Waterloo CoDA Project

Primary School Report

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Dr. Richard Tyler & Prof. Stuart Fairclough

Sport and Physical Activity Department, Edge Hill University

Mark Forster

West Lancashire Sport Partnership

A novel 24-hour compositional data analysis approach to understand the influence of sleep, sedentary time, and physical activity on children's and adolescents' behavioural, psychological, and cognitive health

Lead researcher
Prof. Stuart Fairclough; Email: stuart.fairclough@edgehill.ac.uk; Tel: 01695 584143
Project coordinator: Dr. Richard Tyler; Email: Tylerr@edgehill.ac.uk; Tel: 01695 584842

What is the purpose of the study?

Children's health and development are influenced by how much time is spent sleeping, sitting, and doing physical activity. Together these termed, *movement behaviours*, and they can impact on a range of health and wellbeing indicators. The aims of this project are to investigate associations between children's movement behaviours and psychological, behavioural, and cognitive health, and to understand children's views of the role of movement behaviours on their health and wellbeing. The information gathered from the project will help us to better understand how different types of movement behaviours influence health and how schools can use this information to promote their pupils' wellbeing (e.g., the effects on classroom behaviour, academic performance, etc).

What measures are involved in the project?

Participants took part in various measures at school and data was collected by trained research staff. These measures are described below.

Height and weight – These measures took place in a private area away from the rest of the group. Weight was measured by asking the child to stand on weighing scales with their shoes removed. Height was measured using a height meter; each child was asked to stand with their back to the height meter and the researcher recorded the height values.

Questionnaires – As a whole class, children were asked to fill out questionnaires that asked them about their general wellbeing, mood, and self-perceptions. We also asked parents/carers to complete questionnaires about their child's coordination and cognitive ability, as well as information about their postcode and education level.

Movement skills – As part of PE lessons, the children took part in a skills circuit designed to measure balance, agility, throwing, dribbling, catching, jumping, and running skills. To view the movement skills circuit, please see https://www.youtube.com/watch?v=lSPLtwDrgRM.

Physical activity and sleep monitoring – A small activity monitor was handed out and children were asked to wear this for 8 days. The monitors are small and lightweight and are worn on the wrist. Children were asked to wear the monitors throughout the day and during the night to get a true indication of their activity and sleep patterns.

Cognitive tests – Children completed an online cognitive ability and intelligence test in the classroom.

NC levels/SATS – We asked schools to provide information about each child's National Curriculum level in English, Maths, and Science, and where applicable, SATS scores. We are currently in the progress of receiving these results from, so have not included this information in this report.

Additional descriptive data - We also recorded pupils' gender, ethnicity and date of birth, and postcode. This information provides information about the demographic make-up of the participating children. Any identifiable data was removed immediately after anonymization and linking in accordance with GDPR regulations.

Data collection to date:

There are 10 schools from the Lancashire TARDiS (Tarleton and Rural District) primary school cluster that have taken/are taking part in the project. These include Bretherton Endowed C of E Primary School, Holmeswood Methodist Primary School, Tarleton Community Primary School, Tarleton Holy Trinity CE Primary School, Mere Brow C of E Primary School, Banks St Stephen's Primary School, Rufford C of E Primary School, Banks Methodist Primary School, Hoole St Michael CE Primary School, and Hesketh with Becconsall All Saints C of E Primary School.

Overall, we have had 210 primary school pupils take part in the project so far. Summary results for these pupils are presented in this report.

