

Can the seated posture of school children be improved by a wedge shaped cushion? - A Pilot Study with 10 year olds in Claddagh School, Galway, Ireland between November 2015 and June 2016

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Abstract

Several previous studies have identified postural benefits of chairs with a forward-sloping seat base; a new study was undertaken with primary school children aged 10 years old. A pilot study was completed to explore the impact on a child's posture while sitting on a 5° forward sloping wedge cushion. A marked improvement in posture was noted by trained observers following the introduction of the wedge cushions. Photographic evidence, comments from children and the class teacher's report all corroborated the findings of the observers. The impact of a forward sloping seat on seated postures of school children should be studied further, particularly since the European Standards Committee for School Furniture now permits this chair design.

Introduction

It is clear to see that in the pre-school period the majority of children have a healthy posture with a lengthened spine and free movement, yet in industrialized civilisations the majority of teenagers and young adults develop poor posture which is apparent from their slouched appearance, including rounded shoulders and over-curved backs. Poor posture can not only cause back and neck pain; it can be the cause of a multitude of other musculoskeletal problems. It can also affect the way a child breathes simply because the ribcage is constricted and therefore there is less space in which the lungs can move. By having less oxygen the child's overall health and learning abilities can be compromised. It therefore becomes important to identify the main factors contributing to the deterioration of children's posture as they progress through the school years into adolescence. There has been much discussion in recent years about whether children at school spend too much time sitting, and there have been many attempts to introduce more physical exercise and activity to help deal with this problem; however, is it possible that the type of chair children are sitting on could also be a major factor in posture deterioration in school? This pilot study was designed to find an answer to some of these questions.

The specifications for primary school chairs have recently been altered by the European Standards Committee for School Furniture (Document Ref: EN 1729-2+AT2015). At the present time, all schools in Europe are free to use chairs with a seat that can slope between 5 degrees (5°) backward to 8 degrees (8°) forward. But what seat slope better assists the child in maintaining a healthy posture during their year in school? According to a report published by the UK National Back Pain Association in 2005, a backward sloping seat does not promote good posture while sitting, as it results in the children being 'pulled' backward while at the same time as they are instructed to lean forward to write at their desk. Several other studies identify benefits of forward sloping seat (see references 1, 2, 3 and 4). This pilot study was completed between November 2015 and June 2016 at the Claddagh Primary School, Galway City, Ireland to explore the impact on a child's posture of sitting on an 8°

forward sloping wedge cushion (as the actual chair seat was sloping backwards it meant that the child was sitting on a forward slope of 5°).

Method

Nineteen 4th class pupils (approximately 10 year old) were provided with wedge shaped cushions. The wedge cushion was made of 8lb chip foam and therefore it was very firm. It had an angle of 8 degrees (8°) and its dimensions were 35.5cm x 35.5cm. (See photos 1 and 2 on page 4 show the impact of placing the wedge shaped cushion on the seat.)

The children were given a 15 minute presentation by Richard Brennan, Director of the Alexander Technique Centre Ireland, on the day the wedges were introduced to the classroom (4th November 2015). The presentation included simply anatomy of the pelvis and spine, on how children's posture often changes from toddlers to teenagers, and how the school chair contributes to this change in posture. A model spine was brought in in order to show the children how balancing their sitting-bones (**ischial tuberosity**) help to promote good posture when seated. The children were also shown how they could rock forward on the sitting bones when leaning forward to their desk instead of bending the upper spine.

The children were then taken in groups of 4 by four trainees on the Alexander Technique teacher training course. Two qualified Alexander Teachers (STAT) were present and oversaw and advised the trainees. The trainees showed the children how to find their hip joints and their sitting-bones, and how to balance on the sit-bones to help the spine stay lengthened when working at the desk. They were each given a wedge and shown how to correctly position it on the chair. It was also explained to them how placing their feet flat on the floor can also help to promote good posture.

Observation of the children's postures were recorded by the trainees both before and after the intervention, using the forms attached in Appendix 1. The recording took place on two occasions, (4th November 2015 and 14th June 2016). On both these occasions, the children were observed for the presence of the same factors, as follow:

1. The back is straight and bending is at hip joints
2. Both feet are flat on the ground

The observer recorded Yes or No on the form.

Children's views on seated postures were also recorded by the trainees in note-form, on both occasions, i.e. before and after the intervention.

