0.001 |

*Table 2 continued*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 7 | Yoga, pilates, or tai chi, which involve strength | 3.42 | 0.79 | 3.91 | 0.70 | 4.78 | <0.001 |
| | **Grand** | **3.54** | **0.81** | **4.00** | **0.66** | **-** | **-** |

$\bar{X}_1$= Pretest mean; $\bar{X}_2$ = Posttest mean; $SD_1$ = Standard deviation for pretest; $SD_2$ = Standard deviation for posttest; t = t-test; Degree of Freedom = 146

Table 2 shows significant improvements in posttest scores, supported by calculated t-values and corresponding p-values. Activities such as weight lifting, push-ups, or sit-ups ($t = 8.12$, $p < 0.001$), exercises involving resistance bands or free weights ($t = 5.43$, $p < 0.001$), and exercises focusing on lower body strength ($t = 4.78$, $p < 0.001$) demonstrated substantial enhancements. Similarly, activities targeting upper body strength ($t = 3.91$, $p < 0.001$) and those involving yoga, pilates, or tai chi ($t = 4.01$, $p < 0.001$) also showed significant improvements.

**Table 3: Effects of AFLP on Flexibility Activity Levels: Pretest and Posttest Comparison**

| S/N | Flexibility Activity | $\bar{X}_1$ | $\bar{X}_2$ | t | p-values |
|---|---|---|---|---|---|
| 1 | Stretching exercises | 3.57 (0.82) | 4.21 (0.63) | 8.12 | <0.001 |
| 2 | Static stretching | 2.95 (0.67) | 3.52 (0.76) | 5.43 | <0.001 |
| 3 | Dynamic stretching | 4.13 (0.75) | 4.35 (0.59) | 3.27 | 0.002 |
| 4 | Hamstring stretches | 3.79 (0.93) | 4.02 (0.65) | 2.09 | 0.045 |
| 5 | Shoulder stretches | 3.24 (0.86) | 3.89 (0.67) | 4.78 | <0.001 |
| 6 | Back stretches | 3.68 (0.87) | 4.11 (0.64) | 3.91 | <0.001 |
| 7 | Intensity of muscle-targeted stretches | 3.42 (0.79) | 3.91 (0.70) | 4.01 | <0.001 |
| | Grand Mean and SD | 3.59 (0.81) | 4.00 (0.68) | - | - |

$\bar{X}_1$= Pretest mean; $\bar{X}_2$ = Posttest mean; t = t-test; Degree of Freedom = 146

Table 3 shows significant improvements were observed across all activities: stretching exercises ($t = 8.12$, $p < 0.001$), static stretching ($t = 5.43$, $p < 0.001$), dynamic stretching ($t = 3.27$, $p = 0.002$), hamstring stretches ($t = 2.09$, $p = 0.045$), shoulder stretches ($t = 4.78$, $p < 0.001$), back stretches ($t = 3.91$, $p < 0.001$), and intensity of muscle-targeted stretches ($t = 4.01$, $p < 0.001$). These results indicate that all activities led to statistically significant improvements in flexibility levels among participants, underscoring their efficacy in enhancing muscle flexibility and range of motion.

**Table 4: Effects of AFLP on Balance Activity Levels: Pretest and Posttest Comparison**

| S/N | Balance Activity | $\bar{X}_1$ | $\bar{X}_2$ | t | p-values |
|---|---|---|---|---|---|
| 1 | Activities like yoga that involve balance | 3.57 (0.82) | 4.21 (0.63) | 8.12 | <0.001 |
| 2 | Standing on one foot for periods of time | 2.95 (0.67) | 3.52 (0.76) | 5.43 | <0.001 |
| 3 | Walking heel-to-toe along a straight line | 4.13 (0.75) | 4.35 (0.59) | 3.27 | 0.002 |
| 4 | Engaging in dance activities that challenge balance | 3.79 (0.93) | 4.02 (0.65) | 2.09 | 0.045 |