Demographics:

Primary School Pupils			
Variables	**Boys**	**Girls**	**All**
N	107	103	210
Age (years)	10.5 ± 0.7	10.3 ± 0.7	10.4 ± 0.7
Academic Year			
Year 5	58.9%	68.9%	63.8%
Year 6	41.1%	31.1%	36.2%
Ethnicity			
White	95.3%	99.0%	97.1%
Any Other	4.7%	1.0%	2.9%
Deprivation			
Deprivation Score (EIMD)	11.1 ± 5.9	11.6 ± 7.1	11.3 ± 6.5
Rank (1 = most deprived)	23604 ± 5998	23300 ± 6498	23455 ± 6235
Decile (1 = most deprived 10%)	7.8 ± 2.0	7.8 ± 2.1	7.8 ± 2.0
Parent Education Level			
Secondary School	18.4%	17.0%	17.7%
College/6th Form	28.6%	34.1%	31.2%
Undergraduate Degree	23.4%	19.3%	21.5%
Postgraduate Degree	29.6%	29.6%	29.6%

Height and weight:

From the measures of height and weight, the children's Body Mass Index (BMI) was calculated, and age- and sex-specific cut-points were used to provide a percentage of children classed as healthy weight and unhealthy weight (underweight, overweight and obese).

Anthropometric Measures					
	Year 5		Year 6		
Variables	**Boys**	**Girls**	**Boys**	**Girls**	**All**
Height (cm)	140.1 ± 6.9	140.2 ± 7.4	148.5 ± 7.0	147.3 ± 9.0	143.0 ± 8.3
Body Mass (kg)	35.0 ± 8.4	36.0 ± 8.7	41.8 ± 8.9	42.4 ± 12.4	37.9 ± 9.7
BMI ($kg \cdot m^{-2}$)	17.6 ± 2.9	18.2 ± 3.2	18.8 ± 3.1	19.2 ± 3.9	18.3 ± 3.2
Weight Status					
Underweight	11.1%	5.6%	2.2%	15.6%	8.0%
Healthy	65.1%	66.2%	75.0%	59.4%	66.7%
Overweight	20.6%	22.6%	20.5%	15.6%	20.5%
Obese	3.2%	5.6%	2.3%	9.4%	4.8%

These measures provide an insight into the overall health of children, over and above their physical activity behaviours. It is important for children to maintain a healthy weight, through both good nutrition and physical activity, in order to lower the risks of heart disease, stroke and diabetes in the future. Overall, 25.3% of primary school pupils were classed as overweight or obese for their age and sex.

Questionnaires:

Strength and Difficulties Questionnaire (SDQ) (Goodman, 1997):

The 25 items in the SDQ comprise 5 scales of 5 items each. For each item, children were asked to mark the box for 'Not True', 'Somewhat True' or 'Certainly True', on the basis of how things have been for them over the last six months.

Strength and Difficulties Questionnaire

Variables	Year 5		Year 6		
	Boys	Girls	Boys	Girls	All
Total Difficulties Score	**12.8 ± 6.4**	**11.4 ± 6.1**	**10.3 ± 5.2**	**12.9 ± 5.6**	**11.8 ± 5.9**
Emotional Problems Scale	2.8 ± 2.2	3.3 ± 2.4	2.4 ± 2.1	4.2 ± 2.5	3.1 ± 2.3
Conduct Problems Scale	2.5 ± 2.0	2.1 ± 1.7	2.0 ± 1.6	2.1 ± 1.4	2.2 ± 1.7
Hyperactivity Scale	4.8 ± 2.3	4.0 ± 2.3	4.3 ± 2.3	4.2 ± 2.3	4.3 ± 2.3
Peer Problems Scale	2.7 ± 2.0	2.1 ± 1.8	1.7 ± 1.7	2.4 ± 1.8	2.2 ± 1.9
Prosocial Scale	7.8 ± 1.9	8.5 ± 1.2	8.0 ± 1.9	8.3 ± 1.3	8.16 ± 1.6
Impact Score	0.6 ± 1.3	0.5 ± 1.3	0.4 ± 0.9	0.6 ± 1.3	0.5 ± 1.2

Although SDQ scores can be used just as continuous variables, it is sometimes convenient to categorise scores. Classifications to highlight children with difficulties are found below. The initial bandings presented for the SDQ scores were 'normal', 'borderline' and 'abnormal'. More recently a four-fold classification has been created based on an even larger UK community sample. Overall, for all SDQ components and total difficulties score, the primary school pupils were in the normal/close to average range.