In addition, the class teacher took photographs of the 4th class students over the period of the study. As a 'control group' in the study, the teacher also photographed a second 4th class which had *not* been provided with wedges.

Finally, the class teacher wrote up a short report on the experience of using the cushions in the classroom.

Results

1. Observational study of children's posture before and after the intervention

As can be seen in Figure 1, the major finding of the study is that there was a marked improvement in the number of pupils who were sitting with their backs straight and moving from their sitting bones, between November 2015 and June 2016, (i.e. prior to, and at the end of the year when the cushions were distributed). There was also a small improvement in the placing of feet flat on the floor between November 2015 and June 2016. (However, it is notable that the numbers of students with feet flat on the floor was very low on both occasions, and this in itself strongly suggests the need for further baseline research on children's seating habits in school).

Observed Postures	Pre Yes	Pre No	Post Yes	Post No
1. The back is straight and the hip joints are bending	3	16	14	5
2. Both feet are flat on the ground	2	17	5	14

Fig 1. Observed Postures prior to and post intervention

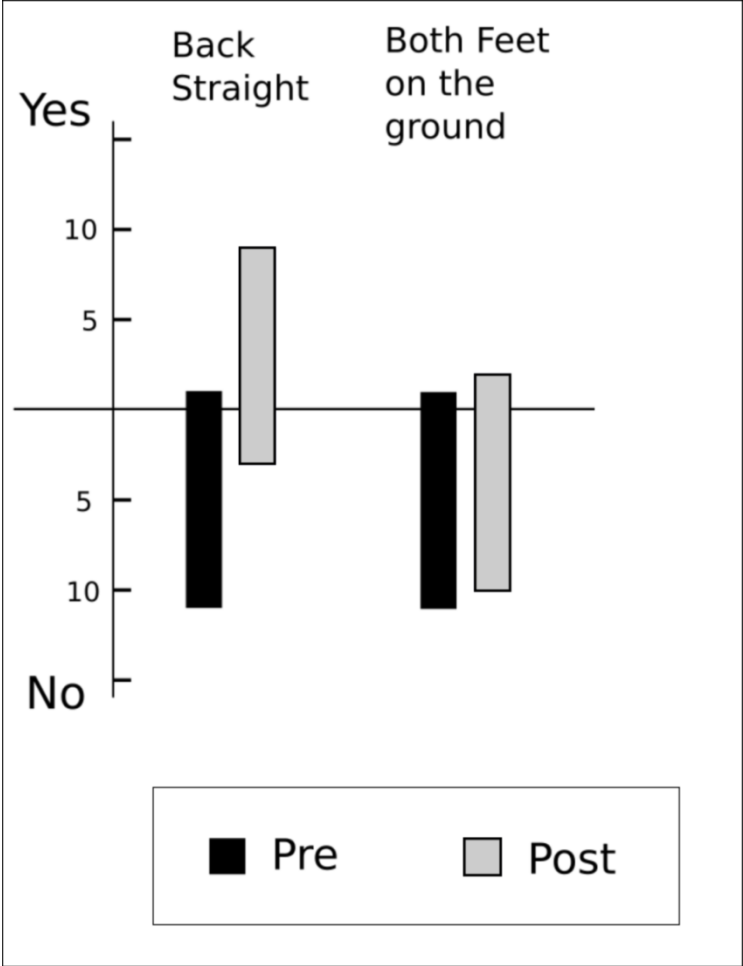


Photo 1: Chair with backward sloping seat



Photo 2: Chair with wedge shaped cushion

2. Study of children's views on the cushions and their posture, as recorded by the children.

At the end of the study on 14th June 2016 children were asked to complete a form and trainees observed their postures as they completed this task. See Appendix 2 for the form used. All of the comments recorded by the children reflected very positively on the use of the wedges.

The following are the answers received from different children, in response to the three question asked:

What do you think of the cushion?

- I think the cushions are comfortable and helpful
- It's great and it's comfortable.
- It helps with my back and sitting straight
- It's good.
- I think the cushions are great for your spine and they are very comfortable and helpful.
- It's comfortable and its way better than the chair.
- The cushions helped me sit up straight and help my back and help me reach the table and I think they should give more schools these to help more people sit up straight.
- It's cool like fluffy and comfortable and is like a pillow.
- I think it is comfortable, nice and good. It helped me really good to sit properly and don't injure my back.
- I think the cushion was helpful
- Is very good for your back; Is fun; is playful
- I think it is very helpful and I feel very straight
- I think the cushion is great for your back; I think it is comfortable; I think it helps you not to slant; I think it makes you sit up straight
- It is nice comfortable, relaxing and great
- It is good and comfortable
- I like it. It is very comfortable and it definitely changed the way I sit.
- I think that the cushion is wonderful.
- I think that you can sit very good.
- I think the cushion in good because it helps people reach the table and is very comfortable

Do you think the cushion has changed how you sit? If it has list all the ways.

