International Journal of Kinesiology & Sports Science
ISSN: 2202-946X
www.ijkss.aiac.org.au

Inclusive Recreational Sport for Visually Impaired and Sighted School Children Using Floormatics

Franz U. Atare[1]*, Abdulsalam Abdullah[2], Funke A. Olarinoye[3] & Tajudeen O. Ibraheem[4]

[1]*Department of Human Kinetics and Health Education, University of Uyo, Uyo. Akwa Ibom State- Nigeria*

[2]*Department of Physical and Health Education, University of Maiduguri, Maiduguri. Borno State- Nigeria*

[3]*Department of Human Kinetics & Health Education, Federal University, Dutsin Ma. Katsina State- Nigeria*

[4]*Department of Human Kinetics Education, University of Ilorin, Ilorin. Kwara State- Nigeria*

Corresponding Author: Franz U. Atare, E-mail: franzatare@uniuyo.edu.ng

ARTICLE INFO

Article history
Received: February 25, 2024
Accepted: April 22, 2024
Published: April 30, 2024
Volume: 12 Issue: 2

Conflicts of interest: None.
Funding: This research work is part of the research work "Promoting inclusive recreational sport behaviour in Nigeria using Floormatics" sponsored by Tertiary Institutions Trust Fund. TETF/ES/DR&D-CE/NRF/2020/HSS/43/01

ABSTRACT

Background: Globally, no sport provides a competitive setting for both the sighted and visually impaired, with either having an equal chance of winning. Floormatics is an innovative game designed to give a fair and inclusive play situation for the sighted and visually impaired with the aid of the blindfold. **Objective:** This study focused on utilising floormatics (play de blind) to promote inclusive recreational sports among visually impaired and sighted school children in Northern Nigeria on acceptability, inclusiveness, recreation behaviour, level of satisfaction, willingness to participate, and ability to compete in the game. **Method:** The cohort study design was used adopting a posttest-only experimental research method and a multistage sampling technique in selecting 180 volunteered participants comprising 90 visually impaired and 90 sighted from six schools in four states at the three geo-political zones that are part of the 19 states that comprised northern Nigeria. After 10-12 weeks of training and competition, data were collected with a modified theory of planned behaviour questionnaire (TBQ). Data were analysed using simple regression at.05 alpha levels. **Result:** The findings showed that 98% of the participants were delighted and willing to sustain participation [P<.05], and engaged in competition with their counterparts irrespective of their visual status [P<.05]. Also, there was no significant difference in the level of satisfaction [P>.05] or competition involvement [P>.05] among the sighted and visually impaired. **Conclusion:** The study has shown that floormatics as a game is capable of changing the inclusive recreational behaviour of the visually impaired with the sighted. Consequently, it was recommended that floormatics should be introduced to all-inclusive schools as an extracurricular sport, and adopt floormatics as a National Sport to promote healthy competition among the sighted and visually impaired.

Key words: Inclusive Sport, Recreational Activities, Visually Impaired, Sighted

INTRODUCTION

It is widely recognised that regular physical activities in the form of recreation, sports or play bring many health benefits, they revitalise a person's energy, drive and outlook about life thus equipping the individual for a more fruitful and meaningful life. It contributes immensely to the growth and development of the participant. No wonder the World Health Organization (2010) reported that physical inactivity ranked as the fourth leading cause of death globally. Delimiting the scope of WHO, Haegele and Poretta (2013) observed that visually impaired individuals tend to engage less in physical activities than their sighted peers and that they are at increased risk of low fitness and other health problems. Highly competitive recreation activities tend to shape the attitude and conduct of the participants as they promote honesty, bravery, the willingness to prioritize the group's wellbeing over personal gain, and strong teamwork skills. During periods of insecurity, depression and unusual strain individuals need activities that provide satisfaction and a sense of accomplishment more than ever.

Inclusion means accepting everyone regardless of their differences, in other words, "it is the practice or policy of providing equal access to opportunities and resources for people who might otherwise be excluded or marginalized due to physical or intellectual disabilities" (Kiuppis, 2018). It's about valuing individuals for their unique qualities, and recognizing that despite our differences, we are united as one. Inclusion enables individuals to appreciate each other's differences while acknowledging that everyone has a valuable contribution to make toward a better society. Most times people living with visual impairment are not appreciated or

Published by Australian International Academic Centre PTY.LTD.

http://dx.doi.org/10.7575/aiac.ijkss.v.12n.2p.59

counted as worthy of providing any good to society. They suffer gross neglect and deprivation even in play activities (Ruin *et al*, 2023). Inclusion in recreation is more than allowing children with or without disabilities to participate in the same activity. For inclusive recreational sports to be effective and successful, inclusion must be a value shared by all parties involved (Stumbo *et al*, 2011).