Categorising SDQ scores for 4-17 year olds (not validated for 18+)

	Original 3-band categorisation			Newer 4-band categorisation			
	Normal	Borderline	Abnormal	Close to average	Slightly raised (/slightly lowered)	High (/Low)	Very high (very low)
Parent completed SDQ							
Total difficulties score	0-13	14-16	17-40	0-13	14-16	17-19	20-40
Emotional problems score	0-3	4	5-10	0-3	4	5-6	7-10
Conduct problems score	0-2	3	4-10	0-2	3	4-5	6-10
Hyperactivity score	0-5	6	7-10	0-5	6-7	8	9-10
Peer problems score	0-2	3	4-10	0-2	3	4	5-10
Prosocial score	6-10	5	0-4	8-10	7	6	0-5
Impact score	0	1	2-10	0	1	2	3-10
Teacher completed SDQ							
Total difficulties score	0-11	12-15	16-40	0-11	12-15	16-18	19-40
Emotional problems score	0-4	5	6-10	0-3	4	5	6-10
Conduct problems score	0-2	3	4-10	0-2	3	4	5-10
Hyperactivity score	0-5	6	7-10	0-5	6-7	8	9-10
Peer problems score	0-3	4	5-10	0-2	3-4	5	6-10
Prosocial score	6-10	5	0-4	6-10	5	4	0-3
Impact score	0	1	2-6	0	1	2	3-6
Self-completed SDQ							
Total difficulties score	0-15	16-19	20-40	0-14	15-17	18-19	20-40
Emotional problems score	0-5	6	7-10	0-4	5	6	7-10
Conduct problems score	0-3	4	5-10	0-3	4	5	6-10
Hyperactivity score	0-5	6	7-10	0-5	6	7	8-10
Peer problems score	0-3	4-5	6-10	0-2	3	4	5-10
Prosocial score	6-10	5	0-4	7-10	6	5	0-4
Impact score	0	1	2-10	0	1	2	3-10

Note that both these systems only provide a rough-and-ready way of screening for disorders; combining information from SDQ symptom and impact scores from multiple informants is better, but still far from perfect.

Youth in mind. (2016). Scoring the Strength and Difficulties Questionnaire. Retrieved from Youth in mind: http://www.sdqinfo.com/py/sdqinfo/c0.py

Mood and Feelings Questionnaire (MFQ) Long Form (Angold & Costello, 1987):

This questionnaire is about how children might have been feeling or acting recently. For each statement, children checked 'Not True', 'Sometime true' and 'True' on the basis of how they have been feeling or acting in the past two weeks.

Mood and Feelings Questionnaire (Long Form)

	Year 5		Year 6		
Variables	**Boys**	**Girls**	**Boys**	**Girls**	**All**
Mood & Feelings Total Score	**12.0 ± 12.5**	**9.6 ± 10.6**	**10.7 ± 11.6**	**15.3 ± 13.9**	**11.5 ± 12.0**

The Mood and Feelings Questionnaire (MFQ) consists of a series of descriptive phrases regarding how the participant has been feeling or acting recently. The MFQ is a screening tool for depression in children and young people aged between 6 and 17 years. Scores on the long version range from 0 to 66. Higher scores on the MFQ suggest more severe depressive symptoms. Scoring a 27 or higher on the long version may indicate the presence of depression in the respondent. However, there are no prescribed cut-points for the MFQ since there is no single cut-point that is best for use in all circumstances. Overall, the primary school pupils scored well below 27 on the MFQ.

Rosenberg's Self-Esteem Scale (RSES) (Rosenberg, 1965):

This questionnaire is about the child's general feelings about themselves. The scale is a ten item Likert scale with items answered on a four point scale - from strongly agree to strongly disagree, on the basis of how the participant has been feeling over the past two weeks. The scale ranges from 0-30. Scores between 15 and 25 are within normal range; scores below 15 suggest low self-esteem.

