

Technical Appendix

Definition

This entry covers changes to the built environment such as a move to a new school building or improvements to the design, air quality, noise, light, or temperature of an existing building.

Search Terms: Physical environment; building; physical setting; physical classroom environment; built environment; physical learning environment

Evidence Rating

There are no meta-analyses of interventions on the impact of the built environment on learning. Available systematic reviews do not contain effect size information. Research on this area is mainly based on correlational studies or drawn as inferences from wider environmental research. There are two strands of evidence, one which looks for a link between attainment and poor environmental conditions (negative effects) and one which seeks to identify a link between attainment and good conditions or particular features (positive effects). There are very few rigorous experimental designs or well-matched studies, and this makes it hard to establish causal claims about the impact of physical changes. The correlational evidence tends to be stronger for the negative effect of poor conditions. Overall the evidence is rated as very limited.

References

- 1 *Baker, L., & Bernstein, H.*
The Impact of School Buildings on Student Health and Performance [↗](#)
Washington DC: The Center for Green Schools
(2012)
- 2 *Bakó-Biró, Z., Clements-Croome, D. J., Kochhar, N., Awbi, H. B., & Williams, M. J.*
Ventilation rates in schools and pupils' performance [↗](#)
Building and Environment, 48, 215-223
(2012)
- 3 *Daisey, J. M., Angell, W. J., & Apte, M. G.*
Indoor air quality, ventilation and health symptoms in schools: an analysis of existing information [↗](#)
Indoor Air, 13(1), 53-64
(2003)
- 4 *Evans, G. W., & Maxwell, L.*
Chronic Noise Exposure and Reading Deficits The Mediating Effects of Language Acquisition [↗](#)
Environment and Behavior, 29(5), 638-656
(1997)
- 5 *Maxwell, L. E., & Evans, G. W.*
The effects of noise on pre-school children's pre-reading skills [↗](#)
Journal of environmental Psychology, 20(1), 91-97
(2000)
- 6 *McLean, P. D.*
A Study of the Relationship Between Building Conditions, Selected Teacher Qualifications, and Student Attendance in High and Low Performing Elementary Schools [↗](#)
Doctoral dissertation
(2011)
- 7 *O'Sullivan, S.*
A study of the relationship between building conditions and student academic achievement in Pennsylvania's high school [↗](#)
Doctoral dissertation, Virginia Polytechnic Institute and State University
(2006)
- 8 *Shield, B. M., & Dockrell, J. E.*
The effects of environmental and classroom noise on the academic attainments of primary school children [↗](#)
The Journal of the Acoustical Society of America, 123(1), 133-144
(2008)
- 9 *Storey, H. C., Pearce, J., Ashfield-Watt, P. A. L., Wood, L., Baines, E., & Nelson, M.*
A randomized controlled trial of the effect of school food and dining room modifications on classroom behaviour in secondary school children [↗](#)
European journal of clinical nutrition, 65(1), 32-38
(2011)
- 10 *Tanner, C. K.*
The influence of school architecture on academic achievement [↗](#)
Journal of Educational Administration, 38(4), 309-330
(2000)
- 11 *Uline, C., & Tschannen-Moran, M.*
The walls speak: The interplay of quality facilities, school climate, and student achievement [↗](#)
Journal of Educational Administration, 46(1), 55-73
(2008)
- 12 *Waterhouse, L.*
Multiple intelligences, the Mozart effect, and emotional intelligence: A critical review [↗](#)
Educational Psychologist, 41(4), 207-225
(2006)
- 13 *Woolner, P., Hall, E., Higgins, S., McCaughey, C., & Wall, K.*
A sound foundation? What we know about the impact of environments on learning and the implications for Building Schools for the Future [↗](#)
Oxford Review of Education, 33(1), 47-70
(2007)
- 14 *Woolner, P., Hall, E., Wall, K., Higgins, S., Blake, A. & McCaughey, C.*
School building programmes: motivations, consequences and implications [↗](#)
Reading: CfBT
(2005)

15 Woolner, P., McCarter, S., Wall, K. & Higgins, S.

Changed Learning Through Changed Space. When can a Participatory Approach to the Learning Environment Challenge Preconceptions and Alter Practice? [↗](#)

Improving Schools 15(1), 45-60

(2012)

16 Xie, H., Kang, J., & Tompsett, R.

The impacts of environmental noise on the academic achievements of secondary school students in Greater London [↗](#)

Applied Acoustics, 72(8), 551-555

(2011)

Summary of effects

Single Studies	Effect size	FSM effect size	
Evans, G. W., & Maxwell, L. (1997)	-1.40	-	Reading (Chronic noise)
O'Sullivan, S. (2006)	0.36	-	Reading (Building conditions)
	0.36	-	Maths (Building conditions)
Shield, B. M., & Dockrell, J. E. (2008)	-0.36	-	(External noise on 5-7 year olds)
	-0.41	-	(External noise on 8-11 year olds)
	-0.40	-	(Internal noise on 5-7 year olds)
	-0.43	-	(Internal noise on 8-11 year olds)
Indicative effect size	0.00		

The right hand column provides detail on the specific outcome measures or, if in brackets, details of the intervention or control group.