



Overweight and Obese Preschoolers: What Does the Latest Research Say?

December 2015

What Was Studied?

A systematic review was conducted to find **the latest research** on the characteristics and outcomes of intervention programs designed for overweight or obese toddlers and preschoolers. The review both confirmed and extended the most recently published review of research of intervention programs for obesity in early childhood.

Why Was It Studied?

In 2013 the World Health Organization¹ estimated that globally there were over 42 million overweight children under the age of five. That is an increase of over 10 million since 1990, and if numbers continue to rise at the current rate, by 2025 the number of overweight preschoolers will reach 70 million.

The World Health Organization² also estimated that children who are obese tend to develop a variety of health problems as adults, such as cardiovascular disease, diabetes, musculoskeletal disorders, and some cancers. The Canadian Institute for Health Information and the Public Health Agency of Canada³ estimated the economic cost of obesity and obesity related diseases is estimated to be between \$4.6-7.1 billion annually.

¹WHO: Childhood overweight and obesity. (2013: Retrieved from <http://www.who.int/dietphysicalactivity/childhood/en/>

²WHO: Facts and figures on childhood obesity (2014, Oct 29). Retrieved from <http://www.who.int/end-childhood-obesity/facts/en/>

³Obesity in Canada: A Joint Report From the Public Health Agency of Canada and the Canadian Institute for Health Information (2011, June 20). Retrieved from <http://www.phac-aspc.gc.ca/hp-ps/hl-mvs/oic-oac/index-eng.php>

Research in childhood obesity is mainly focused on prenatal factors, feeding in infancy, and programs relating to food choice and physical activity in middle childhood. Infant and Child Development Services (ICDS) of Central West, Ontario wanted to know how problems of overweight and obesity should be addressed and remedied in the **early years of childhood**. Our goal was to identify and summarize the very latest research so that that ICDS could provide evidence-based assistance to parents, pre-school teachers, and child development specialists who want to reduce the body mass index (BMI) of overweight and obese children before they reach 6 years of age.

What Was Found?

A. The most recent review of research, prior to our own, focused on the impact of *parent participation* in early childhood education centres (ECEC) programs⁴. In this review 14 articles were published between 2000 and 2013 and one article was published in early 2014. The authors found evidence to support four parental pathways to weight change in early childhood:

1. Replicating in the home, the information and activities relating to healthy eating and physical exercise provided in ECEC programs.
2. Engagement of parents in weight change interventions for adults.
3. Parents' efforts to reduce their children's consumption of sweet drinks and increase intake of water.
4. Parents' satisfaction with weight change programs offered to their children by ECECs.

B. Our review followed the Morris et al. (2014) review in time, but was not limited to factors of parent participation. We identified 13 articles published between January 2014 and September 2015. The studies fell into three categories:

TESTS OF GENERAL INTERVENTIONS

TESTS OF INTERVENTION PROGRAMS FOCUSED ON PARENTING

TESTS OF INTERVENTION PROGRAMS SPECIFIC TO EARLY CHILDHOOD EDUCATION CENTRES

Detailed features of each of the 13 articles are presented in the spreadsheet at the end of this report. Two examples of studies of each category of intervention are provided here.

⁴ Morris, H., Skouteris, H., Edwards, S., Rutherford, L. (2015) Obesity prevention interventions in early childhood education and care settings with parental involvement: a systematic review. *Early Child Development and Care*, 185 (8), pp. 1283-1313.

TESTS OF GENERAL INTERVENTIONS (N=9).

1. *Bocca, G., Corpeleijin, E., Stolk, R. P., et al. (2014)*

Multidisciplinary Program:

- Parents received dietary advice which focused on improving eating behaviour by setting personal goals for parents and children.
- Parents also received psychological counselling which was aimed at teaching parents how to be a healthy role model.
- Children received physical activity in group sessions which resembled elementary school exercise programs.

Results

- At the completion of program, children in the intervention program showed greater decreases in BMI and waist circumference compared with children undergoing usual health care.
- At 1-year follow up, BMI continued to decrease and was associated with improvements in health-related quality of life (HRQoL) (Bocca, G., Kuitert, M. W., et. al (2014)).
- At a 3-year follow up, BMI and subcutaneous fat (SCF) was further decreased as compared to children received only usual health care. (Bocca, G., Corpeleijin, E., van den Heuvel, E. R., et. al (2014)).