Rosenberg's Self-Esteem Scale

	Year 5		Year 6		
Variables	**Boys**	**Girls**	**Boys**	**Girls**	**All**
Self-Esteem Scale Score	**20.9 ± 5.5**	**20.3 ± 5.5**	**21.6 ± 5.4**	**18.8 ± 5.7**	**20.5 ± 5.5**

Overall, for the self-esteem scale score, the primary school pupils were in the normal range for self-esteem.

Parent Questionnaires (parent/carer proxy measures):

Strength and Difficulties Questionnaire (SDQ) (Goodman, 1997):

Parents/carers were asked to complete the 25 item SDQ to obtain their perceptions of their child's strength and difficulties. Please see SDQ section above for details on the scoring and categories.

Strength and Difficulties Questionnaire

	Year 5		Year 6		
Variables	**Boys**	**Girls**	**Boys**	**Girls**	**All**
Total Difficulties Score	**7.8 ± 6.6**	**6.5 ± 4.8**	**7.4 ± 6.0**	**9.0 ± 5.1**	**7.5 ± 5.7**
Emotional Problems Scale	1.9 ± 2.2	2.0 ± 1.9	2.0 ± 2.2	2.7 ± 2.4	2.1 ± 2.1
Conduct Problems Scale	1.2 ± 1.6	1.0 ± 1.3	1.0 ± 1.4	1.4 ± 1.2	1.1 ± 1.4
Hyperactivity Scale	3.6 ± 2.8	2.9 ± 2.3	3.3 ± 2.7	3.6 ± 2.5	3.3 ± 2.6
Peer Problems Scale	1.1 ± 1.6	0.7 ± 1.1	1.2 ± 1.8	1.3 ± 2.1	1.2 ± 1.6
Prosocial Scale	8.8 ± 1.4	9.3 ± 1.2	8.8 ± 1.3	9.1 ± 1.3	9.0 ± 1.3

Impact Score	0.5 ± 1.2	0.3 ± 0.8	0.6 ± 1.2	0.2 ± 1.0	0.4 ± 1.1

Overall, for all SDQ components and total difficulties score, parents'/carers' perceptions of their child's strength and difficulties were in the normal/close to average range.

Parent Perceived Cognitive Function Scale (pedsPCF) (Lai et al., 2011):

The Paediatric Perceived Cognitive Function scale is used to investigate children's cognitive behaviours. For each of the statements, parents/guardians were asked to checkmark the appropriate response for their child, on the basis of their child over the last month. Examples of the statements are: "your child has trouble remembering where he/she put things, like his/her watch or his/her homework", "your child has trouble remembering the names of people he/she knows", and "it is hard for your child to pay attention to something boring he/she has to do". They were asked to indicate the frequency of the statement (e.g. none of the time; a little of the time; some of the time; most of the time; all of the time), or the intensity of the statement (e.g. not at all; a little bit; somewhat; quite a bit; very much), or both frequency and intensity of the statement. Depending on item content, items are measured using either a 5-point frequency rating scale (5 = none of the time, 1 = all of the time) or a 5-point intensity rating scale (5 = not at all, 1 = very much). Higher scores represent better functioning while lower scores indicate more complaints (maximum score = 215, minimum score = 43), with total pedsPCF scores within the data so far ranging from 56 to 215.

Parent Perceived Cognitive Function Scale

	Year 5		**Year 6**		
Variables	**Boys**	**Girls**	**Boys**	**Girls**	**All**
Total pedsPCF Score	**181.4 ± 32.9**	**193.6 ± 23.6**	**180.6 ± 31.4**	**186.4 ± 25.8**	**186.1 ± 28.9**
pedsPCF Frequency Score	106.4 ± 18.2	113.2 ± 12.7	105.4 ± 17.5	109.5 ± 14.0	108.9 ± 15.9
pedsPCF Intensity Score	75.0 ± 15.0	80.5 ± 11.0	75.2 ± 14.1	76.9 ± 12.1	77.2 ± 13.2