The sense of sight is of fundamental importance to any sporting and recreation activity. Visual impairment as used in this study is an inclusive describing any form of vision impairment, whether it involves complete blindness or partial sight that negatively impacts a child's education and athletic performance. Visual impairment and sensory defects lead to challenges in physical movement and raise safety concerns during physical exercises (Chen & Lin. 2011). As a result, individuals with visual impairment exhibit problems with dynamic and static balance, poor motor coordination, and reduced mobility. Visually impaired children have great difficulty in being physically active due to a lack of activities, they often face isolation and socializing opportunities even in the field of play and recreation when compared with their sighted counterparts (Malwina *et al*, 2015). In response to this need for improvement in the recreational experiences of these children, a game called floormatics was developed.

The word floormatics is coined from the English word *floor* and the Latin word *matics*. The term floor simply means an even flat surface, while matics are activities that require a variety of movements that are performed on shapes. So floormatics as used here refer to different blindfolded movement patterns performed on shapes on a flat surface for recreation and sports (Atare, 2017). The philosophy of this game is borne out of the need to create a sporting atmosphere for the sighted and visually impaired to compete in the same activity at the same time, helping alleviate some social issues previously experienced by those living in blind conditions. This game was designed and developed by Franz Atare in 2016 (see Figure 1)

This study aimed at utilizing floormatics as a recreational sport to promote inclusivity by providing accessibility, equal opportunity, shared values of satisfaction, collaboration and teamwork through constant practice for 10-12 weeks among the sighted and visually impaired school children as skill learnt at this early stage of life could have lifelong implications. Specifically, to examine the acceptability and utilization of floormatics as a recreational activity for the promotion of physical activity and competitiveness. Thus, it determined the level of contribution of floormatics to the promotion of inclusive sports, recreational sports behaviour and competitiveness. It also investigated if there will be a significant difference in the game's acceptance, level of satisfaction and ability to compete inclusively among the sighted and visually impaired.

This study is rooted in the Theory of Planned Behaviour (TPB) developed by Icek Ajzen in 1988. The TPB posits that behaviour can be predicted by behavioural intention and perceived behavioural control. Behavioural intentions, in turn, are influenced by one's attitude towards the behaviour, subjective norms, and perceived behavioural control.

Figure 1. Floormatics game

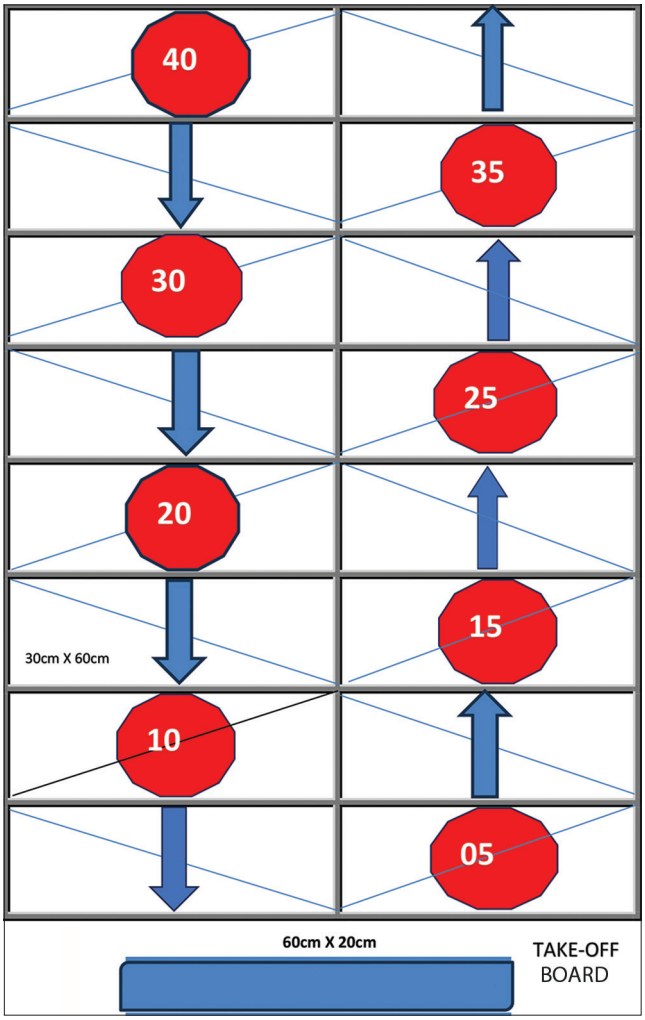

Figure 1 is an example of a floor mat used in the game of floormatics created by the principal researcher. The game has three levels of difficulty starting from the diagonal movement on the RED circles as stage one. Stage two is the horizontal movement from the take-off board and back, while the Third stage is moving on the small triangles in vertical positions. For this research, the result is based on stage one only.

Theory of planned behaviour postulates that the likelihood of an individual engaging in health behaviour is correlated with the strength of their "intention" to carry out a behaviour at a specific time and location. According to Ajzen (2011), the theory is designed to predict human behaviour. TPB is a persuasive theory that has been widely adopted to investigate various forms of behaviour including recreational and sporting activities. Researchers have adopted this theory to develop effective interventions, Stolte, *et al* (2016) stated that it is important to know which behaviour determinants need to be targeted, hence it was used for expected physical activity behavioural outcomes among older adults. Cunningham and Kwon (2003) used the variables of this theory on intervention to attend a sports event, Mok and Lee (2013) adopted this theory in predicting the physical activity of adolescents in Hong Kong while Chuan, *et al* (2014) used TPB to predict recreation and sports activities participation of students in Malaysia. This theory is apt for this study as it seeks to

predict the recreational sports behaviour of the sighted and visually impaired on the use of floormatics by asking if they intend to continue using floormatics as a regular recreational sports activity during their leisure hours.