2. *de Vries, A. G. M., et al. (2015)*

Early Obesity Intervention Program:

- Over a course of five visits, between when the child was 2 weeks and 11 months old, nurses worked with parents in stimulating an active lifestyle for babies by stimulating motor development.
- Recommendations for physical activity changed at each visit, according to the progress and development of the child. For example:
 - At 2 weeks, the focus was to engage symmetric handling and encourage use of coloured toys and sound.
 - At 2 months, the focus was to encourage variation in the infant's position and location of play, which was expanded further at the 4 month visit.
- At 2.5 years of age, overweight or obese children who had participated in the intervention showed significantly greater reductions in skinfold thickness (used to measure total body fat) as compared with children in the control group.

TESTS OF INTERVENTION PROGRAMS FOCUSED ON PARENTING (N=2)

1. *Quattrin, T., et al. (2014)*

Behavioural Intervention:

- There were thirteen individual and group sessions in pediatric clinics, during which parents learned behaviour modification and parenting techniques such as positive reinforcement, modeling a healthy diet and activity, and stimulus control.
- Parents in the intervention group also monitored *their own* dietary intake, sedentary activity, and physical activity levels along with those of their children.
- 1 year later, children and parents in the intervention group showed greater reductions in BMI as compared with children and parents who received basic healthcare information only.
- Child weight changes were positively correlated with parent weight changes.

2. *Stark, L. J., et al. (2014)*

Learning About and Understanding Nutrition for Child Health-Home Visit (LAUNCH-HV):

- Intervention sessions alternated between the home and clinic settings.
- Phase I addressed life-style and parenting skills by encouraging tests of new foods and physical activity, and home inspections for retention of high calorie foods.
- Phase II engaged parents in long-term planning and problem solving for individual barriers.
- Children in the LAUNCH-HV group had significantly greater decreases in BMI than children who merely received pediatric counselling.

TESTS OF ECEC INTERVENTION PROGRAMS (N=2)

1. *Lumeng, J. C., et. al (2015)*

Head Start Program:

- A federally funded preschool program for children living in poverty delivered in community settings.
- Program mandates nutritional and health services, adequate time and space for active play and parental involvement.
- Children that entered Head Start programs as overweight or obese showed a greater decrease in BMI during the first academic year, when compared with children in the two control groups.

2. *Salazar, G., et al. (2014)*

Educational Intervention to Promote Physical Activity and Nutrition:

- The program, delivered to staff of federally supported daycare centres, provided education material on physical activity and nutrition, and weekly counselling by nutritionists and physical educators.
- A parent educational and motivational strategy called “Happy Days” was provided each month.
- Educational leaflets were given to parents containing information on growth, nutritional factors, and physical activity needs.
- Parents’ and staff’s perceptions and attitudes towards the intervention program were monitored.

- Obese children in the intervention group had decreased % of body fat, decreased caloric and fat intake, and increase in moderate-vigorous physical activity.

How Do We Know What the Research Says?

A search of the electronic Scopus database at the University of Waterloo Library was conducted in September 2015 using the search string:

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(TITLE-ABS-KEY ((obesity OR overweight OR over-weight OR adiposity)) AND  
TITLE-ABS-KEY ((preschool OR pre-school OR infant OR toddler)) AND  
TITLE-ABS-KEY ((interven* OR program* OR treatment*))) AND PUBYEAR > 2013 AND  
(LIMIT-TO (LANGUAGE, "English")).
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The search returned 956 citations. The abstract of each article was read, and most were excluded on a number of factors such as: the article was not written in English, it addressed the obesity of pregnant mothers not children, it addressed children older than age 6, it did not describe the features of the intervention program, it reported a study of only the causes and not the treatments of obesity, and so forth. Once the exclusions and outliers were removed, 13 articles remained.

Conclusion

Research studies on intervention programs for overweight and obese prior to school age seem to be increasing in number. The Morris et al. review found 14 peer-reviewed articles in approximately 13 years. We found 13 articles published in the subsequent 20 months. Past research indicates that children who are overweight or obese typically have one parent who is also overweight or obese. Of the 27 articles relating to preschool interventions reviewed in the past 15 years, most if not all suggest that the effectiveness of programs depend upon the degree of parental involvement. Children of parents who themselves engage in weight loss activities have a better chance of BMI reduction.

