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The effect of school bag weight on the behaviour of primary school children A field study in the Hassani Arabi Ben Ibrahim primary school, Ouargla

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Abstract:

The current study aims to determine the weight of the school bag carried by fourth grade students and to assess whether this weight is appropriate in relation to the students' body weight. In addition, it seeks to understand the impact of school bag weight on the behaviour of fourth grade students, taking into account their gender.

We adopted a descriptive methodology, with a sample of 23 students purposively selected. Tools such as a medical scale, tape measure and observation were used.

The study came to the following conclusions

- The average weight of the school bag carried by fourth grade students is high.

- The weight of the school bag does not correspond to the body weight of the fourth grade students.

- The effect of school bag weight on students' behaviour varies by gender among fourth graders.

The results of the study were analysed and discussed in relation to previous studies, as well as observations from teachers and parents.

Keywords: School bag, student behaviour, fourth grade students.

Introduction

Ergonomics is a very important subject that affects several areas and deserves attention for its valuable and beneficial studies aimed at providing safety and well-being. It offers solutions to problems in various fields, such as industry, economy, education and teaching, which are fundamental to the development of nations. Particular attention should be paid to these areas, especially in the early stages of education, as primary education is one of the most critical periods. It is the first foundation for the individual, where the child's growth takes place in various areas, including abilities, aptitudes, attitudes, physical development and the acquisition of knowledge and information.

Attention to pupils at this stage is crucial for their mental and physical health, providing them with what they need to succeed and excel in their studies. The issue of backpack weight has become a significant obstacle for educational institutions, as many students suffer from the burden of heavy backpacks and its impact on their behaviour, actions and health, especially in the early stages of education. Consequently, ergonomics always seeks to achieve compatibility and harmony between all factors to ensure comfort and safety. This current study aims to address a very important issue in the educational field in order to provide solutions and suggestions.

Problem of the study

The school is an essential part of the education system in most countries, where students learn reading, writing, arithmetic and various other subjects. It is the primary place for the growth and development of the child at different levels, including academic, social, cognitive, physical and psychological development. Therefore, the school plays a crucial role in the developmental stages of the child, with each stage having its own characteristics.

Childhood is a critical period in a person's life that requires specific needs to ensure physical, mental, emotional, social, moral and educational growth.

Meeting these needs in a balanced way allows the child to grow in a healthy way and contributes to his or her proper development. When a child reaches the age of 6 to 10, they attend primary school where they receive their education. Therefore, they carry their school bag filled with tools, books and notebooks according to the subjects they are studying. The way in which they carry their backpacks varies from one student to another, and the weight of the backpacks often causes fatigue and pain in certain parts of the body.

This is confirmed by a study conducted by Mohammed Redha Shena in 2020, which found that the average weight of the backpack was high, exceeding the recommended limit of 10% of the child's weight as suggested by many studies. Furthermore, a study by Mbaraki et al in 2014 found that the weight of the bag compared to the weight of the child was highest in the first grade at 18.58% and lowest in the fifth grade at 12.58%. The study found that 67.14% of students experienced back pain due to the excessive weight of their bags.

Primary school students need their backpacks to carry all their school supplies and these backpacks are essential. The World Health Organisation has stated that the appropriate weight for a backpack should be 10% of the child's body weight, emphasising that school bags have specific characteristics and dimensions. In view of the problems faced by the education sector, particularly in primary education, with regard to school backpacks, it is essential to address these concerns.

Our current study aims to provide solutions to this problem by posing the following question:

Does the weight of the school backpack match the physical and psychological capabilities of the student?

Research questions

1. What is the average weight of a backpack carried by a fourth grade student?

2. Does the weight of the school rucksack correspond to the weight of the fourth grade student?

3. Does the effect of backpack weight on student behaviour differ by gender among fourth graders?

Hypotheses of the study

1. The average weight of a fourth grade student's backpack is high.

2. The weight of the school rucksack is equal to the weight of the fourth grade student.

3. The effect of backpack weight on student behaviour differs by gender among fourth graders.

Importance of the study

The importance of this topic lies in its relevance, as it addresses the important issue of ergonomics in the school environment and its applications, given the health, psychological and behavioural problems associated with carrying heavy backpacks. Our study aims to provide comfort to students by reducing the weight of their backpacks and maintaining their health and behaviour.

Aims of the study

1. To determine the weight of a fourth grade student's school backpack.

2. To determine whether the weight of the backpack is appropriate to the weight of the fourth grade student.

3. To assess the effect of the weight of the backpack on the behaviour of the fourth grade student.

Study terminology

- School backpack weight: This refers to the mass and volume of the school backpack, including notebooks, books, and tools, that a fourth-grade student carries from home to school, measured using a scale.

- Student Behaviour: This includes the actions, behaviours and movements of a Grade 4 student in the classroom, with peers and at home, assessed through observation and interviews.

Scope of the study

- Spatial boundaries: Hassani Arab Ben Ibrahim Primary School, fourth grade class.

- Temporal boundaries: First term of the academic year 2023/2024.

Methodology and procedures

- Research method: The researcher used a descriptive method because it is the most appropriate for our study, which focuses on describing and analysing data.