For an adult visually impaired individual to enjoy recreation and sports, they must have started very early in life, otherwise, once an opinion is formed it becomes difficult to change. Research has shown that it is difficult to change someone's beliefs and expectations after they reach the age of 13-14 (Beal *et al,* 2016). Thus, if we want visually impaired children to see themselves as capable of participating in active pursuits like sports and recreation in adulthood, attention must be provided for them to have great experiences in their developmental stage. They must learn to appreciate that recreational activities are satisfying and bring fun to those who voluntarily participate. This is one of the justifications for including primary schools in this study involving the use of floormatics in promoting inclusive recreational sports behaviour because when you catch them young and they internalize inclusiveness, they will grow with it.

This becomes more important for promoting social inclusion skills (Duhaime *et al*, 2004). Lundberg, *et al* (2011) examined the significance and impact of participating in adaptive sports and recreation for individuals with disabilities. Results indicated that the participants felt stigmatized and stereotyped before participation, after participating in the adaptive sports and recreation programme, they gained opportunities to build social networks, experience freedom and success, and positively compared with those without disabilities and feel a sense of normalcy. That sense of normalcy and social networking are some of the objectives this study seeks to achieve by combining the visually impaired and the sighted to be part of this study at the same time.

The individual tends to stick with activities that give them ultimate satisfaction. In the opinion of Allender, *et al* (2006) "participation is motivated by the enjoyment and the development and maintenance of social support networks". Inclusive recreation programmes offer opportunities for individuals to socialize and participate together in non-threatening environments and activities. It takes place when individuals of all abilities participate in a recreational activity together in an attempt to decrease barriers to leisure by utilizing adaptation and programming accommodation. The benefits of inclusive recreation are not limited to individuals with disabilities. Individuals without disabilities benefit from inclusive recreation as well. To confirm this assertion, Ebesugawa, *et al* (2010) investigated the effects of exceptional karate (E-Karate) in an inclusive community sports programme on children's social-emotional development, motor development and attention skills. The findings are supportive of using inclusive recreation sports programmes for the development of children with or without special needs. In brief, the researchers share the sentiments felt by Kleinert, *et al* (2007) that recreation, leisure and extra-curricular involvement are essential for developing friendships, increasing the likelihood of community integration and post-school success and improving the overall quality of life of individuals.

From the available literature, little is mentioned on any sporting or competitive recreational activity in that both the visually impaired and the sighted can compete against one another with equal chances of winning. The aim of this study, therefore, was to promote inclusive recreational sport using the game of floormatics among visually impaired and sighted school children in the northern part of Nigeria.

METHODS

Participants

The sample of the study was 180 (M=93, F=87; Sighted =90, Blind = 60, Low Vision = 30) voluntary participants selected from three primary and three secondary schools in the Northern part of Nigeria. Multi-stage sampling technique was used in selecting 30 participants from each school. According to Creswell (2013), irrespective of the population, a reasonable sample size may range from 3-25 participants for a phenomenological study. However, due to the uniqueness and the need to popularize the game, the researchers approximated 30 participants per school. In Stage One, simple random sampling was used in selecting one state from each of the geopolitical zones, making a total of three states out of the 19 states. Stage two, deliberate sampling was used to select two special schools that have a sizeable number of visually impaired students from each of the states. In stage three 30 participants were selected from each school through non purposive convenient sampling technique. Participants were selected from the pool of volunteers from primary (4 & 5) and secondary (Junior School 1 & 2; Senior School 1 & 2) schools. This technique enabled the researchers to select voluntary participants with visual impairment from the study locations. A sample of 30 was selected from each school. Two schools were selected from each zone making a total of 60 per zone making a total of 180 volunteers participating in the research. Sighted participants who volunteered but possess other forms of disability other than visual impairment and children in terminal classes (Junior School 3 and Senior School 3) were excluded from the research as they would have graduated before the end of the study, this is to prevent participants' mortality.

The entire research work was approved by the Institutional Ethical Committee. University of Uyo Institute for Biomedical Research and Innovation ((IBMRI) on 21/OCT/2020. The details of the study were explained and each voluntary participant or their parents in the case of those below 18 years were made to sign a consent form. Participants can withdraw from the study whenever they feel like doing so.

Study Design

The study adopted a Cohort research design as it involves two groups of school children the sighted and the visually impaired. Both groups were trained simultaneously for 10 to 12 weeks. Post-test only Phenomenological research method was used for the study. This is an approach to quantitative research that focuses on the commonality of a live experience within a particular group (Creswell, 2013). The primary

aim of this research is to uncover reality through individual's narratives about their experiences and emotions, thereby creating a detailed description of the phenomenon. (Neubauer, *et al*, 2019). Through this process, the researchers may construct the universal meaning of the events associated with floormatics, situations where both sighted and visually impaired compete in the same activity share their experiences and arrive at a more profound understanding of floormatics. This design enabled the researchers to identify interesting live experiences from participants especially those that are living with visual impairment.