Detailed Features of Each Article

NOTE:

1. RCT = Randomized Controlled Trial, BMI = Body-Mass Index, WC = Waist Circumference, NR = Not Reported
2. Each article is displayed across three consecutive pages

Citation	What was studied	Study Type						Participants				DCD				
		Identification	Intervention	Descriptive	Comparison		Psychometric	Case Study	Age	Sample Size	Boys	Girls	Diagnosed	Suspected	Not Diagnosed	DCD Diagnostic Tool
					RCT	Non-RCT										
Ashkenazi, T., Weiss, P. L., Orian, D., & Laufer, Y. (2013). Low-cost virtual reality intervention program for children with developmental coordination disorder: A pilot feasibility study. <i>Pediatric Physical Therapy, 25</i> (4), 467-473.	Feasibility of using a low-cost virtual reality game as a DCD intervention.		•			•			4-6	9	•	•		•		• M-ABC-2
Ashkenazi, T., Laufer, Y., Ashkenazi, T., Orian, D., & Weiss, P. L. (2013). Effect of training children with Developmental Coordination Disorders in a virtual environment compared with a conventional environment. <i>International Conference on Virtual Rehabilitation</i> , art. no. 6662075, 46-50.	Conventional media vs. low-cost virtual reality training games.		•			•			4-6	30	•	•		•		• M-ABC-2
Asonitou, K., Koutsouki, D., Kourtessis, T., & Charitou, S. (2012). Motor and cognitive performance differences between children with and without developmental coordination disorder (DCD). <i>Research in Developmental Disabilities, 33</i> (4), 996-1005.	Specific motor and cognitive abilities in children with and without DCD.			•		•			5-6	108	•	•	•	•		• M-ABC

Citation	Outcome Measures	Intervention Details	Admin.			What was found
			Clinician	Primary Caregiver	Teacher	
Ashkenazi, T., Weiss, P. L., Orian, D., & Laufer, Y. (2013). Low-cost virtual reality intervention program for children with developmental coordination disorder: A pilot feasibility study. <i>Pediatric Physical Therapy, 25</i> (4), 467-473.	<ul style="list-style-type: none"> • Motor Skills (DCD-Q-07) • Parents' Reports • Walking and Talking Test • 6MWT 	<p>Virtual Reality Intervention: <u>Sony's Playstation 2 EyeToy</u> A collection of games that entail motor planning, balance, eye-hand coordination, etc.</p>	•			<ul style="list-style-type: none"> • 12 weeks after starting the intervention, there were improvements in M-ABC-2 and DCD-Q scores. • Parents reported that children truly enjoyed the treatment.
Ashkenazi, T., Laufer, Y., Ashkenazi, T., Orian, D., & Weiss, P. L. (2013). Effect of training children with Developmental Coordination Disorders in a virtual environment compared with a conventional environment. <i>International Conference on Virtual Rehabilitation</i> , art. no. 6662075, 46-50.	<ul style="list-style-type: none"> • Motor Skills (DCD-Q-07) • Parents' Reports • Walking and Talking Test • Short Feedback Questionnaire for Children (SFQ-Child) 	<p>Virtual Reality Intervention: <u>Sony's Playstation 2 EyeToy</u> A collection of games that entail motor planning, balance, eye-hand coordination, etc.</p> <p>Conventional Intervention: Games such as basketball and bowling, using typical physiotherapy equipment.</p>	•			<ul style="list-style-type: none"> • 12 weeks after starting the interventions, both groups showed equal improvements in M-ABC-2, DCDQ-07, and Walking and Talking Test scores. • Parents' and children's subjective responses were also positive following the interventions. • Thus, low-cost virtual reality games can be used to expand the current treatment tools.
Asonitou, K., Koutsouki, D., Kourtessis, T., & Charitou, S. (2012). Motor and cognitive performance differences between children with and without developmental coordination disorder (DCD). <i>Research in Developmental Disabilities, 33</i> (4), 996-1005.	<ul style="list-style-type: none"> • Running Speed and Agility (BOTMP) • Cognitive Ability (Das-Naglieri CAS) 		•			<ul style="list-style-type: none"> • Children with DCD showed poorer scores on all relevant motor and cognitive scales (M-ABC), when compared to children without DCD.