Developmental Coordination Disorder Questionnaire (DCDQ) (Wilson, 2007):

The DCDQ is a parent report measure developed to assist in the identification of Developmental Coordination Disorder (DCD) in children. It provides a standard method to measure a child's coordination in everyday, functional activities. Most of the motor skills that this questionnaire asks about are things that children do with their hands, or when moving. A child's coordination may improve each year as they grow and develop. For this reason,

parents were asked checkmark the response that best describes their child, whilst comparing the degree of coordination their child with other children of the same age.

Developmental Coordination Disorder Questionnaire

	Year 5		Year 6		
Variables	**Boys**	**Girls**	**Boys**	**Girls**	**All**
DCDQ Total Score	**64.7 ± 13.4**	**68.1 ± 7.3**	**64.3 ± 12.6**	**65.3 ± 10.6**	**65.8 ± 11.0**
Control During Movement Score	26.8 ± 5.0	27.4 ± 2.9	26.6 ± 5.0	26.1 ± 4.8	26.9 ± 4.3
Fine Motor/ Handwriting Score	17.0 ± 4.1	18.6 ± 2.5	16.8 ± 4.2	18.7 ± 2.4	17.8 ± 3.5
General Coordination Score	20.8 ± 5.2	22.2 ± 3.6	21.0 ± 5.4	20.5 ± 4.7	21.2 ± 4.7

Using the child's chronological age at the time the questionnaire was completed, the table below presents a range that indicates whether the child's DCDQ total score is an "Indication of, or Suspect for, DCD", or "Probably not DCD". Overall, for DCDQ total score, parents/carers perceptions of their child's developmental coordination were in the "Probably not DCD" range.

Age Group	Indication of, or Suspect for, DCD	Probably not DCD
5 years *to* 7 years 11 months	15 - 46	47 - 75
8 years 0 months *to* 9 years 11 months	15 - 55	56 - 75
10 years 0 months *to* 15 years	15 - 57	58 - 75

Wilson, B.N., Crawford, S.G., Green, D., Roberts, G., Aylott, A., & Kaplan, B. (2009). Psychometric Properties of the Revised Developmental Coordination Disorder Questionnaire. Physical & Occupational Therapy in Pediatrics, 29(2):182-202.

Movement skills:

The Dragon Challenge (DC) aims to measure the physical competency of children age 8-14 years. The DC was developed through a Sport Wales, Swansea University and Liverpool John Moores University partnership, and includes 9 tasks that are completed in a continuous fashion. The DC was designed to be an enjoyable challenge for children, whilst at the same time allowing practitioners to assess stability, manipulative and locomotor skills that are

fundamental in movement proficiency. These skills are essential for physical competence and contribute to physical literacy, but the DC does not explicitly assess other physical literacy attributes such as confidence and motivation, knowledge and understanding.

During the challenge children are assessed on the quality of their movement, their ability to complete the tasks as well as the time to complete the challenge. The time, technique and outcome scores are assigned equal weighting, as the more physically literate child will be able to find the optimal balance between speed and accuracy using the necessary technical quality. The obstacle course score is calculated in the same way for every child, regardless of the child's age and sex.

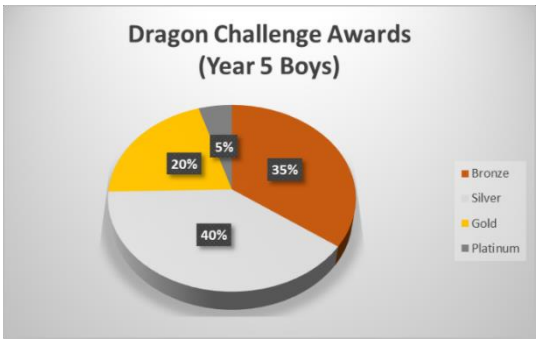
Based on their score, children are placed in categories of competence: Bronze, Silver, Gold and Platinum.

