SCHOOLBAG CARRIAGE AND SCHOOLBAG-RELATED MUSCULOSKELETAL PAIN IN PRIMARY SCHOOL CHILDREN IN IRELAND

A Report for the Joint Committee on Children and Youth Affairs
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Biography

Dr Sara Dockrell is an Assistant Professor in Trinity College Dublin and a Chartered Physiotherapist. Her primary teaching and research interest is the investigation and application of ergonomics to promote physical health and wellbeing. Recent focus has been on children and students in education.

Specific topics include:

- Schoolbag carriage
- Computer-related musculoskeletal disorders
- Sedentary behaviour in the classroom.

Dr Dockrell is an active member of the Irish Society of Chartered Physiotherapists special interest groups and also the Irish Ergonomics Society and the International Ergonomics Association research/technical groups on ergonomics in schools. She was a member of the Department of Education and Science expert working group on Weight of Children's Schoolbags in 1997-98.

She has over 20 years’ experience of research in this area and has published widely in clinical, education, and ergonomics peer-reviewed journals.
1. Introduction

Carrying a schoolbag is a common and necessary activity undertaken by children worldwide. There continues to be concern about the negative health impact of carrying a schoolbag, with particular focus on the schoolbag weight, usually expressed as a percentage of the child’s bodyweight. However, there is considerable inconsistency in the reported global research findings to date. Pain in children is complex and the relationship between schoolbag carriage and pain is not simple (Dockrell et al. 2013).

The first national study of schoolbag carriage in Ireland investigated the characteristics of schoolbag carriage in primary school children (Dockrell et al. 2015). Using a novel approach, the study also established the dose-response relationship of schoolbag carriage and schoolbag-related musculoskeletal pain.

A further study included the calculation of the combination of schoolbag weight and duration of carriage to establish the mechanical burden of carrying a schoolbag and to test its association with schoolbag-related musculoskeletal pain (Dockrell et al. 2016a).

2. Main Findings

2.1. A total of 529 children took part in the study (mean age 10.6 years±7.14 months; 55.8% male: 44.2% female).

2.2. The majority of children (93.8%) had a backpack and 89.7% of them carried it on two shoulders.

2.3. The majority (56.1%) travelled to school by car and 36.9% walked to school.

2.4. The majority of children (77.5%) carried their schoolbag for ten minutes or less on the way to school. Even among the ‘walkers’ the mean duration was 10.9 min.

2.5. The mean schoolbag weight was 4.8±1.47kgs. This represented a mean %bodyweight of 12.6±4.29%.

2.6. The prevalence of baseline musculoskeletal pain i.e. before schoolbag carriage was high (63.4%).

2.7. Schoolbag-related pain was most commonly reported in the shoulders (27.3%) and the back (15%).

2.8. The risk factors for schoolbag-related shoulder pain and back pain were not the same. Psychosocial factors (perception of schoolbag weight and emotional wellbeing) and a history of pain were associated with back pain. Gender (being female) and a history of pain were associated with shoulder pain.
2.9. None of the physical factors (absolute/relative schoolbag weight, carrying an additional item, duration of carriage, method of travel to school) was associated with schoolbag-related pain.

2.10. No threshold of weight, duration or the combination of the two measures provided a cut-off point for predicting schoolbag-related musculoskeletal pain.

3. Conclusions from Research Studies

3.1. There is no merit in guidelines for schoolbag carriage that are based solely on the weight of the schoolbag. A schoolbag weight guideline that is based on the (i) absolute weight of the schoolbag or (ii) the relative weight of the schoolbag to the child’s bodyweight was not associated with schoolbag-related musculoskeletal pain.

3.2. Given the changing pattern of obesity in children, a guideline schoolbag weight that is based on the child’s bodyweight is not appropriate. In the light of this, guidelines and future studies should focus on factors other than schoolbag weight.

