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BSc (Physiotherapy)

2011
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Author’s Declaration

I, the undersigned declare that this project which I am submitting is all my own work and that the data presented is authentic.

______________________ (Printed Name)

______________________ (Signature)

Date    /    /
Acknowledgements

I would like to acknowledge everyone who helped me to complete my final year project. This project would not have been possible without the teachers who agreed to participate – a sincere thank you for your time and your input. I am very grateful for all of the expertise and guidance from my supervisor, Dr. Amanda Connell. I would also like to thank the module coordinator and Year 4 Tutor, Dr. Susan Coote, for all of her advice throughout the year. In particular, I wish to thank Denise, a great partner to work with. A special thanks to Emma, Sarah, Michelle, Mairéad, Linda, and Aideen, for their participation in the test trials with the audiotape for this project – greatly appreciated. I would like to thank my family, in particular my parents, for all of their help and support along the way. Finally, thanks to all of my friends in college and at home for an enjoyable and unforgettable year.
Abstract

**Background:** Motor skill development refers to the development of physical abilities over time and factors influencing these changes (Ulrich 2007). Children with Developmental Coordination Delay (DCD) display a delay in this process (APA 2000).

**Objectives:** To gain an insight into teachers’ knowledge on motor skill development in children, and whether a teacher can recognise a child with poor motor skill development, including fine and gross motor skills, balance, and coordination.

**Methods:** A qualitative approach was used, where focus groups were conducted in a semi-structured interview style. Following approval from the University of Limerick Research Ethics Committee, three interviews were conducted. Eight eligible primary school teachers took part in the study. Data was audiotaped, transcribed verbatim, analysed extensively until themes and subthemes were identified.

**Results:** Overall, teachers displayed varied knowledge on motor skill development. Teachers demonstrated confusion regarding activities involving fine motor skills, often confusing them with gross motor skills. Teachers discussed gross motor skills in less depth and detail than fine motor skills. Most teachers displayed accurate knowledge on balance. The majority of teachers were unable to define coordination but succeeded in linking appropriate activities to the term. The ability to identify a child with poor motor skills and the experience of teachers were factors to be considered in relation to their knowledge.

**Conclusions:** Gaps in primary school teachers’ knowledge in Ireland exist on motor skill development, potentially limiting their ability to identify a child with delayed motor skill development. Increased education on motor skill development amongst teachers is required.

**Keywords:** Motor skill development; Developmental Coordination Delay (DCD); teachers’ knowledge
1. Introduction

Motor skill development is a term that refers to the development of physical abilities and factors influencing this development (Haywood and Getchell 2001; Payne and Isaacs 2005; Ulrich 2007; Zaichkowsky and Larson 1995). A more precise definition of motor skill development, according to Ulrich (2007), is “the ongoing process of exploring and matching one’s intrinsic and extrinsic resources to one’s goals”. Examples of intrinsic factors that affect motor behaviour include muscle strength, neural integrity and organisation, arousal level and experience. The extrinsic resources are the environmental surrounding of the person, for example, the playing field or the backyard. The goal of movement is the desired outcome from the movement, for example, choosing to optimise on power or performance. Throughout childhood, children are constantly developing their motor skills, by gaining increased control of their movement, as evident in the increased fluidity, speed and accuracy of the movement.

Developmental Coordination Delay (DCD) is where children display a delay in this motor skill development process and experience difficulties with their coordination skills (American Psychiatric Association (APA) 2000). Coordination of movement involves the co-ordering of muscle activity by the neuromuscular system (Sugden and Keogh 1990). Difficulties in coordinating movement can lead to problems with learning and performing fine and gross motor skills (Parker and Larkin 2003). Fine motor skills involve movements that are primarily governed by the small muscles or muscle groups, for example, movements performed by the hands (Payne and Isaacs 2005, p.10). In comparison, gross motor skills are movements primarily controlled by the larger muscle groups, for example, the muscles in the upper leg that are used for walking or running (Payne and Isaacs 2005, p.10). Children with DCD can also exhibit poor balance (Geuze 2005; Parker and Larkin 2003). Balance is a term describing the dynamics of body posture to prevent falling (Winter 1995). Almost every school activity involves a motor activity. For children with coordination difficulties, participation in school activities requires tremendous effort (Missiuna et al 2007). Hence, if primary school-teachers are able to accurately recognise fine and gross motor
skills, coordination and balance, they should be able to identify if a child in their class is experiencing difficulties with their motor skills or a delay in their motor skill development process, which may be indicative of DCD. Therefore, the main aim of the study is to explore the latter hypothesis and to gain an insight into primary school-teachers’ knowledge of various aspects of motor skill development in children.