Procedure for Materials Used

The main instrument for data collection was the modified seven-point Likert-type TPB questionnaire (Ajzen, 2013). The questionnaire (print and braille) is divided into two sections. Section A contains instructions and examples of how to complete the questions and some demographic information such as age, class, gender, and school. Section B contains 30 questions that cover all the variables to be measured such as acceptability, satisfaction and competitive ability.

The instruments were validated by three experts at the University of Ibadan, Ibadan, Oyo State, and Nnamdi Azikiwe University, Awka. Anambra State, and Bayero University, Kano, Kano State for logical and content validity. The braille version of the instrument was produced at the Federal College of Education (Special) in Oyo State. The split-half method was used to establish reliability in Edo State using 20 inclusive samples not part of the sample for the study. The data obtained were subjected to internal consistency using the Kuder-Richardson 21 formula (KR-21) which yielded a score of 0.88 (Froster, 2021).

Measurement

Floormatics is an activity performed on a flat surface. The surface was a flex carpeted floor measuring 1.26m in width and 2.58m in length excluding the distance from the take-off board which is 50cm. The take-off board is 60cm by 20cm. (Atare, 2017), Participants were trained on how to walk from the starting take-off board to the red marked spots which are scored 05-40 [see Figure 1] with their eyes blindfolded to ensure that everyone has an equal level of impairment during the competition (Mann & Ravensbergen, 2018). It takes a maximum of 2 minutes irrespective of their visual status to complete the first attempt. In the process of moving diagonally from one red spot to another, no part of the foot should come out of the circle, once any part of the leg comes out of the circle, the participant is out and set for another trial, and the last correct placement is recorded as the score. Six attempts are made every practice day which is done three times per week after closing hours for 10-12 weeks on the game to master leg movement and gain balance and agility, a mini competition where prizes were won was organized, and the individual with the highest accumulated scores after six trials on the day of competition is declared the winner. The questionnaire was administered by the researchers/research assistants/site caregivers at the various study locations.

Statistical Analysis

In this research, the demographic characteristics of the participants such as age, visual status and gender were analyzed with cross-tabulated frequency counts and percentages. The extent of correlation was determined by regression analysis. On whether there is statistical significance of the null hypotheses stated, One-way ANOVA was used. When the calculated Probability value is greater than a.05 level of significance, the null hypotheses were rejected or otherwise retained when lower values were obtained (Kim, 2017). IBM Statistical Package for Social Science Version 23 was used to analyze the data.

RESULTS

Data in Table 1 showed the cross-tabulated frequency counts of visual status on gender. The result showed that 93 (51.6%) of the participants are male, of which 49 are visually impaired, while 87 (48.4%) are female, of which 41 are also visually impaired. The total number of visually impaired from the six secondary schools in Northern Nigeria that were selected for study was 90 visually impaired and 90 sighted.

Data in Table 2 showed the cross-tabulation of frequency counts of visual status on the age range of participants. The result showed that 23(12.8%) were within the age range of 8-10 years, 46(25.6%) were within the age range of 11-13 years, 57(31.7%) were within the age range of 14-16 years, 53 (29.4%) were within the age range of 17-19 years and one participant was above 20 years. This distribution buttresses the fact that floormatics can be performed by young as well as adults.

Research Question 1: To what extent do floormatics promote inclusive sports participation?

The result presented in Table 3 showed a positive correlational coefficient of.490 between floormatics and inclusive sports participation. The table further showed the coefficient of determination (R^2) value as.240 which implies that 24% of the floormatics game contributed to the observed inclusive sports participation of the visually impaired and sighted students who participated in the game in Northern Nigeria. The Analysis of variance on the model yielded an $F_{(8,171)} = 8.752$ which is significant at.000 alpha levels in-

Table 1. Distribution of participants by Visual Status and Gender. (N=180)

Visual Status	Male	Female	Total	Percentage
Sighted	44 (24.4%)	46 (25.6%)	90	50%
Blind	32 (17.8%)	28 (15.6%)	60	33.3%
Low Vision	17 (9.4%)	13 (17.2%)	30	16.6%
Total	93 (51.6%)	87 (48.4%)	180	100%

When the visually impaired are added together we have a balanced distribution between the sighted and the visually impaired

Table 2. Distribution of participants by Visual Status and Age range

Visual Status	8-10	11-13	14-16	17-19	20+
Sighted	01	21	38	30	0
Blind	16	14	10	20	0
Low Vision	06	11	09	03	01
Total	23 (12.8%)	46 (25.6%)	57 (31.7%)	53 (29.4%)	1 (0.5%)

The youngest participant in the study was 8 years, while the oldest was 28 years

Table 3. Regression analysis of floormatics game and inclusive sport participation