- Study Population: Fourth grade class of Hassani Arab Ben Ibrahim Primary School.

- Sample of the study: The sample was purposively selected and consisted of 31 students. However, during the implementation of the study, some students were absent, resulting in a final sample of 23 students.

Table 1: Sample distribution by gender

Gender	Students number	Percentage
Males	15	65.22%
Females	8	34.78%
Total	23	100%

Tools of the study

The researcher used a medical scale to measure both the student's weight and the weight of the backpack. A tape measure was used to measure the length and width of the student's shoulders. In addition, observations were made to monitor the student's behaviour and movements as they entered the classroom and the way they carried their backpack.

Results and Discussion

- Question 1: The average weight of the school backpack is high.

Table 2: Weight of school rucksack (full and empty)

Student	Full backpack weight	empty backpack Weight
1	3	1
2	2	1
3	2.5	1
4	4	1
5	3	1
6	2	1
7	4	1
8	3	1
9	4	1
10	4	1
11	3	1
12	3	1
13	2.5	1
14	3	1
15	2	1
16	2	1
17	4	1
18	2	1
19	3.5	1
20	2.5	0.5
21	2	1
22	2.5	1
23	5	1

Table 1 shows that the weight of the empty rucksack was 1 kg for all students. In contrast, the highest weight of the filled rucksack was 5 kg, followed by a weight of 4 kg carried by 5 students (3 females and 2 males). The lowest weight recorded for a rucksack was 2 kg.

We interpret these results to mean that the weight of the rucksack is high in relation to the physical structure of the students, especially as they are in primary school, when their bodies are still developing. This can lead to health problems and pain in certain parts of their body. Appropriate backpack weight is critical to the health of the student, as confirmed by various global health organisations, which recommend that the weight of the school backpack should

not exceed 10-15% of the student's body weight. Excess weight can cause back pain and changes in the structure of the spine. A heavy backpack can also cause the student to stumble when walking, as seen when students walk with their backpacks tilted, sometimes using their hands to support the weight, even when carrying it on their back. This is particularly worrying in childhood, when their physical growth is not yet complete.

Dr Mohammed Shbeib, a paediatrician, said that the weight of a child's backpack for children under 12 should not exceed 40 cm in height and 28 cm in width, and that the backpack should sit from the back to the waist without falling lower. This is in line with many studies that emphasise the need to pay attention to the backpacks carried by fourth-grade students, especially since this level has a very large curriculum with many subjects - 11 in total - each requiring its own tools and books. For example, Arabic includes two books: one for activities and one for texts, as well as notebooks for grammar and expression. The same applies to mathematics and French, which are key subjects, along with specialised books and notebooks for other subjects.

Consequently, all these factors contribute to increasing the weight of the backpack, forcing students to bring their materials to study according to the weekly distribution schedule. In addition, some students live far from school, so the burden of a heavy backpack causes delays in getting to school and has a negative impact on their health. Many specialist doctors have confirmed that carrying a heavy backpack increases the risk of spinal deformities and various health problems. Parents should therefore monitor their children's backpacks and ensure that they do not exceed 1-2 kg in weight.

In our study, we found that some backpacks exceeded the recommended weight set by the relevant authorities, which can be attributed to a failure to follow these recommendations. This includes the need to buy good quality backpacks that meet the specifications set by the Ministry, as each age group has specific requirements for backpack features and dimensions.

Question 2: Does the weight of the school rucksack correspond to the student's weight?

Table 3: Student's weight, height and the weight of the backpack

Student	Height (cm)	Weight (kg)	Backpack weight (kg)
1	1.30	25	3
2	1.32	28	2
3	1.28	22	2.5
4	1.35	22	4
5	1.30	25	3
6	1.28	21	2
7	1.26	22	4
8	1.37	31	3
9	1.35	24	4
10	1.28	20	4
11	1.31	28	3
12	1.21	20	3
13	1.30	25	2.5
14	1.24	22	3
15	1.36	30	2
16	1.30	25	2
17	1.22	20	4
18	1.33	28	2
19	1.35	26	3.5
20	1.37	29	2.5
21	1.31	31	2
22	1.45	32	2.5
23	1.44	35	5

From Table 2 above it is clear that the weight of the rucksack does not match the weight of the student. Consequently, the weight of the rucksack causes the student to display involuntary behaviours, sometimes in response to the fatigue and pain they experience. For example, pupil 17, who carries a 4 kg rucksack, shows a significant difference in relation to his slim physique and the distance between his home and school. Over time, this leads to severe fatigue, making even minimal effort feel exhausting. In addition, the large number of subjects and the heavy backpack contribute to the student's negative behaviour,

both towards himself and his classmates, as well as to a reluctance to learn, eagerly awaiting the end of the school day.

As a primary school teacher, I observe the behaviour of my pupils when they come to school. There is often procrastination and reluctance, with some pupils carrying their backpacks with one hand as if they were dragging them. Many express frustration at the weight of their backpacks, which causes pain in their lower backs and between their shoulders. We can therefore attribute some of these behaviours to the heaviness of what they carry in their backpacks. This was confirmed by a Saudi study (2022) published in the *Journal of Health Sciences*, which focused on schools in Saudi Arabia. The study found that a significant percentage of students carry school bags that exceed the recommended weight limit, negatively impacting their physical health.