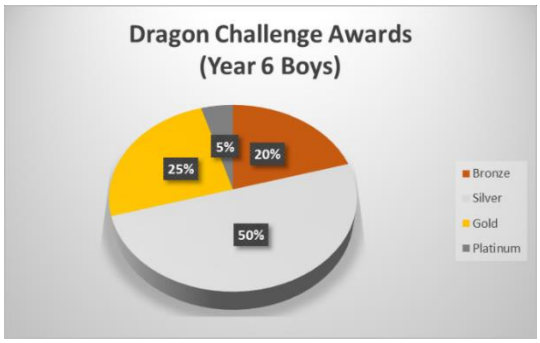
- Children in the bronze category are in the bottom category for physical competence/literacy. These children have low levels of physical competence compared to other children their age and their physical skills are still emerging and require significant improvement. These children need significant encouragement, support and opportunities for practice and instruction to develop their physical competence.
- Children in the silver category fall within the middle category. These children have levels of physical competence that are similar to other children of their age but their physical skills are still developing and require improvement. These children may benefit from opportunities for instruction and practice to refine their skills.
- Children in the gold category fall within the upper category. These children have good levels of physical competence/physical literacy compared to other children their age and have acquired a broad range of physical skills. These children are doing well and should be encouraged to keep practising and exploring different sports and activities to advance and maintain their physical skills.
- Children in the platinum award fall within the top 5% of children. These children have exceptional levels of physical competence/literacy compared to similar aged children and are proficient and accomplished at using their physical skills. These children are very talented and should be congratulated on their skills and encouraged to keep up the fantastic work!

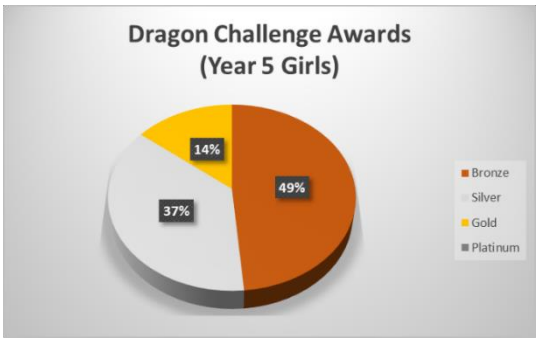
Movement Skills

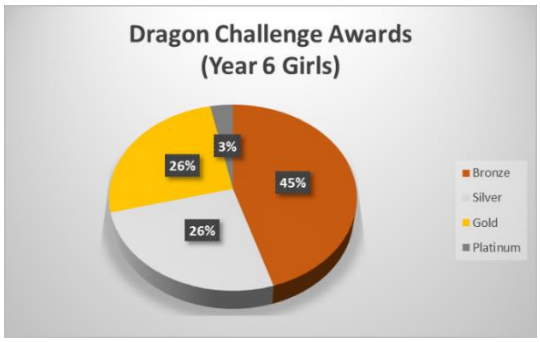
	Year 5		Year 6		
Variables	**Boys**	**Girls**	**Boys**	**Girls**	**All**
Dragon Challenge Score	**31.5 ± 8.2**	**29.6 ± 6.3**	**33.5 ± 7.3**	**31.1 ± 7.8**	**31.2 ± 7.4**