Citation	What was studied	Study Type						Participants				DCD				
		Identification	Intervention	Descriptive	Comparison		Psychometric	Case Study	Age	Sample Size	Boys	Girls	Diagnosed	Suspected	Not Diagnosed	DCD Diagnostic Tool
					RCT	Non-RCT										
Kennedy-Behr, A., Rodger, S., & Mickan, S. (2013). A comparison of the play skills of preschool children with and without developmental coordination disorder. <i>OTJR Occupation, Participation and Health</i> , 33(4), 198-208.	Developmental play age and frequency of play in preschool children with and without DCD.			•		•			4-6	63	•	•		•		• M-ABC-2 (German)
Kennedy-Behr, A., Rodger, S., & Mickan, S. (2013). Aggressive interactions during free-play at preschool of children with and without developmental coordination disorder. <i>Research in Developmental Disabilities</i> , 34(9), 2831-2837.	Frequency of victimization and aggression during preschool free-play of children with and without DCD.			•		•			4-6	63	•	•		•		• M-ABC-2 (German)
Kennedy-Behr, A., Rodger, S., & Mickan, S. (2015). Play or hard work: Unpacking well-being at preschool. <i>Research in Developmental Disabilities</i> , 38, 30-38.	Relationship between engagement in play and well-being for preschool children with and without DCD.			•		•			4-6	63	•	•		•		

Citation	Outcome Measures	Intervention Details	Admin.			What was found
			Clinician	Primary Caregiver	Teacher	
Kennedy-Behr, A., Rodger, S., & Mickan, S. (2013). A comparison of the play skills of preschool children with and without developmental coordination disorder. <i>OTJR Occupation, Participation and Health</i> , 33(4), 198-208.	<ul style="list-style-type: none"> • Play Skills (RKPPS) • Free-Play Behaviour (POS) 		•			<ul style="list-style-type: none"> • Children with pDCD: <ul style="list-style-type: none"> • Showed a lower developmental play age and scored lower on 3 of 4 dimensions of the RKPPS. • Had problems with gross motor play, engaged in less group play outdoors and more frequently engaged non-play (POS). • Were found to have negative affect more frequently than typically developing children.
Kennedy-Behr, A., Rodger, S., & Mickan, S. (2013). Aggressive interactions during free-play at preschool of children with and without developmental coordination disorder. <i>Research in Developmental Disabilities</i> , 34(9), 2831-2837.	<ul style="list-style-type: none"> • Free-Play Behaviour (POS) 		•			<ul style="list-style-type: none"> • Children with pDCD: <ul style="list-style-type: none"> • Were more likely to be involved as aggressors and victims. • Were more frequently involved in physical proactive aggression (unprovoked hitting, grabbing, kicking).
Kennedy-Behr, A., Rodger, S., & Mickan, S. (2015). Play or hard work: Unpacking well-being at preschool. <i>Research in Developmental Disabilities</i> , 38, 30-38.	<ul style="list-style-type: none"> • Free-Play Behaviour (POS) • Well-Being (Parent-Proxy version of the KINDL) 		•			<ul style="list-style-type: none"> • Parents of children with pDCD rated their children's well-being at preschool lower than parents of typically developing children. • For children with pDCD, group play was negatively related to well-being.