- Sit straight; not slouching; making it comfortable
- I sit more straighter
- The cushion helped my posture; It is more comfortable
- I don't think it helped me, but if I get to keep it will help.
- It helps me sit properly; it is comfortable; it is made from foam and is helpful.
- It has changed my back is not sore.
- It made me more comfortable; it made me stop going on my knees to sit down.
- If I did not have the cushion my back would be sore and with this cushion it feels good.
- It makes me sit better; It is comfortable; It helped my back
- Is comfortable; Is fun and useful; Is second best colour; Is super and hard
- It makes me straighter; It feels good; I feel straighter

- I've not been slouching; I've not been uncomfortable; I sit up straight without even knowing
- Good posture
- I feel taller when I sit; I like that you can remove it from the chair if you are not comfortable
- I don't sit on my knees any more; I not naturally sit up straight on every chair. I'm much more comfortable sitting now when I write; I don't put my head on the table.
- I think they are very comfortable
- I can reach the table easier

What would you be most likely to say about the cushions?

- They are the best!!!!!!
- They're great!!
- I like them.
- They are awesome nearly like me.
- It helps me sit properly;
- They are very comfortable and soft.
- Sell more of these to more schools to help those children as well
- That it is comfortable and awesome cool and it helps straightening my back so I love it.
- Keeps me straight; It makes me feel comfortable; It doesn't injure my back
- I never want to get off
- They are very stable and very comfortable and very light
- They are very good for your back
- They are so helpful
- The cushion feels comfortable and gives me good posture
- It is comfortable
- They're comfortable and very good if you sit in awkward ways. If these were for sale I would buy one.
- It is the best
- The cushion is very good
- They are good for our posture so we ca do our work easier

3. Photographic evidence of children's seated postures

The class teacher, Sean Leonard, photographed the class on two occasions during the period of the study and also photographed the second 4th year class the members of which had not been given wedges.

Generally, children appear in the photographs to have better posture with less collapse of the spine when sitting on wedges.

It is worth noting that perching on the front edge of a backward sloping seat can be a way of eliminating the negative impact of the seat as this part is often flat.

Photographs of seated postures The children were not aware that they were being photographed although both the parents and the children had previously given their permission

Pic 3. Claddagh School 4th Class post introduction on wedges on 4th Nov 2015 (pictures taken 13/1/16 and 1/3/16)



Pic 4. Claddagh School second 4th Class – no wedges given to pupils (pictures taken 13/1/16 and 1/3/16)



4. Teacher's report on use of wedges

Teacher's report

Wedge Cushion Study – Claddagh N.S., Galway, 2015-2016
Personal Observations of Class Teacher, Seán Leonard
23rd June 2016

The children of my class were very excited about the prospect of getting their wedge cushions at the outset of this project, and were unanimously positive about them upon receiving them.

Having taught for a number of years, I assumed that this was childish excitement at the novelty of getting something new and different. Strikingly, and surprisingly, rather than diminishing with familiarity, the children's attachment to, and appreciation of, the cushions only grew as the year continued. I have not experienced one instance of a child removing a cushion to sit on a chair without it. Indeed, if a child's cushion had been misplaced from their chair, they would insist upon locating it before sitting down.

At the end of the study period, the universal concern among the children was that their cushions were going to be taken away.

Initially, I noticed a significant improvement in the children's seated posture, but this awareness dulled as the months wore on and I became familiar with them sitting on them every day. Indeed, perhaps typically for a teacher, I was prone to noticing only when they were *not* sitting well. It was when colleagues from other classes came into my room during the year, and noticed the remarkable difference between the posture of the children in their rooms, and the children using cushions in mine, that I realised the cushions were obviously still effective.

Personally, I see this as a worthy and progressive experiment, and one that has, at the very least, provided the children with a heightened awareness of the importance of good seated posture.

