

Table 3. Research priorities generated and rated on importance by scientific experts

	Statements concerning research priorities	Rating of importance
CLUSTER 1: Causality	1. <i>Is there a causal (not correlational, not covariational) relationship between PA (spontaneous/structured/regular PA or sport) and cognition (cognitive functions, higher-level cognition (executive function, metacognition)), and cognitive performance) and academic behaviour and achievement?</i>	111
	2. <i>What are the effects of PA on learning? (We mostly know about cognitive performance, and know very little about actual learning).</i>	98
	3. <i>Are the effects of exercise/PA enduring?</i>	95
	4. <i>Are the effects of exercise/PA on cognitive functioning global or task specific?</i>	87
	5. <i>Are the effects of PA on cognitive/academic performance chronic or acute effects and does this depend on the nature of the PA?*</i>	86
	6. <i>What is the breadth of cognitive outcomes that are affected by PA?</i>	85
	7. <i>Which specific aspects of memory (explicit vs. implicit) and core executive function (inhibition vs. set shifting vs. working memory) are sensitive to regular exercise?</i>	85
	8. <i>Are the causal effects of PA and academic performance limited to certain academic subjects, such as mathematics or language?</i>	72
CLUSTER 2: PA characteristics (type, frequency, intensity, duration, timing)	9. <i>What are the qualitative and quantitative characteristics of PA that allow reaping largest cognitive benefits?</i>	100
	10. <i>How do quantitative and qualitative aspects of exercise influence exercise-induced benefits on cognitive performance?</i>	97
	11. <i>What type of exercise/PA is important?</i>	97
	12. <i>What is the optimum intensity of PA to exert benefit on cognitive outcomes (light, moderate, vigorous)?</i>	94

	13. <i>What is the dose-response relationship between PA and cognitive outcomes (ie, is there an optimum amount of activity to receive cognitive benefits? What dose of PA is necessary to observe meaningful changes in cognitive outcomes? What are the effects of increased physical education lessons on cognitive/academic performance?)</i>	93
	14. <i>Are the effects of PA on cognitive/academic performance chronic or acute effects and does this depend on the nature of the PA?*</i>	86
	15. <i>What is the frequency x intensity x duration of exercise required to induce improved cognitive and academic performance?</i>	86
	16. <i>What is the frequency x intensity x duration of exercise required to induce changes in brain morphology?</i>	85
	17. <i>How does timing of exercise sessions (before school, during classes, during breaks, after school) influence possible benefits on cognitive and academic performance?</i>	84
	18. <i>What are the effects of adapted motor skills interventions on cognitive/academic performance?</i>	82
	19. <i>Can we reliably modulate cognition/academics through a standardized dose of PA (ie, can a specific mode, duration, & intensity of PA reliably change cognition)?</i>	80
	20. <i>Why do aerobic exercise and resistance training interventions generally fail to improve memory or executive functions, and when they do the cognitive benefits are uncorrelated with the physical fitness benefits, but people who are more physically active and have better aerobic fitness have better executive functions? How can the latter be reconciled with the rest?</i>	78
	21. <i>Do physical activities that train and challenge executive functions, bring joy and pride, and engender feelings of social belonging and support improve executive functions and academic performance?</i>	78
	22. <i>What are the effects of increased time for recess in schools on cognitive/academic performance?</i>	77
	23. <i>Is exercise while simultaneously undertaking a cognitive task more beneficial than exercise alone?</i>	76
	24. <i>In what ways do aerobic and anaerobic PA affect cognitive functioning differently?</i>	73
	25. <i>What is important - exercise or PA?</i>	69

	26. <i>What are the effects PA interventions implemented in sport clubs on cognitive/academic performance?</i>	60
CLUSTER 3: Moderators	27. <i>Are there particular groups of individuals (eg, those with ADHD, overweight or obese, genetic predictors) who might achieve greater cognitive benefits in response to PA than observed in the general population?</i>	93
	28. <i>Does the relationship differ across age? That is, are there critical periods of development when PA is especially beneficial to cognitive/academic performance?</i>	92
	29. <i>What are the most meaningful moderators (individual and task constraints) and mediators (mechanisms) acting on the acute and chronic exercise-cognition relationship?*</i>	90
	30. <i>Do healthy children and children with executive function deficits need different exercise stimuli for the elicitation of cognitive benefits?</i>	88
	31. <i>Are there other lifestyle behaviours (eg, nutrition, sleep quality/quantity) that can be combined with PA to increase observed benefits to cognitive outcomes?</i>	87
	32. <i>What youth moderators influence the relationship between activity and cognition (child gender, fitness level, age, ethnicity/race, disability status)?</i>	86
	33. <i>Is there an interaction between exercise and nutrition that is necessary to induce improved cognitive and academic performance?</i>	78
	34. <i>Why do there appear to be gender differences in cognitive functioning associated with PA?</i>	76
CLUSTER 4: Mechanisms	35. <i>What are the brain mechanisms responsible for the observed relationship between PA and cognitive/academic performance (from cellular to functional and morphological (gray or white matter) changes in the brain)?</i>	96
	36. <i>What are the most meaningful moderators (individual and task constraints) and mediators (mechanisms) acting on the acute and chronic exercise-cognition relationship?*</i>	90
	37. <i>How do exercise-induced improvements in specific cognitive domains relate to academic performance?</i>	88

	38. <i>What is the role of cognitive functions (eg executive functions, memory) in the relationship between PA and academic performance?</i>	86
	39. <i>Which psychosocial factors mediate the relationship between PA and educational achievement?</i>	85
	40. <i>Which psychosocial factors mediate the relationship between PA and educational achievement?</i>	85
	41. <i>Are benefits of PA for cognitive performance due in large part to PA's benefits for mood (relieving stress and depressed affect) and/or for sleep?</i>	69
CLUSTER 5: Miscellaneous	42. <i>Is PA at early developmental stages predictive of later cognitive efficiency and academic achievement?</i>	85
	43. <i>Do we need to generate more RCTs, reviews and meta-analyses on the relationship between PA and cognitive/academic performance, particularly on the effects of adapted motor skills interventions on cognitive/academic performance?</i>	82
	44. <i>If PA enhances educational achievement, what effect is sedentary behaviour likely to have?</i>	79
	45. <i>How can scientific (especially neuroscientific) evidence on the acute and chronic exercise-cognition relationship be rendered suitable to inform policy development?</i>	76
	46. <i>What are the motivational factors affecting children's and adolescents' willingness to undertake exercise in order to improve their cognitive and academic performance?</i>	76
	47. <i>Might aerobic activities that train and challenge executive functions be especially beneficial for 3-6 year olds? We know so little about the cognitive benefits of PA for very young children.</i>	74
	48. <i>What makes PA special?</i>	59

* coded in two clusters