1.1. Literature in relation to Previous Findings

Previous literature has highlighted that there is a need for improved awareness amongst teachers in recognising and understanding motor skills in children (Chiu et al 2008; Dunford et al 2004; Macivei et al 2010; Rivard et al 2007). Motor impairments of children with DCD significantly interfere with the child’s ability to engage in basic self-maintenance activities such as dressing, personal hygiene and eating (Dunford et al 2005; Summers et al 2008; Wang et al 2009). These motor impairments can lead to activity limitations and in turn to participation restrictions (Mandich et al 2003). For the latter reason, children with impaired coordination are alone more often, and tend to be onlookers (Smyth and Anderson 2000), which could potentially lead to issues with bullying (Livesey et al 2010; Piek et al 2005; Stephenson and Chesson 2008). In addition, the effects of being “clumsy” as a child carry into adolescence in motor, academic and social areas (Cantell et al 1995; Cousins and Smyth 2003; Gueze and Borger 1993; Losse et al 1991). Identification of younger children with slower motor development may enable early targeted interventions to improve motor skills, which is proven to be more effective than no intervention (Akbari et al 2009; Hillier 2007; Peters and Wright 1999). As acknowledged by Kirby et al (2005), teachers will not be able to recognise or accommodate a child with motor impairments if their knowledge is limited. Therefore, if teachers are equipped with the knowledge, it will maximise their ability to detect a child with poor motor skills or DCD.
1.2. Study Objectives

- To establish if teachers can identify good and poor motor gross and fine motor skills in children.
- To determine if teachers are aware of various components of motor skill development of the children in their class, in particular, coordination and balance.
- To investigate whether teachers have the knowledge to differentiate between good and poor coordination and balance in children.
2. Methodology

2.1. Study Design

A qualitative approach in the form of a focus group, using a semi-structured interview style, was used to explore this research question. This method was chosen in order to provide powerful research insights based on individual perceptions associated with this topic (Hollis et al. 2002). Qualitative studies can also provide rigorous empirical evidence that addresses these questions relevant to practice but are not amenable to experimental methods, thus adding an important piece to the clinical puzzle (Gibson and Martin 2003).

2.2. Ethics

Ethical approval was granted by the EHS University of Limerick Faculty of Education and Health Sciences Research Ethics Committee.

2.3. Recruitment/Sample Selection

Purposive sampling of newly qualified primary school-teachers was carried out (refer to Tables 1 and 2 for inclusion/exclusion criteria). This sample was chosen because children with DCD represent 5-6% of school-aged children (APA 2000) and early recognition of these children and timely referral to services are optimal (McCall and Craft 2000). Schools with greater than 200 pupils were chosen in order to increase the scope and likelihood of eligible interested teachers. Eligible and most accessible schools as recognised by www.schooldays.ie/articles/primary-Schools-in-Ireland-by-County. Twenty schools were randomly chosen using www.random.org. Letters (Appendix 1), addressed to the school principal, were sent to the chosen primary schools, along with an information leaflet (Appendix 2), consent forms (Appendix 3) and a return stamped envelope.
Table 1: Inclusion Criteria

- Primary school-teachers, male/female, who have recently qualified, with a maximum of five years teaching experience.
- Primary school-teachers with at least one year teaching experience of senior infants or first class pupils, where children are aged between six and eight.
- Primary school-teachers who teach in schools with a minimum of two hundred pupils.

Table 2: Exclusion Criteria

- Primary school-teachers with more than five years teaching experience.
- Primary school-teachers who have no experience teaching senior infants or first class pupils.
- Primary school-teachers who teach in primary schools with less than two hundred pupils.
- Primary school-teachers who have underwent further education in the area of motor development in children or DCD.
2.4. Pilot Study

Due to the inexperience of the moderator, two pilot studies were conducted in order for the moderator to practice the questioning route as well as to rehearse the techniques required to conduct a focus group (Breen 2006). A secondary aim was to ensure the suitability and validity of the questions (Krueger 1998a). The first pilot study was undertaken with two final year students studying primary teaching. The second pilot study consisted of four final year physiotherapy students. Following the focus groups, feedback was given by the participants regarding the wording, relevance and flow of questions. The moderator and assistant moderator discussed the feedback from the participants in the pilot study in order to make any amendments to the phrasing of the questions and identify areas for potential probing. The questions were then finalised following a discussion with the supervisor.