Variables	Means	STD	R	R^2	AR^2	%Contribution
Floormatics	3.2722	2.54091	0.490	0.240	0.205	24%
Participate	2.3333	1.66126				
Attitude	4.6000	2.33889				
Free time	4.4278	2.20469				
Competing	3.2556	2.23262				
Care	4.7833	2.28004				
Parents	4.6389	2.27388				
Friendship	4.5722	2.37078				
Classmate	4.2000	2.28035				
MODEL	**SS**	**DF**	**MS**	**F**	**SIG.**	
Regression	277.429	8	34.378	8.752	0.000	
Residual	878.241	171	5.136			
Total	1155.661	179				

STD represent Standard deviation, R stands for correlation coefficient, R^2 mean the coefficient of determination, while AR^2 represents the Adjusted coefficient of determination. SS represents the sum of squares, DF stands for Degree of Freedom, MS stands for the Mean of squares and the F-Ratio is used to determine the significance of the R^2.

dicating that floormatics is capable of promoting inclusive sport among participants.

Research Question 2: To what extent do floormatics promote the recreational sports behaviour of the participants?

The result presented in Table 4 revealed a weak positive correlational coefficient value of.267. The table further showed the coefficient determination(R^2) value of.071 which implies that floormatics contributed only 7% to the observed recreational sport behaviour of the participants irrespective of their visual status. Analysis of the variance of the model yielded an F(5, 174)=2.667 significant at .024 alpha levels meaning that though weak, floormatics is capable of changing the recreational sports behaviour of the participants.

Research Question 3: To what extent do floormatics promote competitive ability among the participants?

The regression analysis presented in Table 5 revealed a positive correlational coefficient value of.419. The table further showed the coefficient determination (R^2) value as.175 which implies that floormatics contributed only 18% to the level of competitive ability of the participants. This contribution is significant as the analysis of variance yielded F(9. 170) = 3.892 which is significant at.000 alpha levels. This means that floormatics is capable of promoting competitive ability among the participants.

Hypothesis 1: There will be no significant difference in the satisfaction level in the floormatics game.

A one-way ANOVA on Table 6 revealed a non-significant difference in the level of satisfaction among the sighted and the visually impaired as F(6,173) =.370. P>.05. Therefore, the hypothesis which states that there will be no significant difference in the level of satisfaction in the game of floormatics is hereby retained, which means that both the sighted and visually impaired derived satisfaction during their participation in the game of floormatics. This can be attributed to the fun and audience-participatory nature of the game.

Hypothesis 2: There will be no significant difference in the willingness to compete

A one-way ANOVA on Table 7 revealed a non-significant difference in the willingness to compete among the sighted and the visually impaired as F(6,173) =.543. P>.05. Therefore, the hypothesis that states that there will be no significant difference in the willingness to compete is hereby retained, which means that participants were eager and willing to compete among themselves irrespective of their visual status.

Hypothesis 3: There will be no significant difference in their ability to compete

A one-way ANOVA revealed a non-significant difference in the ability to compete among the sighted and the visually impaired as F(6,173) =.321. P>.05. Therefore, the null hypothesis which states that there will be no significant

Table 4. Regression analysis of floormatics and recreational sport behaviour

Variables	Means	STD	R	R^2	AR^2	%Contribution
Floormatics	3.2722	2.54091	0.267	0.071	0.044	7%
Tired	2.5111	1.95047				
Enjoy	2.3778	1.71473				
Friendly	2.2500	1.64733				
Keep	2.4167	1.73003				
Regular	4.0556	2.40047				
MODEL	**SS**	**DF**	**MS**	**F**	**SIG.**	
Regression	82.269	5	16.454	2.667	0.024*	
Residual	1073.392	174	6.169			
Total	1155.661	179				

STD represent Standard deviation, R stands for correlation coefficient, R^2 mean the coefficient of determination, while AR^2 represents the Adjusted coefficient of determination. SS represents the sum of the squares, DF stands for Degree of Freedom, MS stands for the Mean of squares and F is used to determine the significance of the R^2.

Table 5. Regression analysis of floormatics game and promotion of competitive ability

Variables	Means	STD	R	R^2	AR^2	%Contribution
Floormatics	3.2722	2.54091	0.419	0.175	0.132	18%
Important	2.6333	1.87277				
Regular	2.4722	1.78269				
Always	2.2944	1.56675				
Serious	3.7500	2.34431				
Enjoy	2.8778	4.13144				
Valuable	2.5389	1.81356				
Happy	2.4111	1.77124				
Learning	2.2222	1.54470				
Effort	2.2556	1.75646				
MODEL	**SS**	**DF**	**MS**	**F**	**SIG.**	
Regression	197.451	9	21.939	3.892	0.000	
Residual	958.210	170	5.637			
Total	1155.661					

STD represent Standard deviation, R stands for correlation coefficient, R^2 mean the coefficient of determination, while AR^2 represents the Adjusted coefficient of determination. SS represents the sum of the squares, DF stands for the Degree of Freedom, MS stands for the Mean of squares and F is used to determine the significance of the R^2.

