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| RESEARCH ARTICLE

Physical Activity Levels and Sedentary Behaviours of Students with Hearing Loss in Ghana: A Case Study

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| ABSTRACT
This study aimed to assess physical activity (PA) levels and sedentary behaviours (SB) of students with hearing loss (SWHL) at Mampong Senior High Technical School for the Deaf (MSHTSD). A survey design was employed for this study. The sample size for the study was 392 students with hearing loss (201 boys and 191 girls) from MSHTSD, who were all selected using Census sampling. Data was collected using the International Physical Activity questionnaire (short form) and the Sedentary Behaviour questionnaire. 392 questionnaires were administered and retrieved; however, 318 were deemed well filled out as directed by the researcher and coded for analysis. MET was calculated, and descriptive statistics of frequency and percentages were used to ascertain the PA and SB of the students. Spearman rho was used to calculate the correlation between students PA and SB. An Independent sample t-test was used to establish the gender difference in participants PA and SB levels. The study results highlighted different levels of PA among the participants, while SB varied among the study population. 200(62.9%) out of the 318 SWHL were categorized as highly active, indicating a commendable engagement in PA. Notwithstanding students' high PA level, SB patterns were polarized. Thus, 44.3% of the SWHL reported no SB, while a closer percentage of 30.8% exhibited sedentariness. A positive correlation (Spearman's rho = 0.379, $p < 0.001$) was observed between the PA levels and SB of the students. There were notable gender disparities in both PA and SB, with males exhibiting higher PA levels (t-value = 3.294, $p < 0.001$) and lower sedentariness (t-value = 2.206, $p = 0.028$) compared to their female counterparts. The study concluded that SWHL at Mampong have high PA and somewhat low SB levels. A positive correlation exists between SWHLs PA and SB levels. Furthermore, there was a noteworthy gender difference in both PA levels and sedentariness among the study population.

| KEYWORDS

Deaf, disability, physical activity, sedentary behaviour, students with hearing loss, etc.

| ARTICLE INFORMATION

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1. Introduction

Disability studies in recent times are gaining ground globally. Available data indicates that an estimated 15% of the world's population live with some form of disability, with 2-4% experiencing significant difficulties in functioning. Close to 80% of these people live in the low-income countries of the world (WHO, 2020). Out of this number, 1.7% are deaf and found in Ghana (Ghana Statistical Service, 2021). Studies have shown that persons with disabilities (PWDS) are susceptible to non-communicable diseases because of a lack of physical activity (PA) and sedentarism (WHO, 2023; Tovin, 2013; Klein & Hollingstead, 2015). Hence, studies on PA and sedentary behaviour (SB) among this group must be encouraged.

Physical activity (PA), according to the World Health Organization (WHO, 2020), is any bodily movement produced by skeletal muscles that requires energy expenditure'. Thus, PA is not solely limited to sports but comprises locomotor (walking, running) and manipulative skills (ball games, martial arts, etc). The indication for numerous benefits of consistent and regular PA are well documented, likewise the consequences of sedentary behaviour (Piercy et al. 2018). Among the numerous outcomes of PA are a decline in mortality (Abell et al. 2017, Anderson et al. 2014), cognitive and physical decline (Anderson et al. 2014; Barlow et al.

2014), glycaemic control (Aljawarneh et al. 2019; Chastin et al. 2019), pain and disability (Abdulla et al. 2015, Alanazi et al. 2018), muscle and bone strength (Adsett et al 2015), and functional mobility and well-being (Abdin et al 2018; Albalawi et al 2017). Despite all these benefits accrued in engaging in regular PA, global health reports incessantly exposed a surge in sedentary lifestyle, which has demonstrated to have dreadful implications on an individual (Eichorn et al 2018), which SWHL are no exception to these implications.

The World Health Organisation (WHO), in the year 2020, updated the physical activity (PA) guidelines with specific recommendations for children, adolescents, adults, and older adults. Additionally, people with disabilities were included in these new guidelines. For the first time, beyond PA, SB was taken into consideration, indicating its importance for healthful living. Research have stipulated that time spent in continuous prolonged bouts of SB may have the worst health consequence (Segura-Jiménez et al. 2020; Santos et al. 2019; Ellingson et al. 2018; Júdice et al. 2017) and that assessing SB patterns in all population is paramount, hence, this study.

Sedentary behaviour and physical activity patterns among students with hearing loss are crucial aspects of their overall health and well-being. Research has shown that individuals with hearing loss are at a higher risk of chronic diseases, such as obesity, diabetes, and cardiovascular disease (Barnett et al., 2011; Fellinger et al., 2018). Conversely, studies have highlights the importance of physical activity in mitigating these risks. A study by Hill et al. (2019) found that regular physical activity improves cardiovascular health and reduces sedentary behaviour in adolescents with hearing loss. Another study by Kargin et al. (2020) found that students with hearing loss who engaged in physical activity had better mental health outcomes and reduced symptoms of anxiety and depression. However, there is a lack of research specifically examining sedentary behaviour and physical activity patterns among students with hearing loss in school settings in Ghana.