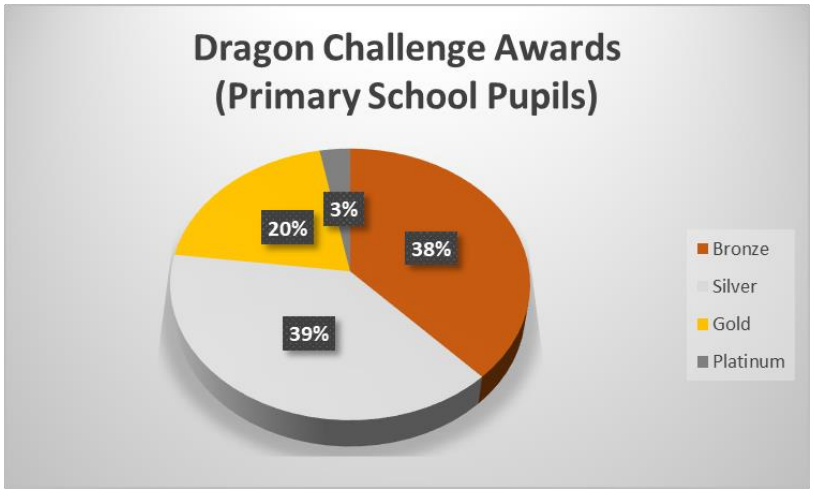
Process/Technique Score	9.2 ± 3.3	8.5 ± 2.7	10.0 ± 3.0	8.3 ± 3.4	9.0 ± 3.1
Product/Outcome Score	10.2 ± 3.7	9.3 ± 3.2	10.5 ± 3.4	10.6 ± 3.7	10.0 ± 3.5
Time Score	12.1 ± 2.6	11.9 ± 1.9	13.0 ± 2.2	12.2 ± 1.8	12.2 ± 2.2











Cognitive tests:

Executive functions are a subset of higher-order cognitive functions that are involved in goal-directed motor outputs. There are three core executive functions including switching, inhibition and working memory. Executive Functions are skills essential for mental and physical health, success in school and in life, and for cognitive, social, and psychological

development. Together, these skills allow children to manage their thoughts, actions and emotions in order to get things done.

Switching or cognitive flexibility involves the ability to shift between mental sets. This skill is a key part of problem solving at school and during everyday life and allows us to think about something in more than one way. A child would use switching to come up with alternative ways to solve the problem when their first attempt doesn't work. It also allows us to 'shift gears' mentally. A simple situation of this would be when it is time for a child to stop playing during break and get ready for class. A child who struggles with cognitive flexibility may find it difficult to switch from play mode to lesson mode.

Inhibition or inhibitory control involves having self-control over one's attention, behaviour, thoughts, and emotions. One example would be that a child needs such selective attention during a lesson, such as when a child wants to screen out their friend talking to them to listen to the teacher. Another would be not shouting out an answer and instead raising their hand.

Working memory involves holding information in mind and mentally working with it. Some simple examples would be doing any math in your head or mentally reordering items (such as reorganising a to-do list).

For the cognitive tests, children completed three Cambridge Neuropsychological Test Automated Battery (CANTAB) cognitive tests of executive function on a touchscreen platform (iPad).

1. Intra-extra Dimensional Set Shift (IED; switching) - Which is a computerised version of the Wisconsin Card Sorting test. Two dimensions are used in the test: Pink shapes and White lines. In this task, participants must use feedback to work out a rule (either pink shape or white line) that determines which stimulus is correct. After six correct responses, the stimuli and/or rule changes.

2. Multitasking Test (MTT; inhibition) - The test displays an arrow which can appear on either side of the screen and can point in either direction. Each trial displays a cue at the top of the screen either direction or side, that indicates to the participant whether they have to select the right or left button according to the "side on which the arrow appeared" or the "direction in which the arrow was pointing". Difficulty increases as the test goes on and the test produces a Stroop-like effect.

3. Spatial Working Memory (SWM; updating)- The aim of this test is that by selecting the boxes and using a process of elimination, the participant should find one yellow 'token' in each of a number of boxes and use them to fill up an empty column on the right-hand side of the screen.

Errors were recorded in each of the three core executive functions, with fewer errors showing greater performance. The ranges of errors within the data set so far are, 7 to 148, 0 to 80 and 0 to 34 for IED, MTT and SWM, respectively.