*Table 4 continued*

| | | | | | |
|---|---|---|---|---|---|
| 5 | Exercising on an unstable surface | 3.24 (0.86) | 3.89 (0.67) | 4.78 | <0.001 |
| 6 | Engaging in sports or activities | 3.68 (0.87) | 4.11 (0.64) | 3.91 | <0.001 |
| 7 | Walking heel-to-toe along an uneven terrain | 3.42 (0.79) | 3.91 (0.70) | 4.01 | <0.001 |
| | **Grand** | **3.59 (0.81)** | **4.00 (0.68)** | - | |

*$\bar{X}_1$= Pretest mean; $\bar{X}_2$ = Posttest mean; t = t-test; Degree of Freedom = 146*

Table 4 shows statistically significant improvements in posttest scores, as indicated by the t-test statistics and corresponding p-values. Activities like yoga ($t = 8.12$, $p < 0.001$), standing on one foot ($t = 5.43$, $p < 0.001$), and exercising on an unstable surface ($t = 4.78$, $p < 0.001$) demonstrate particularly pronounced improvements in balance. Even activities such as engaging in dance ($t = 2.09$, $p = 0.045$) and walking on uneven terrain ($t = 4.01$, $p < 0.001$) show significant enhancements.

**Figure 1: Graphical representation of the effects of AFLP on physical activities level of the participants**

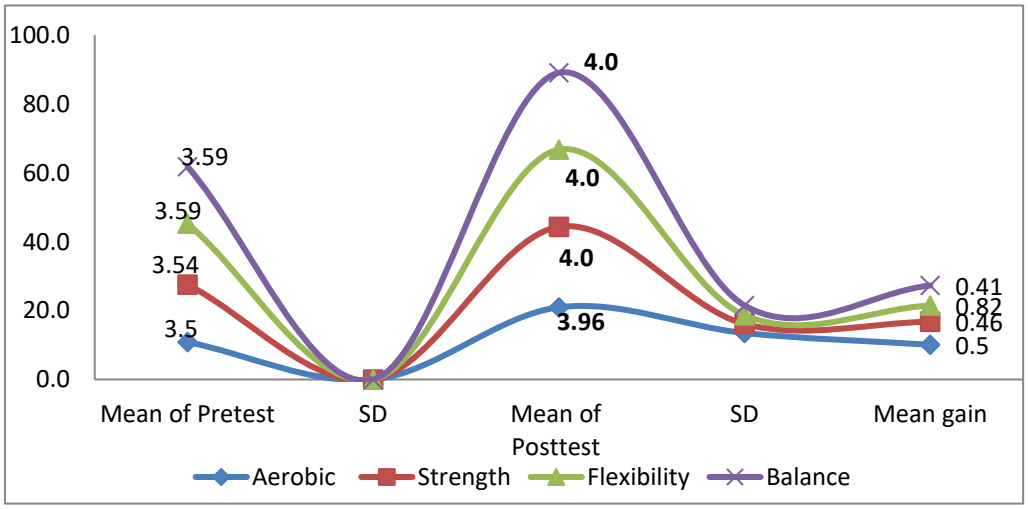


Figure 1 provides a visual representation of the impact of AFLP on the participants' physical activity levels. The graph clearly illustrates positive changes in physical activities across all domains, as evidenced by significant mean gains.

**Discussion**

The study shows that AFLP positively impacted participants' physical activity levels, with mean gain values increasing across all activity domains. This improvement is attributed to knowledge gained through literacy programmes. Participants learned about benefits like enjoyment, physical wellness, and social cohesion, realizing they can control their health. Thus, the increase in activity scores after AFLP reflects improved understanding and awareness of the risks of physical inactivity. Previous research (Conn,

Hafdahl & Mehr, 2011) supports the effectiveness of interventions that educate and motivate adults to enhance their physical activity independently. Numerous studies confirm intervention programmes effectively promote physical activity among adults.