3.3. The risk factors for shoulder pain and back pain are different, therefore a better understanding of the risk factors that contribute to musculoskeletal pain in the separate body areas is important to the planning of successful preventative strategies. The role of psychosocial factors in paediatric back pain was further vindicated in our research. A previous history of pain was a risk factor for both shoulder pain and back pain. This highlights the need to identify the earliest reporting of schoolbag-related pain in children and to implement plans for its prevention.

3.4. The high prevalence of baseline pain in children (63%) has implications for the interpretation of schoolbag-related pain both in the laboratory and in the ‘real-world’ setting. If there is a pre-existing baseline level of pain in a population of children it may not be accurate to attribute their pain, measured at only one time point, to schoolbag carriage alone, as it may inadvertently influence the reported prevalence of pain attributed to carrying a schoolbag.

3.5. The effect of the digital age on schoolbag weight is as yet unknown. It has been suggested that the use of technology in education would result in the reduction of the weight of schoolbags, as the need to carry books to and from school would be eliminated or at least decreased. Although some children use technology widely and exclusively in school, they are still in the minority. Even in these situations the children frequently continue to do book-based homework. Therefore the need to carry a schoolbag continues for these children. In our research, the mean schoolbag weight from schools where iPads were used was not lower than that of the other schools included in the survey.
4. Recommendations

4.1. Carrying a well-designed and correctly-fitted backpack over both shoulders has been accepted as the optimum method of carriage in the real-world setting. Therefore strategies on schoolbag carriage should focus on improved knowledge and adherence to schoolbag-related advice in general (Appendix 1: Guidelines for Schoolbag Carriage) with less emphasis on the schoolbag weight alone.

4.2. There is little documented evidence that children or their parents have ever received information or advice about schoolbag carriage. An awareness of basic ergonomic principles, and advice on best practice for schoolbag lifting and carrying should be provided to children, parents and teachers. There is a need for ongoing school-based strategies that aim to disseminate information using existing or novel ways of communication. These could include initiatives such as raising the level of awareness about schoolbag type, features, comfort and safety through various media such as poster campaigns, lecture/demonstration/talk series, email and social media or on the school website.

4.3. Knowledge transfer to the wider range of stakeholders including health professionals, schoolbag designers, manufacturers and retailers is also recommended (Dockrell et al. 2016b).

4.4. Many of the solutions to carrying a schoolbag are found locally within the school community. For example, the provision of school lockers or improved accessibility (because of location, class timetable or school policy) to existing school lockers may be a solution. Projects conducted by students and/or teachers in collaboration with the parents that focus on their own particular situation in a school or school district could also be of value and may be more preferable as they are more likely to improve adherence to advice.

4.5. Exercise and movement are critical to healthy child development and to maintaining a healthy quality of life. Current physical activity guidelines state that children should do at least 60 minutes of moderate-to-vigorous physical activity every day. Walking to and from school while carrying a schoolbag could count as moderate activity and therefore it should be encouraged, and not discouraged. Not carrying a schoolbag could be seen to be a barrier to physical activity and may deny children the benefits of daily resistance exercise as they travel to and from school.
Selected References

The complete findings of the research on which this report is based can be found in the following references:


Other relevant references


APPENDIX 1

Guidelines for Schoolbag Carriage

The adverse effects of schoolbag carriage can be decreased if there is awareness of basic ergonomic principles. Consider the type of school bag, the contents and method of lifting and carrying the bag. The aim is to eliminate or minimise discomfort, similar to the approach used in risk assessment in the workplace, and make the most from the exercise that children can get when walking to and from school with their bags.

- Buy a backpack style bag with adjustable padded shoulder straps to fit the size
- Look for a padded back and hip strap if possible.
- Put the heaviest items in the backpack close to your back
- Wear the bag on the back with the straps on both shoulders.
- Carry only what is needed. Think ahead and only carry books and other items as required. If there is a locker available in school, you should make good use of it.
- Carry only when you have to.
- Avoid swinging the schoolbag around and lifting it on the back.
- Involve the children, parents and teachers in finding solutions to schoolbag carriage.