Cognitive Tests of Executive Function					
	Year 5		Year 6		
Variables	**Boys**	**Girls**	**Boys**	**Girls**	**All**
IED Total Errors (Adjusted)	52.5 ± 40.6	59.3 ± 48.6	50.0 ± 44.3	37.8 ± 27.5	51.6 ± 42.6
MTT Total Incorrect	17.8 ± 11.6	23.9 ± 18.4	16.0 ± 10.7	17.9 ± 12.7	19.4 ± 14.4
SWM Between Errors	18.0 ± 7.0	18.4 ± 7.0	16.1 ± 8.2	18.7 ± 7.3	17.8 ± 7.3

Physical activity, sedentary time, and sleep monitoring:

Physical activity, sedentary time and sleep were measured using wrist-worn accelerometer monitors. Children were asked to wear the monitors for 8 consecutive days during waking and sleeping hours, removing them only during water-based activities as they are not waterproof. Children were provided with log sheets to note down the times they removed the monitors and then put them back on. The average amount of time per day spent in physically activity (PA), sedentary time (ST), and sleeping were calculated. PA was calculated by intensity and is described being light (LPA), moderate (MPA), vigorous (VPA), and moderate-to-vigorous (MVPA). Greater health benefits are generally associated with higher intensity PA. Results from the participants that have taken part in the project so far are presented below.

Physical Activity, Sedentary Time and Sleep					
	Year 5		Year 6		
Variables	**Boys**	**Girls**	**Boys**	**Girls**	**All**
LPA (min/day)	189.8 ± 35.8	197.0 ± 42.7	205.9 ± 42.5	214.7 ± 34.8	199.3 ± 40.4
MPA (min/day)	49.7 ± 13.5	41.1 ± 13.4	54.6 ± 15.6	48.5 ± 15.7	47.5 ± 15.1
VPA (min/day)	13.2 ± 5.5	8.6 ± 4.4	14.7 ± 8.8	9.3 ± 5.4	11.4 ± 6.6
MVPA (min/day)	63.0 ± 17.8	49.7 ± 16.7	69.3 ± 22.2	57.8 ± 19.9	58.8 ± 20.1

Percentage Meeting PA Guidelines for Health	57.9%	25.0%	53.1%	35.3%	41.7%
ST (h/day)	8.8 ± 0.9	8.9 ± 0.9	9.0 ± 0.9	8.6 ± 0.8	8.9 ± 0.9
Average Sleep (h/day)	9.0 ± 0.6	9.1 ± 0.6	8.6 ± 0.5	8.8 ± 0.6	8.9 ± 0.6
Percentage Meeting Sleep Guidelines	52.8%	65.3%	26.7%	47.1%	50.7%

The pupils were very compliant to the accelerometer protocol, wearing the monitors for an average of 22 hours each day for an average of 6 days in the week. The percentage of pupils that achieved current UK physical activity guidelines for health, which is averaging at least 60 minutes MVPA/day was 41.7% for primary school pupils. These data are broadly consistent with national self-report data from the Sport England Active Lives Survey in 2018. Time spent sedentary was high in all pupils (8.9 hours/day) but this would include a large proportion of time spent seated during school time. Pupils recorded 8.9 hours sleep/night which is close to the American Academy of Pediatrics recommendation of at least 9 hours sleep/night for primary school aged children. These guidelines were achieved by 50.7% of the primary group.

We would like to thank the pupils and parents/carers for their participation in the project and we hoped that they enjoyed it and found it of interest. We also appreciate the time and support of the teachers for facilitating the data collection. We would be very happy to answer any questions that you may have about these results.

Stuart Fairclough, PhD
Professor of Physical Activity Education
Principal Investigator - Waterloo Foundation CoDA Project
Department of Sport and Physical Activity
Edge Hill University
E: stuart.fairclough@edgehill.ac.uk
T: 01695 584143

Richard Tyler, PhD
Lecturer in Physical Activity & Physical Education Psychology
Co-ordinator/Researcher - Waterloo Foundation CoDA Project
Department of Sport and Physical Activity
Edge Hill University
E: Tylerr@edgehill.ac.uk
T: 01695 584842