2.5. Materials and Procedure

As outlined by Krueger (1998a), a series of carefully planned questions phrased in a conversational manner was used for each focus group (Appendix 4). These questions were developed following an extensive review of the literature. Prior to data collection, written informed consent was obtained from all participants. The focus groups took place in a location that was most accessible for the teachers. The interview was audio-taped from beginning to end. The questions were asked according to the prepared route and probing was used, when necessary, to clarify any ambiguous statements (Krueger 1998b). The assistant moderator took detailed hand notes of the significant comments made as well as the observing the group dynamics. Directly after the questions, the assistant moderator summarised the main findings to the group, in order to improve the validity of results (Krueger 1998c). Any inaccurate or misinterpreted information in the summary were corrected or explained further by the teachers. Following the interview, an information handbook was given to each participant (Appendix 5) and a debriefing session took place between the assistant moderator and the moderator.
2.6. Data Analysis

The data was transcribed verbatim from the audio-tape using Jefferson notation (Atkinson and Heritage 1999). Anonymous codes were assigned to each participant (Abrams 2001). A thematic analysis method was used. The researcher became immersed in the data by repeatedly reading the transcripts (Dey 1993). Open coding was applied to the transcripts. The process of coding condenses the data and thereby allows the researcher to “move toward interpretation” (Coffey and Atkinson 1996). Similar codes were combined and codes were combined under higher order codes. The codes were collected together, compared, and re-analysed to develop hypotheses or theoretical explanations (Newell and Burnard 2006). The tapes were listened to on numerous occasions and the transcripts were scrutinised in order to analyse the group dynamics, the frequency (amount of times a comment was identified), intensity (the strength of opinion or point of view) and extensiveness (number of teachers who mentioned the comment) of comments (Krueger 1997). In order to minimise any potential errors, the validity of the results was assessed by using member checking in the form of a letter (Appendix 7) following the analysis of results (Mays and Pope 2000).
3. Results

3.1. Participant Characteristics

Overall, eight eligible female primary school-teachers participated in the study (participant characteristics, Appendix 6). The first group (Group A) consisted of four primary school-teachers. Five teachers agreed to partake in the second focus group (Group B). However, there was four drop-outs. The date of the focus group did not suit two of the teachers, and consequently they withdrew their participation. The other two teachers did not attend on the day for unknown reasons. Therefore, a semi-structured interview with one primary school teacher was conducted. The final group (Group C) was composed of three primary school-teachers.

3.2. Group Dynamics

Group A:

There was one dominant character in Group A, who answered the majority of the questions. In order to overcome this, the researcher directed questions towards the quieter participants in order to encourage their opinions to be voiced (Krueger 1998b). The brevity of the interview (16 minutes), the numerous pauses or silences following questions and the decreased speed and intonation of their voices indicated the teacher’s lack of confidence on the topic of motor skill development. Also, the majority of the discussion was directed only to the moderator, indicating their inability to discuss the topic freely amongst themselves.

Group B:

In Group B, the teacher discussed the topic confidently. There was a relaxed atmosphere established between the moderators and interviewee.
Group C:

There was a sense of camaraderie within the group. Teachers discussed the topic more openly, more confidently and in greater depth, as indicated by the duration of the interview (34 minutes) and absence of silences or pauses. Participants in Group C often deviated from the questions, laughter was evident throughout the interview and discussion was directed to the group as well as the moderator.

3.3. Main Findings/Themes

The key theme identified was primary school-teachers’ knowledge on motor skill development (Diagram 1). Citations, with page numbers for reference to the transcripts, along with the participant and group number are displayed in order to illustrate the themes.
3.3.1. Variable Knowledge

3.3.1.a) Motor Skill Development

Group A were unable to define motor skill development and probing was required. Teachers in Groups A and B displayed uncertainty regarding the term and what the term involved, for example,

“...this might not be fully related to motor development but just putting on her shoes on her right foot or dressing herself, putting on her jumper the right way...maybe that is related to her motor development or maybe it wouldn’t be.” (A1, p.8)

“...their (the child’s) general movement, I suppose, that it wouldn’t be all over the place, that it would just be kind of regular and normal...” (B1, p.11)

Group C provided more detailed knowledge on the term, as evident in the example below.