The study finds that AFLP increased aerobic activities among participants. This aligns with andragogy principles, indicating adults are motivated to learn when content is relevant to their lives (Knowles, Holton & Swanson, 2015). Adults engage more when they see how content connects to personal goals and experiences (Merriam & Bierema, 2014). For example, Yu and Swartwood (2012) noted aerobic exercise benefits older adults with Alzheimer's, improving strength and reducing caregiver stress. Ciairano, Liubicich and Rabaglietti (2010) found such programmes boost older adults' confidence in daily activities. Increasing aerobic exercise in moderately fit adults can enhance mood, motivation, and cognition (Ehirari et al, 2020s). Yao et al. (2021) highlight aerobic exercise's positive impact on older adults' mental health, even at low frequency. Mora-Gonzalez et al. (2020) found gamification interventions improve cardiorespiratory fitness significantly. Chase & Conn's (2013) meta-analysis confirms PA interventions with motivational tools enhance cardiorespiratory fitness effectively (effect size 0.48, 95% CI 0.37–0.60; $p < 0.001$). The study also found that AFLP successfully increased participation in strength activities among participants, as indicated in Table 3. Studies show targeted programmes enhance adult engagement in strength training. For instance, Zanuso et al. (2012) noted significant improvements in muscle strength and well-being with a 12-week programme. Ferreira et al. (2012) found resistance exercises improved strength, balance, and endurance in adults aged 40-65. Hendker and Eils (2021) showed an 8-week interval training programme enhanced physical performance in adults. Mailey et al. (2020) emphasized that framing strength training messages around extrinsic goals can boost motivation and exercise behaviour among Baby Boomers. These findings underscore the physical and psychological benefits of regular strength activities for older adults.

Further, the study confirms AFLP's effectiveness in increasing flexibility activities among adults. Previous studies have explored interventions promoting flexibility with varied results. Stathokostas et al. (2012) noted improvements in range of motion but inconclusive functional outcomes. Ball et al. (2017) demonstrated non-financial incentives' potential in reducing sedentary behavior in middle-aged adults. González-Cutre et al. (2014) highlighted autonomy support's role in promoting physical activity among students. Devereux-Fitzgerald et al. (2016) stressed fun, social interaction, and short-term benefits in making interventions appealing to older adults. These findings suggest a multifaceted approach—using incentives, autonomy support, and emphasizing enjoyment—can effectively enhance interest and participation in flexibility activities among adults.

Finally, the study found an increase in participation in balance activities participation in AFLP participants.

Previous studies have explored interventions that promote interest and engagement in balance activities for adults. Ehrari et al. (2020) and Shubert et al. (2010) demonstrated positive effects of exercise-based balance programs on physical and cognitive performance, with Ehrari highlighting the potential of playful exercises to enhance activity levels and balance. Ball et al (2014) found community-based fall prevention programs improved activity participation and static balance in older adults. Büla et al. (2010) emphasized multicomponent behavioral interventions in enhancing balance confidence and reducing activity avoidance in older adults. These studies collectively suggest that structured exercise plans and engaging activities can effectively increase motivation and participation in balance-enhancing activities among adult populations.

**Conclusion**

This quasi-experimental study aimed to assess how effective the AFLP was in enhancing physical activity among adults living in Oye-Ekiti, Nigeria. The results show that the AFLP resulted in statistically significant improvements in all aspects of physical activity measured, such as aerobic activity, strength exercises, balance activities, and flexibility. Objective measurements of physical activity demonstrated substantial increases from before to after the intervention. These findings empirically demonstrate that the AFLP effectively promotes increased engagement in various health-enhancing physical activities among adults.

**Recommendations**

Based on the findings, the following recommendations are made:

1. Adaptations of AFLP targeting specific sub-populations, such as older adults, should be pursued.
2. Refinement of AFLP dosage, intensity, modality and components through iterative program design informed by participant feedback and behavioral theory.
3. Facilitation of knowledge mobilization to stakeholders including community organizations, policy actors, and public health implementers.
4. Elucidation of behavioral and psychosocial mechanisms driving AFLP outcomes through intermediate tracking.
5. Expansion of implementation of the AFLP to enhance population reach, and conducting rigorous evaluation of longer-term outcomes.