Similarly, a study in Egypt (2019), published in the Journal of Pediatrics, found that children who regularly carried heavy school bags were more likely to suffer from neck and back pain. The study recommended reducing the contents of the bags and relying on digital resources to lighten the load. The Directorate of Education in Algeria has also tried to reduce the weight of backpacks by providing a second copy of textbooks to be placed in drawers in classrooms, with each drawer designated for a specific student. This is a laudable initiative, but some students still bring their books because teachers often need them for class. Sometimes the second copy is not meant for writing, but only for reference.

Thus, the Ministry of Education's decision to reduce the weight of the backpack has contributed significantly to protecting the physical and psychological health of the students. It is important to note that the fourth grade curriculum is one of the longest and most challenging in primary education, as it includes many lessons, which also affects students' behaviour. In addition, the quality of backpacks varies from student to student; some buy expensive backpacks while others opt for cheaper options, depending on their financial capacity.

The backpack is fundamental to the student's health and the quality of the backpack affects the student's psychological state. For example, a student with a rucksack that meets international and ideal standards is very different from a

student with a standard rucksack. This is why it is important to pay attention to this aspect, especially during the primary school years, when children are still developing.

Question 2: Does the Impact of the Weight of the School Backpack on Student Behavior Vary by Gender (Males - Females)?

Student (males)	Student weight	Backpack weight	Student height
1	25	3	1.30
2	28	2	1.32
3	22	2	1.28
4	22	4	1.35
5	25	3	1.30
6	31	3	1.37
7	24	4	1.35
8	28	3	1.31
9	25	2.5	1.30
10	30	2	1.36
11	25	2	1.30
12	20	4	1.22
13	31	2	1.31
14	32	2.5	1.45
15	35	5	1.44
Total	403	44	19.96
Average Weight	26.87	2.93	1.33

Table 5: Average Weight of the Backpack for Females

Student (female	Student weight	Backpack weight	Student height
1	21	2	1.28
2	22	4	1.26
3	20	4	1.28
4	20	3	1.21
5	22	3	1.24
6	28	2	1.33
7	29	2.5	1.37
8	26	3.5	1.35
Total	188	24	10.32

Average Weight	23.5	3	1.29

Table 6: Average Weight of the Backpack for Males and Females

	Student weight	**Backpack weight**	**Student height**
Males	26.87	2.93	1.33
Females	23.5	3	1.29

From the table above, it is clear that gender is related to the weight of the pack, as the physical structure of men and women is different, leading to differences in endurance. In general, men have a greater capacity for endurance than women, as confirmed by various studies. As we are at the primary school stage and students are still growing, carrying a heavy backpack in the same position every day can cause some immediate problems for female students, such as shoulder pain, fatigue and the need to stop after walking only short distances. This has been observed by some teachers and parents on the way to and from school.

In addition, some effects may not become apparent until later in life, such as scoliosis and lower back pain. A University of California study (2016) found that children who regularly carry heavy backpacks may suffer from chronic back and shoulder pain. Many orthopaedic specialists have confirmed that this is due to the weight of the backpack.

The same is true for male students, who may carry their rucksacks with one arm, causing their bodies to tilt due to the weight, which can lead to back arching. In addition, some teachers have noticed that when the rucksack is heavy, it is often carried with one hand or slung over the shoulder, especially for students whose homes are far from the school. When they arrive at school and enter the classroom, these pupils often appear exhausted, which affects their attention during lessons. They may even react to their fatigue by being aggressive towards their classmates.

An orthopaedic specialist added that endurance varies between males and females, as well as by age and body type. A slim student is different from an overweight student, and the same goes for females. All of these factors affect the student's behaviour and interactions with peers, as well as their psychological

state. In some cases it can lead to thoughts of leaving school and negative thinking.

In addition, one parent mentioned that their child cannot carry the rucksack from home to school every day because of the long distance, which leads them to leave it at school. This inability to cope with the weight of the backpack can affect the child's physical abilities and have a negative impact on their mental wellbeing.

Conclusion

In conclusion, the researcher found that the weight of the backpack is high compared to the weight of the student and that the heaviness leads to negative behaviours and reactions. Therefore, the school backpack is an important factor that needs to be addressed in order to protect the physical and psychological health of students. Excess weight can have a negative impact on the spine, causing pain and fatigue, which can affect academic performance and social behaviour. It is important to raise awareness among parents and schools about the importance of choosing the right backpack and distributing the weight evenly to avoid these negative effects. It is also important to teach students how to carry their backpacks correctly to ensure their comfort and safety.

Recommendations and suggestions

1. Address the issue from different angles, including the psychological dimension.

2. Ensure the provision and design of school backpacks that are suitable for primary school children.

3. Focus on school-related issues and study them with different variables.

4. Investigate the impact of backpack weight on physical and mental health according to age groups.

5. Reduce the number of school items that need to be carried each day and ensure that the weight of the backpack is evenly distributed.

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