A study by Fellinger et al. (2018) stress the unique challenges faced by individuals with hearing loss, including communication barriers and social isolation, which can impact their physical activity and sedentary behaviour. Nevertheless, their study does not explore these factors in the context of school-based physical activity and sedentary behaviour. Barnett et al. (2011) emphasize the need for community-based participatory research to address health inequities in deaf and hard of hearing populations. However, their study does not specifically focus on physical activity and sedentary behaviour among students with hearing loss in school settings. These gaps in the literature highlight the need for a comprehensive study that explores physical activity and sedentary behaviour patterns among students with hearing loss in a school setting, taking into account the unique challenges and experiences of this population. Hence, the main objectives of this study were to assess physical activity levels, sedentary behaviours patterns, establish the relationship between PA and SB, and to determine the gender difference between PA and SB of SWHL at Mampong Senior High Technical School for the Deaf in Ghana.

2. Methods

The study employed the survey design (Creswell, 2014). Census sampling was used to select all the students (412) in the school for the study. The premise of this sampling technique was to get the views of all the students in order to get a complete understanding of the issue under investigation. However, 392 were met on the day of data collection and formed the sample size for the study. Research instruments IPAQ – International Physical Activity questionnaire (short form) was used for data collection. IPAQ is a widely used standardised questionnaire for assessing PA levels across a range of domains and thus was helpful in this study. The questionnaire had three sections: A, B, and C. Section A focused on the demographic characteristics of the study participants. Section B was the IPAQ (short form), which sort for participants PA levels, while Section C contained one item on their period of sitting.

2.1 Data collection procedure

Prior to the data collection, an introductory letter was sought from the DRID-UEW to the District Director of Education in the Akwapim municipality as well as the headmistress of Mampong Senior High Technical School for the Deaf. Data was collected using the face-to-face mode. Dates and time were scheduled to meet the students in their various classrooms for data collection. The participants signed a consent form before the questionnaires were distributed to them. Since students can read and write, the questionnaires were giving to them to fill out. However, this was done with the help of two sign language interpreters.

2.2 Data analysis procedure

After receiving the questionnaires from the field, the researcher checked for completeness of the questionnaire. The reason for checking was to know whether participants had followed directions correctly and whether all items had been responded to. Data were screened for missing values and outliers. The researcher administered 392 questionnaires and retrieved all questionnaires. However, out of the 392 questionnaires returned, 318 (81.12%) were deemed fully completed and valid for analysis. According to Wadsworth (2020), a response rate of 80% and above is extremely commendable for any data analysis. Codes were developed to aid the data input on SPSS version 23.0. Descriptive statistics of frequencies and percentages were used to present the participants PA and SB levels in tables. The association between PA and SB levels was establish using Spearman rho correlational

statistics. Difference in PA and SB levels between gender were calculated using an independent sample t-test assuming unequal variance with p-value set at .005 for two tailed.

2.3 Data management procedure

The IPAQ assessed the frequency and duration of past-week walking, moderate-intensity, and vigorous-intensity PA that lasted for at least 20 minutes (WHO, 2005) in an atypical week. The classification of PA levels of the participants was categorized into three levels based on the scoring protocol provided in the short-form. The categories were Inactive, thus no activity reported; (b) Minimally Active, thus some amount of physical activity reported with 5 or more days of a combination of walking, moderate or vigorous-intensity activities achieving a minimum of at least 600 Metabolic Equivalent Task (MET)-min week (WHO, 2005). HEPA (any of the following criteria): 7 or more days of a combination of walking, moderate or vigorous-intensity activities, accumulating at least 3000 MET-min week (WHO, 2005). Participants in the 'High' Physical activity category were deemed to meet PHR for Physical activity. Thus, they have reached the health-enhancing PA threshold (WHO, 2005). The MET at each Physical activity level was converted to median and thus calculated in frequency and percentage.

3. Results

3.1 PA Levels of the Study Participants

From Table 1, the majority of the study participants, 200 (62.9%), reported Highly Active Physical Activity (HEPA), 58 participants (18.2%) engaged in minimal physical activity, while 60 students (18.9%) reported being inactive. This implies that the majority of the study participants fell into the HEPA active category.

Table 1: PA Levels of Participants

PA Level	Frequency	Percentages (%)
HEPA Active	200	62.9
Minimally Active	58	18.2
Inactive	60	18.9
Total	**318**	**100**

3.2 Sedentary behaviour of the study participants

The result from Table 2 revealed that 98(30.8%) of the participants exhibited sedentary behaviour, 79(24.8%) engaged in minimal sedentary behaviour, while 141(44.3%) reported no sedentary behaviour.