“...their kind of awareness of their own muscles, their awareness of how to use them in their body” (C3, p.25)

Some teachers related the term motor skill development to an underlying condition.

“...normally find it in a child that would have another underlying problem like maybe autism....or dyspraxia” (A2, p.8)

All of the groups related motor skill development to physical abilities of the child such as writing tasks, cutting activities, PE (Physical Education), games and hand-eye coordination. Groups B and C referred to fine and gross motor skills as a part of motor skill development.
“Motor skill development, that’s to do with like their development of their muscles...there, is fine motor and gross motor...” (C2, p.17)

The amount of time spent practicing the task in different environments, such as the school or at home, was recognised by Groups B and C as factors that influence motor skill development. This was discussed more frequently and with greater intensity by Group C (n=43) compared to Group B (n=5). Group C also referred to factors that limit the opportunity to practice.

“...cutting activities...at this age group they should be encouraged to do a lot of cutting activities, because I find (emphasis) anyway it is a skill that they will definitely improve on the more practice that they get...” (B1, p.13)

“An awful lot of it will depend of course on the infant teacher and how much practice.” (C3, p.20)

“...a child who does a lot of art at home with the parents...then obviously they are used to using those muscles and so they are used to it and so they have (emphasis) good motor skills” (C1, p.25)

“You can really tell from the kids, the difference between kids who have or who do extra-curricular activities outside schools against those who don’t” (C1, p.30)

“gone is the day were they spend all (emphasis) their time outside...now they have the DS, the playstation” (C1, p.29)

3.3.1.b) Fine Motor Skills

The teachers discussed fine motor skills most frequently (n=36) and extensively (n=8), when compared to the other skills. They made reference to fine motor skills, such as cutting, pencil grip, as examples throughout the interviews. Definitions of the term included:
“...more tedious things, like threading and peg-boards and things like that, is it?” (A4, p.4)

“...doing work with your hands, and you know, being kind of exact with it.” (B1, p.13)

Fine motor skills activities were described in great detail when identifying a child with poor fine motor skills.

“Or if they were using a scissors, they wouldn’t be able to cut along the line drawn on the page. They would be cutting all over the place.” (A2, p.4)

“...holding their pencil and tracing over a dotted line and just being able to stay on the line with their pencil and drawing some simple shapes but staying (emphasis) in control of the pencil.” (B1, p.13)

“...the peg boards that we use in Maths...manipulating them that they will go into the place that they want them to go and that they have control over them” (B1, p.13)

However, there was still some confusion regarding the term, and components of speech were mentioned occasionally (n=7) by one teacher as a fine motor skill. The other teachers in Group C agreed with her comments.

“I don’t know whether this is fine motor related to your tongue as well so the way you speak” (C2, p.23)

Fine motor skills were at times (n=2) confused with gross motor skills by one teacher in Group A. The following example was given for identifying poor fine motor skills in a child.

“...in PE, not being able to catch a ball or maybe throw a bean bag and do simple two-hand catch...”(A1, p.4)
In addition, none of the other teachers in Group A disputed the above comment that fine motor skills involved throwing and catching a ball, even following the summary.

3.3.1.c) Coordination

The majority of teachers (n=7) were least knowledgeable in defining coordination. Initially, Group A were unable to respond to the question and probing was required in order to elicit an answer. Some of the following responses were given for coordination:

“...the way the brain sends messages to the muscles, is it?” (A3, p.5)

“It is hard to explain” (C1, p.24)

“Are we right?” (C2, p.24)

Nevertheless, Group B gave a reasonably good definition for the term, describing coordination as:

“...a link between the message that the brain is sending and the movements that the hands are carrying out or feet or whichever part of the body they are using.” (B1, p.13)

Most teachers (n=6) associated correct activities to the term such as hand-eye coordination, ball activities involving kicking, catching and throwing, which they discussed descriptively.

“can’t kick the ball properly or even looking at a target and trying to coordinate like getting a ball into that (emphasis) target and knowing how far to throw it and what direction to throw it in and the force to throw it in” (C3, p.24)
3.3.2. Accurate Detailed Knowledge

3.3.2.a) Balance

Teachers displayed a good understanding of the term “balance”. They did not confuse the term with fine or gross motor skills or coordination.