Table 6. ONE-WAY ANOVA of visual status on the level of satisfaction with the game of floormatics

Visual Status	SS	DF	MS	F	Sig.
Between Groups	1.266	6	0.211	0.370	0.892*
Within Groups	98.734	173	0.571		
Total	100.00	179			

SS represent the sum of squares, DF denote the Degree of Freedom, MS indicate the Mean of squares and F is used to determine the significant effect of visual status on satisfaction.

Table 7. ONE-ANOVA of visual status on willingness to compete in the game of floormatics

Visual Status	SS	DF	MS	F	Sig.
Between Groups	6.007	6	1.001	1.843	0.093*
Within Groups	93.993	173	0.543		
Total	100.00	179			

SS represent the sum of squares, mean Degree of Freedom, MS signify Mean of squares and the F is used to indicate the significant effect of visual status on willingness to compete.

difference in the ability to compete in the game of floormatics is hereby retained. Meaning that visual status is not a handicapping condition as the game of floormatics is concerned.

DISCUSSION

The purpose of this research was to promote inclusive recreational sports for the visually impaired and sighted school

Table 8. ONE-ANOVA of visual status on the ability to compete in the game of floormatics

_Visual Status	Sum of squares	Df	Mean Square	F	Sig.
Between Groups	1.100	6	0.183	0.321	0.925*
Within Groups	98.900	173	0.572		
Total	100.00	179			

SS represent the sum of the squares, DF symbolize Degree of Freedom, MS signify Mean of squares and F is used to express the significant effect of visual status on the ability to compete.

children using the game of floormatics. To achieve this, three research questions and three hypotheses were developed which focused on the extent of floormatics promoting inclusive sport participation, recreational sports behaviour and competitive ability; differences in the level of satisfaction, willingness to participate and ability to compete. The results showed that there were positive correlations in using the game of floormatics to promote inclusive sports participation, recreational sports behaviour and competitiveness among the sighted and the visually impaired. Also, there were no observed statistically significant differences in the level of satisfaction, willingness to participate and ability to compete in the game of floormatics irrespective of disability status.

The finding revealed a positive correlation between floormatics and inclusive sports participation of the students. The sighted accepting to participate with the visually impaired is a strong demonstration that the game promotes social and mental well-being (of the willingness to engage in inclusive sports and provides the opportunity for the visually impaired to develop strong confidence which is vital for their mental health). This result supports Oyong (2020) who equally observed a significant relationship between adapted recreational sports and social inclusion with persons with hearing impairment similar to Bebetsos *et al* (2017) and Congsheng, *et al* (2022) who reported that participating in inclusive sports and physical activity improves attitude, self-confidence and empowerment of people with disability. The result also supports Carter-Thuillier et al (2023) claims that participation in sports programmes such as floormatics successfully facilitated the social inclusion process, enabling the development of interpersonal skills and relationships between students from different cultural backgrounds.

Floormatics has a significant positive impact on promoting social inclusion outcomes. This can best be achieved when they gain satisfaction from participation and are ready to sustain the level of satisfaction. This view corroborates Roult, *et al*, (2015) that participation in inclusive sports demonstrates substantial positive impacts on young people (such as enjoyment, pride, and self-esteem) on their relatives. Corazza and Dyer (2017) affirmed that models of social inclusion (floormatics) have significant potential for achieving inclusivity outcomes and positive social impacts regardless of disability. The study also, showed that there was no significant difference in the level of satisfaction gained from participating in the game among the sighted and visually impaired. Meaning both groups gain the same level of satisfaction. This view contradicts that of Pagan (2018) that People with disability are less likely to take part in active sports than their counterparts, and obtain a higher level of life satisfaction than their non-disabled people from their participation is almost double that reported by people without disabilities. This difference could be attributed to the opportunities available to the visually impaired and the attitude of the sighted towards engaging in meaningful play activities.

The result also showed a positive correlation between floormatics and the ability to engage in competition as no significant difference was observed in the game of floormatics irrespective of disability status. This means that people with visual impairment can compete effectively with their sighted counterparts with training. This result is similar to Ponchillia, *et al* (2005) study with participants aged 8-18 who found that they knew more about sports, was able to jump and throw farther, held positive attitudes and were more likely to become involved in local sports activities. And provides an answer to Alcaraz-Rodriguez, *et al* (2022) assumption that there is currently a lack of research that addresses the reality of the inclusion of people with visual impairment in both educational and sporting environments in physical activity and sports. So, with the right environment and training the visually impaired can compete favourably with their sighted counterpart.

CONCLUSION

Some limitations might impact the generalization of the results. Firstly, the research design was posttest only as it was assumed that the participants had no prior knowledge of the game. Secondly, one of the data collection instruments, a seven-point Likert scale, appears too advanced for some of the children. Therefore, this research should be replicated with a pretest-posttest control group design and the questionnaire item collapsed to two two-point response scales.