Citation	What was studied	Study Type						Participants				DCD				
		Identification	Intervention	Descriptive	Comparison		Psychometric	Case Study	Age	Sample Size	Boys	Girls	Diagnosed	Suspected	Not Diagnosed	DCD Diagnostic Tool
					RCT	Non-RCT										
Kennedy-Behr, A., Rodger, S., Graham, F., & Mickan, S. (2013). Creating Enabling Environments at Preschool for Children with Developmental Coordination Disorder. <i>Journal of Occupational Therapy, Schools, and Early Intervention, 6(4)</i> , 301-313.	Occupational performance coaching (OPC) in combination with a traditional intervention for children with DCD.		•					4-5	3	•			•		• M-ABC-2 (German)	
King-Dowling, S., Missiuna, C., Rodriguez, M. C., Greenway, M., & Cairney, J. (2015). Co-occurring motor, language and emotional-behavioral problems in children 3-6years of age. <i>Human Movement Science, 39</i> , 101-108.	If children at risk for motor coordination problems also experience more emotional/behavioural and language difficulties.			•		•		3-6	214	•	•		•		• M-ABC-2	
Liberman, L., Ratzon, N., & Bart, O. (2013). The profile of performance skills and emotional factors in the context of participation among young children with Developmental Coordination Disorder. <i>Research in Developmental Disabilities, 34(1)</i> , 87-94.	The relations between participation and senses of coherence, effort, and hope in children with and without DCD.			•		•		5-6	50	•	•	•			• M-ABC-2 • DSM-IV Criteria	

Citation	Outcome Measures	Intervention Details	Admin.			What was found
			Clinician	Primary Caregiver	Teacher	
Kennedy-Behr, A., Rodger, S., Graham, F., & Mickan, S. (2013). Creating Enabling Environments at Preschool for Children with Developmental Coordination Disorder. <i>Journal of Occupational Therapy, Schools, and Early Intervention, 6(4)</i> , 301-313.	<ul style="list-style-type: none"> Occupational Performance (COPM) Play Skills (RKPPS) Free-Play Behaviour (POS) 	<p>Two Part Intervention: <u>OPC with Preschool Teacher</u> Therapists worked with teachers to create a more enabling environment for the child.</p> <p><u>Traditional Intervention</u> Play-based intervention.</p>	•		•	<ul style="list-style-type: none"> 4 weeks after starting the program, there were teacher reported increases in children's performance. Teachers' satisfaction with the children's performance also increased. Children's overall play age increased (RKPPS). Frequency of solitary play decreased, and engagement in group play increased (POS).
King-Dowling, S., Missiuna, C., Rodriguez, M. C., Greenway, M., & Cairney, J. (2015). Co-occurring motor, language and emotional-behavioral problems in children 3-6years of age. <i>Human Movement Science, 39</i> , 101-108.	<ul style="list-style-type: none"> Motor Skills (M-ABC-2) Language Skills (PLS-4) Emotional and Behavioural Functioning (CBCL) 		•			<ul style="list-style-type: none"> Compared to typically developing peers, children at risk of DCD: <ul style="list-style-type: none"> Had lower auditory comprehension and expressive communication. Had higher externalizing behaviour problems, more aggression, withdrawn symptoms, and other negative behaviour.
Liberman, L., Ratzon, N., & Bart, O. (2013). The profile of performance skills and emotional factors in the context of participation among young children with Developmental Coordination Disorder. <i>Research in Developmental Disabilities, 34(1)</i> , 87-94.	<ul style="list-style-type: none"> Activities of Daily Living (CPQ, PSQ) The "Senses" (Children's Sense of Coherence, Hope, and Effort Scales) 		•			<ul style="list-style-type: none"> Children with DCD: <ul style="list-style-type: none"> Had lower performance skills, lower sense of coherence, hope, and effort. Enjoyed their participation less and their parents reported less overall satisfaction. Processing skills rather than motor skills predicted parental satisfaction.

Citation	What was studied	Study Type						Participants				DCD				
		Identification	Intervention	Descriptive	Comparison		Psychometric	Case Study	Age	Sample Size	Boys	Girls	Diagnosed	Suspected	Not Diagnosed	DCD Diagnostic Tool
					RCT	Non-RCT										
Parmar, A., Kwan, M., Rodriguez, C., Missiuna, C., & Cairney, J. (2014). Psychometric properties of the DCD-Q-07 in children ages to 4-6. <i>Research in Developmental Disabilities, 35(2)</i> , 330-339.	Suitability of using a questionnaire based tool (DCD-Q-07) for screening younger children for DCD.	•							4-6	181	•	•	•	•	• M-ABC-2 • DCD-Q-07	
Rathinam, C., Bridges, S., Spokes, G., & Green, D. (2013). Effects of lycra body suit orthosis on a child with developmental coordination disorder: A case study. <i>Journal of Prosthetics and Orthotics, 25(1)</i> , 58-61.	A 30 week case study on the effects of Lycra body suit for a child clinically diagnosed with DCD.		•						5	1	•		•		• M-ABC-2	
Tresser, S. (2012). Case study: Using a novel virtual reality computer game for occupational therapy intervention. <i>Presence: Teleoperators and Virtual Environments, 21(3)</i> , 359-371.	A 12 week case study evaluating 'Growing with Timocco', a virtual reality computer game treatment for children with motor coordination disorders.		•						5	1	•		•		• M-ABC	
Venter, A., Pienaar, A. E., & Coetzee, D. (2015). Suitability of the 'Little DCDQ' for the identification of DCD in a selected group of 3–5-year-old South African children. <i>Early Child Development and Care, in press.</i>	Suitability of using the Little DCDQ for screening younger children for DCD in South Africa.	•							3-5	110	•	•		•	• Little DCDQ • M-ABC-2	