Discussion

The results of the pilot study clearly show that the use of a wedge shaped cushion promotes improved seated postures in 10 year old school children. When closely examining the photos it appears that not all the students who were using a wedge cushion are sitting well and there are a few children in the class without the wedge cushion that appear to be sitting well, however overall assessment is that there is an overall improvement in posture of the children when using a wedge cushion. The most important remarks are made by the Class teacher who was unbiased as he had never heard about the wedges before the study so he had no idea what to expect and other staff members remarked on the difference between the postures of children using the wedge cushion compared to the children who were not. Other staff members remarked on the difference between the posture of children with wedges and other children. In addition, all of the children without exception responded positively to the use of wedge shaped cushions. The study also shows a degree

of awareness of posture among students that could well be tapped into by further action research in this area. For instance, one third of the children stated that the wedge shaped cushions made them 'sit straighter'. However, as the number of participants in the study was small, it would be of value to study a larger group.

While in the past, almost all school chairs were made to slope backwards for what appears to be practical reasons of safe stacking of the chairs, research and campaigning to date has achieved a change in the specifications for school chairs at EU level. These specifications now permit a forward sloping seat: hence the current study. This change also underlies our recommendation that government bodies take up our call for further research in this area, with all the probable benefits that improved posture will bring about in schools, not just for school performance, but also for the future lives of our school children.

Recommendations

1. Further studies into the impact of forward sloping seat pans in classrooms should be considered as follows:
 - a) a longitudinal study where children are given wedge shaped cushions at age of 5 and continue to use them until they finish primary school.
 - b) a larger study incorporating several schools.
 - c) a study in secondary school with older children.

2. To explore the potential of more significant improvements in seated posture in classrooms, a further study which would include using a sloping writing block as well as the wedge cushion should be considered.

3. The impact of a forward sloping seat on seated postures of school children should be studied. (i.e. the forward sloping seat to be made available without the use of a wedge shaped cushion)

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AT Teacher Training College, Galway: Barbara Bradby; Doireann Carney; Shane Kearney; Alazne Larrinaga

References

(1) Your Back in the future (Backcare report 2005)

http://www.alexander.ie/pdfs/School_Furniture_Report_BackCare.pdf

(2) Balanced sitting posture on forward sloping seat by A. C. Mandal M.D.

<http://www.acmandal.com/>

(3) Are you sitting comfortably – Sean Mc Dougall

<http://www.stakeholderdesign.com/are-you-sitting-comfortably/>

(4) Effect of a high-density foam seating wedge on back pain intensity when used by 14 to 16-year-old school students: a randomised controlled trial

<http://www.ncbi.nlm.nih.gov/pubmed/23122434>

Appendix 1

Pilot Study

Impact on pupils' posture of use of wedges on school chairs

4th Class, St Nicholas's Primary School, Claddagh.

Child's Name:	Date of Birth:	Height(circle): below class avg class avg above avg	
As the child completes a written exercise seated (without a wedge) at a desk, complete the following observations with regard to the child's posture. (If the child moves during the period of observation record the posture most frequently held).			
Initial Observations	yes	No	
The back is straight and bending is at hip joints (if no continue below at 2.1)			
Both feet are flat on the ground (if no continue at 3.1 below)			
The pen is being gripped tightly			
The head is positioned to one side			
Additional Observations			
2.1 The child is bending at the back and collapsing spine			
2.2 One shoulder is higher than the other			
2.3 The body is twisted			
2.4.1 The child's nose is more than half their forearm length from the desk OR			
2.4.2 The child's nose is less than half their forearm length from the desk			
3.1 One foot is flat on the ground			
3.2 The toes are making contact with the ground			
If neither of the above can be ticked, explain how the feet are positioned			
Comments from child after giving wedge and instruction on use of same. (Question put to child "how do you feel sitting on the wedge?")			

Information collected by (AT Trainee Name):

Date:

Appendix 2

Pilot Study

Impact on pupils' posture of use of wedges on school chairs

4th Class, St Nicholas's Primary School, Claddagh.

Child's Name:

Date:

Ask the child to complete the following questions and record page 1 observations as they do so.
(If the child needs help completing the form record their answers word for word.)

What do you think of the cushion?	
Do you think the cushion has changed how you sit? If it has list all the ways:	
•	
•	
•	
•	
Would you like to carry on using the cushion?	
Draw a picture of yourself sitting in class	
Before I got the cushion	After I got the cushion
What would you be most likely to say about the cushions?	