Table 2: Sedentary behaviour of participants

SB Level	Frequency	Percentages (%)
Sedentary	98	30.8
Minimally Sedentary	79	24.8
Not Sedentary	141	44.3
Total	**318**	**100**

3.3 Relationship between participants PA and SB levels

Table 3 revealed a positive correlation (Spearman's rho = 0.379, $p < 0.001$) between PA levels and sedentary behaviour. The correlation coefficient of .379 indicates a moderate positive correlation between physical activity levels and sedentariness among students with hearing loss. This correlation may seem counterintuitive, as one might expect physical activity and sedentariness to be negatively correlated (i.e., as physical activity increases, sedentariness decreases).

Table 4: Spearman's Rho Correlation between PA Levels and Sedentary Behaviour of Participants

	Correlation Coefficient	*p*
Physical Activity Levels vrs Sedentariness	.379	.000

3.4 Gender difference in PA and sedentary behaviour among the study participants

From Table 5, an independent sample t-test assuming unequal variance showed statistically significant differences in physical activity levels of male (M = 2.59, SD = .72) and female students (M = 2.30, SD = .84) [t (316) = 3.294, p = .001] with males recording a higher physical activity levels than female students.

Table 5: Gender differences in physical activity levels among the study participants

	Sex	No.	M	SD	T	Df	P
PA Levels	Male	157	2.59	.72	3.294	316	.001
	Female	161	2.30	.84			

*Significance level .05

From Table 6, an independent sample t-test showed statistically significant differences in sedentariness of male (M = 2.24, SD = .87) and female students (M = 2.03, SD = .84) [t (315.043) = 2.206, p = .028] with males recording lower sedentariness than female students.

Table 6: Gender Differences in Sedentariness among the Study Participants

	Sex	No.	M	SD	T	Df	P
SB Level	Male	157	2.24	.87	2.206	315.043	.028
	Female	161	2.03	.84			

*Significance level .05

4. Findings and Discussion

The finding that 200 (62.9%) SWHL were categorized as highly active is consistent with previous research by Hill et al. (2019), who found that adolescents with hearing loss engaged in moderate to vigorous physical activity for an average of 60 minutes per day. Additionally, in support of this current study finding, Ng et al. (2019) reported that young adolescents with HI participated more in MVPA and light PA (LPA) per day than those without functional limitations. However, this present finding is in contrast with a study by Li et al. (2019), who reported that only 20% of adolescents with hearing impairment comply with the recommended quantity of MVPA of 60 minutes daily. Nevertheless, this study's high PA levels may be attributed to the school's emphasis on physical education and sports programs for students with hearing loss (Kargin et al., 2020).

The polarization of SB patterns, with 44.3% reporting no SB and 30.8% exhibiting sedentariness, contrasts with previous research. Sit et al. (2019) assessed the sedentary behaviours of students with hearing impairment and reported that the student have high sedentarism during a typical school day. Also, a study by Barnett et al. (2011) found that adults with hearing loss reported higher levels of sedentary behaviour compared to their hearing counterparts. However, this study's findings may be attributed to the younger age group and school setting, where students are more likely to engage in physical activity (Fellinger et al., 2018).

The positive correlation between PA levels and SB (Spearman's rho = 0.379, $p < 0.001$) supports previous research. A study by Kargin et al. (2020) found a similar positive correlation between physical activity and sedentary behaviour in students with hearing loss. This correlation suggests that students who engage in higher levels of physical activity are also more likely to engage in sedentary behaviour (Hill et al., 2019).

The finding of notable gender disparities in both PA and SB, with males exhibiting higher PA levels and lower sedentariness, is in agreement with a study by Xu et al. (2020), who also established that boys are significantly more physically active than girls. Contrary, a study by Fellinger et al. (2018) found no significant gender differences in physical activity levels among adolescents with hearing loss. However, this study's findings may be attributed to cultural or environmental factors that influence gender roles and physical activity engagement (Barnett et al., 2011).

5. Conclusion

Based on the findings, the study concluded that students with hearing loss at Mampong School for the Deaf have high PA levels and somewhat low sedentary behaviour levels. There exists a positive correlation between SWHLs PA and SB levels. Furthermore, there was a noteworthy gender difference in both physical activity levels and sedentariness among the study population.

6. Recommendations

For practice, the study recommended that there should be a continuous promotion of physical activity awareness and participation among all students by stakeholders. Similarly, there should be a tailored intervention by researchers and stakeholders to address gender-specific patterns in relation to sedentariness to promote a more active lifestyle. For further studies, it is recommended that a longitudinal study should be conducted to track changes in physical activity levels and sedentary behaviour over time among this population. This would provide insights into trends and potential interventions. Also, the study recommended that intervention programs should be designed for the group identified to have low PA and those with a high sedentary lifestyle. Additionally, since these study findings were solely based on self-reported PA and SB, further studies

should use wearable's such as pedometers and accelerometers to ascertain the PA and sedentary lifestyle among this population in Ghana.

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