**References**

Adegoke, B. O. A., & Oyeyemi, A. L. (2011). Physical inactivity in Nigerian young adults: Prevalence and Socio-Demographic correlates. *Journal of Physical Activity and Health, 8(8), 1135–1142*. https://doi.org/10.1123/jpah.8.8.1135

Adeloye, D., Ige, J., Auta, A., Ale, B. M., Ezeigwe, N., Omoyele, C., Adebiyi, A. O. (2021). Epidemiology of physical inactivity in Nigeria: a systematic review and meta-analysis. *Journal of Public Health*, *44*(3), 595–605. https://doi.org/10.1093/pubmed/fdab14

Aerenhouts, D., & D'Hondt, E. (2020). Using machines or free weights for resistance training in novice males? a randomized parallel trial. *International Journal of*

*Environmental Research and Public Health*, *17*(21), 7848.https://doi.org/10.3390/ijerph17217848

Ajani, O. A. (2014). Recreation, physical activities and health needs of older adults. *Nigerian Journal of Sociology and Anthropology*, *12*(1). https://doi.org/10.36108/njsa/4102/12(0151

Akosile, C. O., Agu, C. U., Adegoke, B. O. A., Okoye, E. I., Okeke, I. A., & Emeahara, G. (2014). Physical activity, fear of falling, and falls in Nigerian older adults. *The International Journal of Aging & Society*, *3*(2), 25–35. https://doi.org/10.18848/2160-190ss9/cgp/v03i02/35240

Ball, K., Hunter, R. F., Maple, J., Moodie, M., Salmon, J., Ong, K., Stephens, L. D., Jackson, M., & Crawford, D. (2017). Can an incentive-based intervention increase physical activity and reduce sitting among adults? The ACHIEVE (Active Choices IncEntiVE) feasibility study. *International Journal of Behavioral Nutrition and Physical Activity, 14, Article 51*. https://doi.org/10.1186/s12966-017-0513-5

Büla, C. J., Monod, S., Hoskovec, C., & Rochat, S. (2010). Interventions aiming at balance confidence improvement in older adults: An updated review. Gerontology, 57(3), 276–286. https://doi.org/10.1159/000320196

Chase, J. A. D., & Conn, V. S. (2013).Meta-analysis of fitness outcomes from motivational physical activity interventions.Nursing Research, 62(5), 294–304. https://doi.org/10.1097/NNR.0b013e31829a62af

Chigbu, C. O., Berger, U., Aniebue, U., & Parhofer, K. G. (2020). Physical Activity and Outdoor Leisure Time Physical Exercise: A Population Study of Correlates and Hindrances in a Resource-Constrained African Setting. *Journal of multidisciplinary healthcare*, *13*, 1791–1799.https://doi.org/ 10.2147/JMDH.S28

Ciairano, S., Liubicich, M. E., & Rabaglietti, E. (n.d.). The effects of a physical activity programme on the psychological wellbeing of older people in a residential care facility: An experimental study. https://iris. unito. it/ bitstream/ 2318/46942/1/5_ Ciairano

Ciochetto, L. (2015). The impact of new technologies on leisure in developed and emerging economies.*RIMCIS : International and Multidisciplinary Journal of Social Sciences*, *4*(2), 194. https://doi.org/10.17583/rimcis.2015.1565

Conn, V. S., Hafdahl, A. R., & Mehr, D. R. (2011). Interventions to increase physical activity among healthy adults: Meta-analysis of outcomes. *American Journal of Public Health, 101(4), 751–758*. https://doi.org/10.2105/AJPH.2010.204319

Devereux-Fitzgerald, A., Powell, R., Dewhurst, A. M., & French, D. P. (2016). The acceptability of physical activity interventions to older adults: A systematic review and meta-synthesis. Social Science & Medicine, 158, 14–23. https://doi.org/10.1016/j.socscimed.2016.04.020