Citation	Outcome Measures	Intervention Details	Admin.			What was found
			Clinician	Primary Caregiver	Teacher	
Parmar, A., Kwan, M., Rodriguez, C., Missiuna, C., & Cairney, J. (2014). Psychometric properties of the DCD-Q-07 in children ages to 4-6. <i>Research in Developmental Disabilities, 35(2)</i> , 330-339.	<ul style="list-style-type: none"> Psychometric Properties of the DCD-Q-07: <ul style="list-style-type: none"> Construct Validity Concurrent Validity Reliability, etc. 		•			<ul style="list-style-type: none"> The DCD-Q-07 showed poor psychometric properties for ages 4-6. Therefore, it may not be an appropriate screening tool for preschool aged children.
Rathinam, C., Bridges, S., Spokes, G., & Green, D. (2013). Effects of lycra body suit orthosis on a child with developmental coordination disorder: A case study. <i>Journal of Prosthetics and Orthotics, 25(1)</i> , 58-61.	<ul style="list-style-type: none"> Motor Skills (M-ABC-2) Clinical Observations 	Lycra Body Suit Orthoses (LSBO): The child wore a lycra body suit for 8 hours/day per week, for 12 weeks.	•	•		<ul style="list-style-type: none"> Manual dexterity improved during intervention, but fell sharply after removal. Balance improved with intervention and remained unchanged at follow-up. Increase in throwing/catching ability towards end of intervention, with slight increase post intervention.
Tresser, S. (2012). Case study: Using a novel virtual reality computer game for occupational therapy intervention. <i>Presence: Teleoperators and Virtual Environments, 21(3)</i> , 359-371.	<ul style="list-style-type: none"> Movement Related Data (Number of Errors, Number of Missed Objects, Performance Efficiency) 	Virtual Reality Intervention: <u>Growing with Timocco</u> A monkey named "Timocco" guides children and caregivers through a series of games which have been designed to provide occupational therapy.	•			<ul style="list-style-type: none"> Improvements observed in children's self-esteem, motivation to cope with challenges and maintenance of posture. However, the researchers were unable to conclude if there were improvements in motor skills.
Venter, A., Pienaar, A. E., & Coetzee, D. (2015). Suitability of the 'Little DCDQ' for the identification of DCD in a selected group of 3–5-year-old South African children. <i>Early Child Development and Care, in press.</i>	<ul style="list-style-type: none"> Psychometric Properties of the Little DCDQ (Reliability and Validity) 		•	•		<ul style="list-style-type: none"> Compared to the M-ABC-2, the Little DCDQ showed: <ul style="list-style-type: none"> Good internal consistency Strong reliability (test-retest) Poor sensitivity, but reasonable specificity. Overall, the Little DCDQ is a promising tool.