Limitations notwithstanding, the study has shown that the visually impaired can still enjoy recreational sports with the sighted when exposed to the same training. There were positive social interactions and an increased desire to participate in sporting physical activity by the visually impaired beyond the school environment when adequately motivated by physical education teachers. The study has shown that floormatics as a low activity game is capable of changing the inclusive recreational behaviour of the visually impaired with the sighted. If given adequate training and the right environment, the visually impaired have the potential to soar above the sighted. Consequently, it was recommended that floormatics should be introduced to all-inclusive schools as extracurricular sporting activity, floormatics should be adopted as National Sports to shape sports behaviour and promote regular sports competition among the sighted and visually impaired.

Acknowledgement

The authors would like to thank the Principals, Teachers and Students who participated in the activity. Also, we appreciate

the commitments of other research assistants who served as logistic handlers, recorders and cameramen.

Authors Contribution

FUA contributed the concept, design, data analysis and writing of the original manuscript. TOI Contributed to the literature review and coordinated the data collection in Kwara and Kogi State. AA and FOA: Coordinated the data collection in Borno and Katsina States.

Data Availability

The instruments and datasets used and/or analyzed during the current study are available from the corresponding author on request. Practice sessions of the game are available under the name floormatics on YouTube.

Ethical Clearance

The entire research work was approved by the Institutional Ethical Committee. University of Uyo Institute for Biomedical Research and Innovation ((IBMRI) on 21/OCT/2020. The details of the study were explained and each voluntary participant or their parents in the case of those below 18 years were made to sign a consent form. Participants can withdraw from the activity whenever they feel like doing so.

REFERENCES

Ajzen, I (2013). *Theory of planned behaviour questionnaire*. Measurement Instrument database for social sciences. Retrieved from www.midss.ie

Ajzen, I (2011). Theory of planned behaviour: reactions and reflection. *Psychological and Health*. 26:1113-1127. http://dx.doi.org/10.1080/08870446.2011.61399

Alcaraz-Rodriguez, V., Medina-Rebollo, D., Munoz-Lierena, A & Fernandez-Gavira, J. (2022). Influence of physical activity and sport on the inclusion of people with visual impairment: a systematic review. *International Journal of Environmental Research and Public Health*. 19(1) 443. https://doi:10.3390/ijerph19010443

Allender, S., Cowburn, G., & Foster, G. (2006). Understanding participation in sports and physical activities among children and adults: A review of qualitative students. *Health Education Research Theory and Practice*. 21(6), 826-835. https://doi.org/10.1093/her/cy1063

Atare, F. U. (2017). Floormatics: What is New? *Nigerian Society for Sports Management Journal*. 5: 87-91. https://www.researchgate.net

Beal, S. J., Crockett, L. J., & Peugh, J. (2016). Adolescents' Changing Future Expectations Predict the Timing of Adult Role Expectations. *Developmental Psychology*. 52(10), 1606-1618. https://doi.org/10.1037/dev0000189

Bebetsos, E., Derri, I., & Nezos. N (2017). Can an intervention programme affect students' attitudes towards inclusive physical education? An application of the theory of planned behaviour. *Journal Psychiatry* 20(6), 1-5. https://doi.org/10.4172/2378-5756.1000429

Carter-Thuillier, B., Lopez-Pastor, V., Gallaardo-Fuentes, F., Carter-Beltran, J., Fernandez-Balboa, J.M., Delgado-Floody, P., Grimminger-Seindersticker, E & Sortwell, A (2023). After-school sports programmes and social processes in culturally diverse context. Result of an international multicase study. *Frontiers in Psychology*. 14:1122362. Pp1-14, https://doi.org/10.3389/fpsyg.2023.1122362

Chen, C. C., & Lin, S. Y. (2011). The impact of rope jumping exercise on physical fitness of visually impaired students. *Research in Developmental Disabilities.* 32(1), 25-29. https://doi.org/10.1016/j.ridd.2010.08.010

Chuan, C. C., Yusof, A., Chee, C. S., & Chong, A. M. (2014). Application of the theory of plan behaviour to predict recreational sports activities participation of students in Malaysia. *Journal of Physical Education and Sports*. 14(2) 172-179. https://doi.org/10.7752/jpes.2014.02027

Creswell, J.W. (2013). *Research Design: Qualitative, Quantitative and Mixed Methods Approaches. 4th Edition*. London: SAGE Publications Inc. (pp. 77-83). https://www.scirp.org

Congsheng, L., Kayani, S & Khalid, A. (2022). An empirical study of university students' physical activity and sport affection mental health. *Frontiers in Psychology*. 13:917503. Pp 01-08. https://doi.org/10.3389/Fpsyg.2022.917503

Corazza, M., & Dyer, J. (2017). A new model for inclusive sport? An evaluation of participants' experiences of mixed-ability rugby. *Sports for Social Inclusion: Questioning Policy, Practice and Research*. 5(2), 130-140. https://doi.org/10.17645/si.v5i2.908

Cunningham, G. B., & Kwon, H. H. (2003). The theory of planned behaviour and intention to attend a sports event. *Sports Management Reviews*. 6(2) 127-145. https://doi.org/10.1016/S1441-3523(03)70056-4

Duhaime, G., Searles, E., Usher, P., Myers, H. & Frechette, P. (2004). Social cohesion and living conditions in the Canadian Arctic: from theory to measurement. *Social Indicators Research*, 66(3), 295-301. https://www.jstor.org/stable/27522075