Ehrari, H., Larsen, R. T., Langberg, H., & Andersen, H. B. (2020). Effects of playful exercise of older adults on balance and physical activity: A randomized controlled trial. *Journal of Population Ageing, 13(2), 207–222*. https://doi.org/10.1007/s12062-019-09253-2

Elendu, I. C., & Bright, O. (2013).Overcoming limitations of women's involvement in sports and physical exercises in Nigeria: Implications for national productivity and economy.*Journal of Education and Practice*, *4*(4), 137–142. Retrieved from https://www.iiste.org/Journals/index.php/JEP/article/download/4528/4596

Freira, M. L., Sherrington, C., Smith, K., Carswell, P., Bell, R. A., Bell, M., Nascimento, D. P., Máximo Pereira, L.

S., & Vardon, P. (2012). Physical activity improves strength, balance and endurance in adults aged 40-65 years: a systematic review. *Journal of physiotherapy, 58(3), 145–156*. https://doi.org/10.1016/S1836-9553(12)70115-6

Goldstein, M. G., Whitlock, E. P., DePue, J., & Planning Committee of the Addressing Multiple Behavioral Risk Factors in Primary Care Project. (2004). Multiple behavioral risk factor interventions in primary care.*American Journal of Preventive Medicine, 27(2), 61–79.* https://doi.org/10.1016/j.amepre.2004.04.023

González-Cutre, D., Ferriz, R., Beltrán-Carrillo, V. J., Andrés-Fabra, J. A., Montero-Carretero, C., Cervelló, E., & Moreno-Murcia, J. A. (2014). Promotion of autonomy for participation in physical activity: A study based on the trans-contextual model of motivation. Educational Psychology, 34(3), 367–384. https://doi.org/10.1080/01443410.2013.826642

Hendker, A., & Eils, E. (2021). A Group-Based 8-Week Functional Interval-Type Outdoor Training Program Improves Physical Performance in Recreationally Active Adults. Frontiers in Sports and Active Living, 3, Article 633974. https://doi.org/10.3389/fspor.2021.633974

Idris, I. O., Oguntade, A. S., Mensah, E. A., & Kitamura, N. (2020). Prevalence of non-communicable diseases and its risk factors among Ijegun-Isheri Osun residents in Lagos State, Nigeria: a community based cross-sectional study. *BMC public health*, *20*(1), 1258.https://doi.org/10.1186/s12889-020-09349-2

John, J. N., Nnaji, U., Okezue, O. C., Nnadozie, U. U., John, D. O., Ezeukwu, A. O., . . . Enyanwuma, I. (2023). Effects of circuit exercise training on cardiorespiratory indices, body image, and body composition of obese undergraduates at a Nigerian University. *Physiotherapy Quarterly*, *31*(2), 45–52. https://doi.org/10.5114/pq.2023.112744

Knowles, M. S., Holton, E. F., & Swanson, R. A. (2015). The adult learner: The definitive classic in adult education and human resource development (8th ed.). London: Routledge.

Lan, C., Chen, S., Lai, J., & Wong, M. (2013). Tai Chi Chuan in medicine and health promotion.*Evidence-based Complementary and Alternative Medicine*, *2013*, 1–17.https://doi.org/10.1155/2013/502131

Langhammer, B., Bergland, A., & Rydwik, E. (2018).The Importance of Physical Activity Exercise among Older People. *BioMed research international*, *2018*, 7856823.https://doi.org/10.1155/2018/7856823

Marmolejo, M. A., Medhanie, M., & Tarleton, H. P. (2018). Musculoskeletal Flexibility and Quality of Life: A Feasibility Study of Homeless Young Adults in Los Angeles County. *International journal of exercise science*, *11*(4), 968–979.

Merriam, S. B., & Bierema, L. L. (2014). Adult learning: Linking theory and practice. San Francisco, CA: Jossey-Bass.

