

Electronic Supplementary Material

Development of acoustic computer simulation for performance spaces: A systematic review and meta-analysis

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Appendix A

Table A1 Detailed quality score for eligible studies

Quality assessment item	1	2	3	4	5	6	7	8	9	10
	D'Orazio et al. 2020	Ibarra-Zarate and Padilla-Ortiz 2020	D'Orazio et al. 2018	Shtrepi et al. 2017	Postma and Katz 2016	Alfano et al. 2015	Hornikx et al. 2015a	Alonso et al. 2014	San Martín et al. 2014	Bustamante et al. 2014
Study question										
1 The background is relevant and the research question rationale is given*	1	2	1	1	2	1	1	1	1	1
Study design										
2 on-site tests were conducted to obtain the data for comparison#	2	2	2	2	2	2	2	2	2	2
3 The selected simulation software algorithm is suitable for the case \$	2	2	2	2	2	1	2	2	2	2
4 No multiple simulations are conducted to fit the results of actual measurement #	0	2	0	0	0	0	2	0	0	0
5 the results of on-site tests remain blind before simulations #	0	1	0	0	0	0	1	0	0	0
6 Sound absorption coefficient with angle information is considered \$	1	1	1	1	1	1	1	1	1	1
7 The algorithm can consider certain wave effect, such as edge effects, seat effects, etc. \$	1	0	1	1	1	1	2	1	1	1
8 Simulations and on-site tests are conducted by different people #	1	1	1	1	1	1	1	1	1	1
Participants										
9 The selection of samples is broadly representative \$	1	0	1	1	1	1	1	1	1	1
10 Reasonable modelling of the case \$	1	2	2	2	2	2	2	2	2	2
11 In a large number of cases \$	0	0	0	0	1	1	1	0	0	0
12 The sound absorption coefficient comes from the measured results \$	1	1	1	1	1	1	1	1	1	1

	1	2	3	4	5	6	7	8	9	10
Quality assessment item	D'Orazio et al. 2020	Ibarra-Zarate and Padilla-Ortiz 2020	D'Orazio et al. 2018	Shtrepi et al. 2017	Postma and Katz 2016	Alfano et al. 2015	Hornikx et al. 2015a	Alonso et al. 2014	San Martín et al. 2014	Bustamante et al. 2014
Intervention										
13 the parameters in the simulations are reasonable \$	2	1	2	2	2	2	2	2	2	2
14 The experience level of the simulation conductor #	1	2	1	1	1	1	1	1	1	1
15 on-site tests are conducted based on ISO-3382 \$	2	1	2	1	2	1	2	1	1	2
Outcomes										
16 An appropriate primary outcome is defined *	2	2	2	2	2	2	2	2	2	2
17 Appropriate secondary outcomes are defined *	1	1	1	1	1	0	1	1	1	2
18 simulation and test result data are provided \$	1	1	1	1	1	1	1	2	2	1
Analysis										
19 Verify the stability of the simulation results through multiple simulations with the same configuration \$	1	1	1	1	2	1	1	1	1	1
20 The simulation and test results of all measured points are compared \$	1	1	1	1	1	2	2	2	2	2
21 Comparison of simulation and test results for all major frequency bands (125–4000 Hz) \$	0	1	0	2	2	2	1	2	2	2
22 Statistical analysis of the uncertainty of the results \$	0	1	0	1	1	1	1	0	1	1
23 theoretical and practical significance are considered in interpreting results #	1	1	1	1	1	1	1	1	1	1
Recommendations										
24 The conclusion is supported by the study objectives, analysis, and results *	1	2	1	2	2	2	2	2	2	2
Total	24	29	25	28	32	28	34	29	30	31

Table A1 Detailed quality score for eligible studies (Continued)

	11	12	13	14	15	16	17	18	19	20
Quality assessment item	Koutsouris et al. 2013	Picaut and Fortin 2012	San Martín and Arana 2006	Bork 2006	Gomes et al. 2000	Howarth and Lam 2000	Lam 1996	Vorländer 1995	Strøm et al. 1985	Marshall 1979
Study question										
1 The background is relevant and the research question rationale is given*	2	2	1	2	1	1	2	2	1	1
Study design										
2 on-site tests were conducted to obtain the data for comparison#	0	2	2	2	2	2	2	2	2	2
3 The selected simulation software algorithm is suitable for the case \$	2	2	2	2	2	2	2	2	2	1
4 No multiple simulations are conducted to fit the results of actual measurement #	2	1	2	2	0	1	2	2	2	2

		11	12	13	14	15	16	17	18	19	20
			Picaut and Fortin 2012	San Martín and Arana 2006	Bork 2006	Gomes et al. 2000	Howarth and Lam 2000	Lam 1996	Vorländer 1995	Strøm et al. 1985	Marshall 1979
	Quality assessment item	Koutsouris et al. 2013									
5	the results of on-site tests remain blind before simulations #	0	1	0	2	1	1	1	2	1	2
6	Sound absorption coefficient with angle information is considered \$	1	1	1	1	1	1	1	1	1	0
7	The algorithm can consider certain wave effect, such as edge effects, seat effects, etc. \$	1	1	1	1	1	1	1	1	0	0
8	Simulations and on-site tests are conducted by different people #	2	2	2	2	1	1	1	1	1	1
Participants											
9	The selection of samples is broadly representative \$	1	1	1	1	1	1	1	1	1	1
10	Reasonable modelling of the case \$	2	2	2	2	2	2	2	2	2	1
11	In a large number of cases \$	0	1	0	2	0	2	0	2	0	0
12	The sound absorption coefficient comes from the measured results \$	1	1	1	1	1	2	1	1	1	1
Intervention											
13	the parameters in the simulations are reasonable \$	2	2	2	2	2	1	2	2	2	1
14	The experience level of the simulation conductor #	2	2	1	2	1	1	2	2	2	2
15	on-site tests are conducted based on ISO-3382 \$	2	2	1	2	1	1	1	2	1	1
Outcomes											
16	An appropriate primary outcome is defined *	2	2	2	2	2	2	2	2	2	1
17	Appropriate secondary outcomes are defined *	1	1	1	2	1	1	1	2	0	0
18	simulation and test result data are provided \$	2	1	2	1	1	1	1	1	0	1
Analysis											
19	Verify the stability of the simulation results through multiple simulations with the same configuration \$	1	1	1	1	2	1	1	1	1	1
20	The simulation and test results of all measured points are compared \$	2	1	2	1	2	1	1	2	1	0
21	Comparison of simulation and test results for all major frequency bands (125–4000 Hz) \$	1	1	2	1	2	1	1	1	1	1
22	Statistical analysis of the uncertainty of the results \$	0	0	0	1	1	1	0	1	0	0
23	theoretical and practical significance are considered in interpreting results #	2	1	1	2	1	1	1	2	1	1
Recommendations											
24	The conclusion is supported by the study objectives, analysis, and results *	2	2	2	2	2	2	2	2	2	2
Total		33	33	32	39	31	31	31	39	27	23

* Item is the same as in the Evaluation Guidelines for Rating the Quality of an Intervention Study scoring system.

Item is similar to the original one but modified according to the characteristics of the acoustic simulation in the performance space.

\$ Replace with the new item because the original one does not apply to this research at all.

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