Ebesugawa, M.K., Wensley, L., & Murphy-Sims Murphy-Sims, J. (2010). The developmental and social benefits of the inclusive E-Karate community sports programme. *International Journal of the Humanities*. 8(5), 141-150. https://doi.org/10.18848/1447-9508/CGP/v08i05/42929

Froster, R. C. (2021). KR20 and KR21 for some non-dichotomous data (it's Not Just Cronbach's Alpha). *Educational Psychological Measurement*, 81(6), 1172-1202. https://doi.org/10.1177/0013164421992535

Haegele, J. A., & Porretta, D. L. (2013). Physical activity and school age individual with impairment: A literature review. *Adapted Physical Activity Quarterly*.32(1), 68-82. https://doi.org/10.1123/apaq.2013-0110.

Kim, T. K. (2017). Understanding one-way ANOVA using conceptual figures. *Korean Journal of Anesthesiology*. 70(1), 22-26. https://doi.org/10.4097/kjae.2017.70.1.22

Kiuppis, F. (2018). Inclusion in sport: disability and participation. Sports in Society, 21(1), 4-21. https://doi.org/10.108017430437.2016.1225882

Kleinert, H. L., Miracle, S. A., & Sheppard-Jones, K. (2007). Including students with moderate and severe disabilities in extra-curricular and community recreation activities. *Intellectual and Developmental Disability*. 45(1), 46-55. https://doi.org/10.1352/1934-9556(2007)45[46:ISWMAS]2.0.CO.2

Lundberg, R.N., Taniguchi, S., McCormick, B. P., & Tibbs, C. (2011). Identity Negotiating: Redefining stigmatized identities through adaptive sports and recreation participation among individuals with a disability. *Journal of Leisure Research*. 43(2), 205-225. https://doi.org/10.1080/00222216.2011.11950233

Malwina, K. A., Krzysztof, M., & Piotr, Z. (2015). Visual impairment does not limit Training effects in the development of aerobic and anaerobic capacity in tandem cyclists. *Journal of Human Kinetics.* 48, 87-97. https://doi.org/10.1515/hukin-2015-0095

Mann, D. L., & Ravensbergen, H. J. C. (2018). International Olympic Committee and International blind sports federation joint position stand on the sport-specific classification of athletes with vision impairment. *Sports Medicine*. 48, 2011-2023. https://doi.org/10.1007/540279-018-0949-6.

Mok, W. K., & Lee, A.Y.K (2013). Case study on TPB application: predicting adolescent physical activity in Hong Kong. *Journal of Community Medical Health Education*. 3:231. https://doi.org/10.4172/2161-0711.1000231

Neubauer, B.E., Witkp, C. T., & Varpio, L. (2019). How phenomenology can help us learn from the experiences of others. *Perspectives on Medical Education*. 8(2), 90 – 97. https://doi.org/10.1007/s40037-019-0509-2

Oyong, H. (2020). Adapted sporting activities and social inclusion for persons with learning disabilities in Calabar municipality Local Government Area of Cross Rivers State. Social Science Research Network. https://doi.org/10.2139/ssrn/3568553

Pagan, R. (2018). Disability, life satisfaction and participation in sport. In LR. dela Vega & WN. Toscano (eds). *Handbook of leisure, physical activity, sport, recreation and quality of life*. Springer. Pp 343-364. https://doi.org/10.1007/978-3-319-75529-8_20

Ponchillia, P. E., Annbruster, J., Weibold, J. (2005). The national sport education camp's project: introducing sports skills to students with visual impairment through short-term specialized instruction. *Journal of Visual Impairment and Blindness*. 99(11). https://doi.org/10.1177/0145482X0509901107

Roult, R., Brunet, I., Belly-Ranger, E., Carbonneau, H. & Fortier, J. (2015). Inclusive sporting events in schools for youth with disabilities in Quebec: Social educational and experimental roles of these activities according to interviewed practitioners. *Sage Journals.* 5(3), 1-14. https://doi.org/10.1177/12158244015604696

Ruin, S., Haegele, J.A., Giese, M., & Baumgartner, J. (2023). Barriers and challenges for visually impaired students I PE-An interview study with students in Austria, Germany and the USA. *International Journal of Environmental Research in Public Health*. 20(23), 7081. https://doi.org/10.3390/ijerph20227081

Stolte, E., Hopman-Rock, M., Aartsen, M.J., van Tilburg, T. G., & Chorus, A. (2016). The theory of plan behaviour and physical activity change: Outcome of the ageing well intervention programme for older adults. *Journal of Aging and Physical Activity*. 25(3). 438-445. https://doi.org/10.1123/japa.2016-0182

Stumbo, N. J., Wang, Y., & Pegg, S. (2011). Issue of access: what matters to people with disabilities as they seek leisure experiences. World Leisure Journal, 53(2), 91-103. https://doi.org/10.1080/04419057.2011.580549

WHO (2010). Global recommendation on physical activities for health. Geneva: WHO Press.