“...a kind of control that the child...knows what part of their body...to put their weight on, we’ll say to ensure that they can stay balanced in whatever position they are in...” (B1, p.14)

“...able to get from A to B without banging off anything” (C2, p.23)

“...sitting in a chair and if they lean out of their chair to pick something up I have seen children literally fall out of their chair. So it is their ability to know (emphasis) when to stop leaning” (C3, p.23)

They linked correct activities to the term. The most frequently mentioned activities for balance were walking along a straight line (n= 6), PE activities (n=13), and balancing on one leg (n=6).

“...doing gymnastics, balancing on one foot” (A4, p.7)

“...to stand on one leg and to put their hand on their head...” (B1, p.15)

3.3.3. Limited Knowledge

3.3.3.a) Gross Motor Skills

The teachers displayed less depth in their knowledge on gross motor skills with some ambiguous responses, spoken with little confidence and less frequently than the other skills. Definitions of the term included the following:
“Maybe if they use it with their main muscles, the bigger muscles in the body” (A3, p.3)

“...opposite to fine motor, is it?” (A1, p.3)

All teachers had a good idea of what gross motor skills involved, for example, occasionally linking the term with balance (n=5), running (n=5) and jumping (n=2). In comparison to fine motor skills, descriptions of poor gross motor skills lacked detail and clarity.

“...they would have control over their movements and that...they would be able to hold their balance...”(B1, p.12)

“gross motor is in relation to...running, jumping, so their legs and their arms...”(C2, p.17)

“...they aren’t very awkward” (A1, p.4)

In addition, teachers in Groups A and B inaccurately linked gross motor skills to postural control and sitting balance in order to identify poor gross motor skills.

“...ability to stay on their chairs...” (B1, p.13)

“the way they sit in the chair or in the class with you they get restless easily...they wouldn’t be able to sit properly in the chair” (A1, p.4)

3.3.4. Factors to be Considered

3.3.4.a) Knowledge Influenced by Experience

Teachers who were more confident discussing the topic (the dominant character in Group A and teachers in Groups B and C) had previous experience of a child with poor motor skills. However, the accuracy of their knowledge was the same level as other
teachers with less experience. The dominant character in Group A confused gross motor with organisational skills, as did a teacher in Group C, for example,

“...even the way they have the copy in front of them. I think would be organisational skills maybe would be related.” (A1, p.3)

“and organizational things as well has got to do with it” (C1, p.21)

3.3.4.b) Ability to Identify a Poor Motor Skill

- Strategies

Observation of the child performing activities (n=27) and daily activities (n=18) were frequently mentioned by all teachers in order to identify a child with poor motor skills.

“a lot of it is just observation of their everyday movements really” (B1, p.12)

“PE like is a fantastic way to observe balance like properly” (C2, p.24)

A few teachers (n=2) also linked the terms, in particular, coordination to the child’s ability to perform dressing activities and their general appearance.

“For hand-eye coordination...watching them buttoning up their coats or zipping up their coats.” (B1, p.14)

“Even the way they put their school bag on their back maybe falling over the side ...they would just have poor coordination” (A1, p.5)

Comparing the child to the core group in the class was a strategy used by some of the teachers (n=4).

“...gauge how the child is in relation to how the core group in your class are, like how they are getting on.” (C2, p.22)
Limiting Factors

Some teachers (n=4) referred to the fact that there was no set tick-list or check-list to identify if a child had a poor motor skill, or what a child should be able to achieve with their motor skills when they reach first class.

“...there is no set checklist that we are given to ensure that they are able to do those things...” (B1, p.12)

As highlighted previously, their knowledge on motor skill development, fine and gross motor skills and coordination was incomplete. Therefore, the accuracy of the teacher to identify a child with poor motor skills was limited by their level of knowledge.
4. Discussion

The results illustrated that primary school-teachers’ ability to identify accurately a child with a poor motor skill is influenced by their level of knowledge. Teachers were able to identify the activities that the child could not perform but were at times inaccurate and uncertain as to which activity linked to the particular skill. Teachers were least knowledgeable in identifying a child with poor gross motor skills and most accurate in their knowledge on balance. Although fine motor skills were discussed most frequently, at times they were incorrectly linked to gross motor skills and speech. Hence, the teachers’ level of knowledge can be a facilitating factor or an inhibiting factor in relating the correct skill to the task. This could pose problems in making an accurate identification of a child with poor motor development involving a particular skill.