Citation	What was studied	Study Type						Participants				DCD				
		Identification	Intervention	Descriptive	Comparison		Psychometric	Case Study	Age	Sample Size	Boys	Girls	Diagnosed	Suspected	Not Diagnosed	DCD Diagnostic Tool
					RCT	Non-RCT										
Wilson, B. N., Creighton, D., Crawford, S. G., Heath, J. A., Semple, L., Tan, B., & Hansen, S. (2015). Psychometric properties of the Canadian Little Developmental Coordination Disorder Questionnaire for preschool children. <i>Physical and Occupational Therapy in Pediatrics, 35</i> (2), 116-131.	Suitability of using the Canadian Little DCDQ for screening younger children for DCD.	•						3-4	353	•	•			•	<ul style="list-style-type: none"> • Canadian Little DCDQ • M-ABC-2 	
Zhu, J. L., Olsen, J., & Olesen, A. W. (2012). Risk for developmental coordination disorder correlates with gestational age at birth. <i>Paediatric and Perinatal Epidemiology, 26</i> (6), 572-577.	Correlation between gestational age at birth and the risk of developing DCD.			•				0-7	22, 898	•	•		•	•	<ul style="list-style-type: none"> • DCD-Q-07 	
Zwicker, J. G., Yoon, S. W., MacKay, M., Petrie-Thomas, J., Rogers, M., & Synnes, A. R. (2013). Perinatal and neonatal predictors of developmental coordination disorder in very low birthweight children. <i>Archives of Disease in Childhood, 98</i> (2), 118-122.	Association between perinatal and neonatal risk factors with DCD in a cohort of children with very low birthweight, and to identify DCD in younger children.			•		•		4-5	157	•	•		•		<ul style="list-style-type: none"> • M-ABC 	

Citation	Outcome Measures	Intervention Details	Admin.			What was found
			Clinician	Primary Caregiver	Teacher	
Wilson, B. N., Creighton, D., Crawford, S. G., Heath, J. A., Semple, L., Tan, B., & Hansen, S. (2015). Psychometric properties of the Canadian Little Developmental Coordination Disorder Questionnaire for preschool children. <i>Physical and Occupational Therapy in Pediatrics, 35(2)</i> , 116-131.	<ul style="list-style-type: none"> Psychometric Properties of the Little DCDQ (Reliability and Validity) Beery-Buktenica Developmental Test of Visual-Motor Integration 		•	•		<ul style="list-style-type: none"> Compared to the M-ABC-2, the Little DCDQ: <ul style="list-style-type: none"> Had good reliability and validity Effectively distinguished between typically developing and the probable DCD group. Effectively distinguished between 3 and 4 year olds. Thus, the Little DCDQ is a reliable and valid tool for the early screening of DCD.
Zhu, J. L., Olsen, J., & Olesen, A. W. (2012). Risk for developmental coordination disorder correlates with gestational age at birth. <i>Paediatric and Perinatal Epidemiology, 26(6)</i> , 572-577.	<ul style="list-style-type: none"> Demographic Data 					<ul style="list-style-type: none"> Birth before gestational week 37 was associated with an increased risk of DCD. A decline in gestational age by a week was associated with a 19% increased risk of DCD screening positive, among children delivered before 40 weeks.
Zwicker, J. G., Yoon, S. W., MacKay, M., Petrie-Thomas, J., Rogers, M., & Synnes, A. R. (2013). Perinatal and neonatal predictors of developmental coordination disorder in very low birthweight children. <i>Archives of Disease in Childhood, 98(2)</i> , 118-122.	<ul style="list-style-type: none"> Perinatal Variables: <ul style="list-style-type: none"> Mode of Delivery Gestational Age Birth Weight Postnatal steroid exposure, etc. 		•			<ul style="list-style-type: none"> Male sex, lower birth weight, lower gestational age, and greater postnatal steroid exposure were predictors of DCD. Therefore, male infants born with a lower birth weight should be monitored more closely for the development of DCD.

Acknowledgments

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Disclaimer

Every attempt was made to produce a systematic scoping review of the highest quality relative to time, skills, and professional judgment. This work is not necessarily definitive, authoritative, comprehensive, or current. It represents the findings, views, opinions, and conclusions of the research team only, and is provided as is without warranties of any kind. The work is neither the official nor the unofficial policy of the University of Waterloo and the University of Waterloo does not necessarily endorse the findings, views, opinions, and conclusions expressed in the work. Knowledge Impact Strategies Consulting Ltd. including its directors, officers, employees and agents, accept no responsibility for this work.

Citation

S. Sandhu and K. Bloom (2015). Help for overweight and obese preschoolers: What does the research say? Knowledge Impact Strategies Consulting Ltd: Waterloo, Ontario. www.kimpact.ca

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