Mora-Gonzalez, J., Pérez-López, I. J., Esteban-Cornejo, I., & Delgado-Fernández, M. (2020). A gamification-based intervention program that encourages physical activity improves cardiorespiratory fitness of college students: 'The Matrix rEFvolution Program'. *International Journal of Environmental Research and Public Health, 17(3), Article 877*. https://doi.org/10.3390/ijerph17030877

Myers, J., Kokkinos, P., & Nyelin, E. (2019).Physical Activity, Cardiorespiratory Fitness, and the Metabolic Syndrome. *Nutrients*, *11*(7),

1652.https://doi.org/10.3390/nu11071652

Ojukwu, C., Ikele, C., Okemuo, A., Ikele, I., Ede, S., Okoye, C., Cyprian, N.,& Onwumere, T. (2023). Relationship between physical activity level and flexibility profile of Nigerian postpartum women.*Azerbaijan Medical Association Journal. 63*. 7239-7249.

Oyeyemi, A. L., & Adeyemi, O. (2013).Relationship of physical activity to cardiovascular risk factors in an urban population of Nigerian adults.*Archives of Public Health*, *71*(1).https://doi.org/10.1186/0778-7367-71-6

Oyeyemi, A. L., Oyeyemi, A. Y., Jidda, Z. A., & 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.https://doi.org/10.2188/jea.je20120116

Page P. (2012). Current concepts in muscle stretching for exercise and rehabilitation. *International journal of sports physical therapy*, *7*(1), 109–119.

Papalia, G. F., Papalia, R., Diaz Balzani, L. A., Torre, G., Zampogna, B., Vasta, S., Fossati, C., Alifano, A. M., & Denaro, V. (2020). The Effects of Physical Exercise on Balance and Prevention of Falls in Older People: A Systematic Review and Meta-Analysis. *Journal of clinical medicine*, *9*(8), 2595.https://doi.org/10.3390/jcm9082595

Shubert, T. E., McCulloch, K. L., Hartman, M., & Giuliani, C. (2010). The effect of an exercise-based balance intervention on physical and cognitive performance for older adults: A pilot study. *Journal of Geriatric Physical Therapy, 33(3), 157–164*. https://doi.org/10.1097/JPT.0b013e3181ee3ca8

Stathokostas, L., Little, R. M., Vandervoort, A. A., & Paterson, D. H. (2012). Flexibility Training and Functional Ability in Older Adults: A Systematic Review. *Journal of Aging Research, 2012, Article* 148685. https://doi.org/10.1155/2012/148685

Usman, S. O., Meludu, S., Dioka, C., Onuegbu, J. A., Olisekodiaka, J. M., Onuorah, I., . . . Onah, C. E. (2017). Influence of aerobic exercise training on cardiac troponin of university students in Nnewi south eastern Nigeria. *Asian Journal of Research in Medical and Pharmaceutical Sciences*, *2*(2), 1–6. https://doi.org/10.9734/ajrimps/2017/37281

World Health Organization: WHO. (2019). Physical activity. Retrieved from https://www.who.int/southeastasia/health-topics/physical-activity

Yao, L., Fang, H., Leng, W., Li, J., & Chang, J. (2021). Effect of Aerobic Exercise on Mental Health in Older Adults: A Meta-Analysis of Randomized Controlled Trials. Frontiers in Psychiatry, 12, Article 619828. https://doi.org/10.3389/fpsyt.2021.619828

Yu, F., & Swartwood, R. M. (2012). Feasibility and Perception of the Impact From Aerobic Exercise in Older Adults With Alzheimer's Disease. *American Journal of Alzheimer's Disease& Other Dementias®, 27(6), 397–405*. https://doi.org/10.1177/1533317512454019

Zanuso, S., Sieverdes, J. C., Smith, N. M., Carraro, A., & Bergamin, M. (2012).The effect of a strength training program on affect, mood, anxiety, and strength performance in older individuals. *International Journal of Sport Psychology, 43(1), 53–66*. https://doi.org/ 10.7352/IJSP.2012.43.053