4.1. Accuracy of Recognising Poor Motor Skills

In order to correctly identify a child with poor motor skills, an accurate level of knowledge is required, as highlighted by Dunford et al (2004). The latter study investigated the accuracy of referrals for DCD to occupational therapy services. Teachers demonstrated 20% accuracy in making referrals for DCD. Reasons for inaccurate referrals included teachers not having reliable methods for establishing when coordination skills were the primary cause of a child’s difficulties. Also, they did not have reliable methods for establishing when motor skills are in line with the child’s developmental level. The majority of primary school-teachers in this study could not define the term coordination. Teachers’ knowledge on the term motor skill development was at times inaccurate and uncertainty was displayed. Findings from this study conveyed that teachers need improved knowledge on motor skill development to ensure accurate recognition and referral of a child with DCD.

Similarly, Kirby et al (2005) examined teachers and GPs (General Practitioners) knowledge on different terms, one of which was DCD. DCD was poorly defined by teachers and GPs. Only 1% of teachers moved beyond the basic definition of DCD as a
motor/coordination problem to include various functional difficulties of the disorder, such as handwriting problems and difficulty with ball skills. In contrast, activities involving coordination such as kicking and throwing a ball were identified correctly by teachers. In addition, handwriting and components such as pencil grip were mentioned by all teachers for fine motor skills. This highlighted that the teachers do have some knowledge regarding components of coordination but are perhaps unaware of the link between coordination activities and DCD. This gap in their knowledge implies concerns for early identification.

Toftegaard-Stoeckel et al (2010) investigated the associations between teachers’, parents’ and the child’s own perceptions of the child’s measured motor abilities. Teacher’s evaluation of motor skills was correlated to low motor skills, but parental concern was the best predictor of low motor skills in the child, with a 35-fold increased risk for the child to have poor motor skills. A possible explanation is that teachers are evaluating the child in relation to a group or an external standard, which was also demonstrated in the results from this study. Similarly in a qualitative study by Maciver et al (2010), parents discussed seeking for help and thought teachers, as well as health care professionals, lacked an awareness of DCD. Also, parents felt that there was something wrong with their child but these concerns were not listened to or recognised by education staff or even health care professionals, leading to a delay in accessing help for their child. Another finding from the study by Maciver et al (2010) illustrated parents anger about lost time to make a positive impact on their child’s life, if their child experienced a significant delay in accessing services, which was also reiterated in a study by Restall and Borton (2009). Perhaps teachers could consider or place more emphasis on parental concern in recognising a child with poor motor skills thus, aiding early identification of a child with DCD, (Maciver et al 2010; Restall and Borton 2009; Toftegaard-Stoeckel et al 2010).
4.2. Factors Influencing Knowledge on Motor Skill Development

In the study conducted by Dunford et al (2005) children with DCD voiced concerns about self-care and leisure activities, which the teachers and parents placed little emphasis on. Wang et al (2009) further reinforce the difficulty these children face in the performance of self-care activities, in particular for grooming and dressing. Teachers in this study identified dressing activities occasionally for some of the terms, such as hand-eye coordination for dressing. Activities that involve classroom tasks and the ability to participate in classroom activities were mentioned far more frequently. Teachers tend to place more importance on skills that affect the child’s academic performance and their participation in school activities such as writing, rather than skills that children require to carry out daily living tasks. Even when discussing gross motor skills and balance, they identified classroom activities such as the ability to stay seated on the chair.

The layout of the school week in Ireland would possibly indicate why classroom activities involving fine motor skills were discussed more frequently. The school week in Ireland is comprised mainly of indoor classroom lessons (Government of Ireland 1999), allowing the teachers more time and opportunity to observe the children performing fine motor skills such as writing and cutting. Findings by McHale and Cermack (1992) showed that 31-60% of the school day was allocated to fine motor activities and in particular writing tasks. Additionally, the study by Dunford et al (2005) highlighted that 79.4% of teachers expressed concern about the impact of the child’s coordination difficulties on handwriting. Similarly, Miller et al (2001) showed that the main reason for referral to occupational therapy services was fine motor skill problems, followed by handwriting difficulties. In contrast to this study and other literature (Dunford et al 2005; McHale and Cermack 1992; Miller et al 2001), findings from Rivard et al (2007) conveyed that teachers placed more importance to intervene with children who have gross motor problems rather than fine motor problems. Nevertheless, teachers in this study displayed limited knowledge to accurately identify if a child has poor gross motor skills. This yet again illustrates that teachers are more in tune with skills involving classroom activities.
Teachers’ knowledge on gross motor skills was limited. Firstly, there is only one hour of PE per school week and on average 30 minutes for recreation per day (Government of Ireland 1999). The available time to observe children performing gross motor skills becomes limited to mainly classroom activities, where the child is mostly seated performing academic tasks. In addition, an important point to acknowledge is the fact in ordinary classrooms in Ireland there are in total 24.5 pupils (Department of Education and Skills 2009/2010), which also limits the ability of the teacher to observe all of the children or to notice one particular child who is having difficulty with a particular motor skill.

4.3. Limitations and Methodological Considerations

- The generalisation of results is limited as results were confined to newly qualified teachers; there was a small sample size; and seven out of eight of the teachers qualified from the same university in Ireland. In addition, all of the participants were female. However, this mimics the gender distribution amongst primary school-teachers.

- The time the focus groups took place must also be taken into consideration. Group A was conducted directly following school hours and Group C was conducted later in the evening. Perhaps the teachers in Group A were anxious to leave work and were less enthusiastic to participate than the teachers in Group C.

- Another limitation to focus groups is the possibility that group dynamics may silence individual voices of dissent and the presence of other research participants also compromises the confidentiality of the research setting (Kitzinger 1995). Hence, the relationships between the teachers in Groups A and C must also be acknowledged. Group A were work acquaintances, whereas Group C were friends and worked in different schools. Perhaps the teachers in Group A were less willing to reveal their knowledge or embarrassed to reveal their lack of knowledge on the topic in front of their work colleagues, unlike Group C.

- Another limiting factor was that data saturation was not achieved due to a lack of time and limited resources to complete the recommended 4-6 focus groups (Krueger 1998c).
4.4. Future Research/Recommendations

- Teachers require greater training in the area of motor skill development. Albert Einstein stated that the “only source of knowledge is experience.” However, results highlighted that this is not necessarily true. Experience instilled confidence in the teachers to discuss the topic but did not increase the accuracy of their knowledge. Therefore, other ways to acquire an accurate level of knowledge amongst teachers must be investigated. For example, Chiu et al (2008) successfully showed that an interactive workshop improved school-teachers knowledge on fine motor skills and the role of occupational therapists.

- Further, more extensive quantitative research involving a larger, more diverse sample of school-teachers is required to ascertain the exact level of teachers’ knowledge on this topic across Ireland. Combing qualitative and quantitative research can result in a rich data set (Gibson and Martin 2003).

- Another important question to be considered is whether teachers transfer their knowledge on motor skill development, however limited it may be, into the classroom setting to aid in their identification of a child with DCD.

4.5. Conclusion

Gaps in primary school-teachers’ knowledge in Ireland on motor skill development exist. Confusion and uncertainty of some of the terms were evident apart from balance. It is important to note the gate keeping role teachers play in the identification of a child with DCD. Hence, improved knowledge and confidence on this topic is essential in order to enhance their gate-keeping role.
5. References


the experiences of parents”, Child: Care, Health and Development, 31st October, 1-7.


Dear Principal,

We are Final Year Physiotherapy Students in the University of Limerick. As part of our final year we are completing a research project, titled “The Awareness of School-teachers of Developmental Co-ordination Disorder (DCD), and the Perceptions of its Presentation in Children; Primary School-Teachers Knowledge of Different Aspects of Motor Skill Development in Children”. We are currently recruiting primary school teachers to participate in this study. In particular, we are looking for:

- Primary school teachers, male or female, who are recently qualified, with a maximum of five years teaching experience.
- At least one year teaching experience of senior infants or first class students.

Primary school teachers will be excluded from the study for the following reasons:

- Teachers who have had any additional training in the area of motor skill development or developmental coordination disorder.
- Teachers who have more than five years teaching experience.
- Teachers who do not have experience teaching senior infants or first class.

As outlined in the information leaflet, an audio-recorded discussion group will take place, where participants will be asked to discuss two separate research questions, for approximately 90 minutes in total. All data collected will remain confidential and will be non-attributable to the participating schools and teachers.

We would appreciate if you would inform any teachers in your school of our research project and provide them with the information leaflet and a consent form attached. Also included is a stamped addressed envelope. We would be very grateful if any eligible and interested teachers in your school could return the consent forms to you, and you could forward them to us in the provided envelope. A follow-up phone call to your school will take place within 1 week of receiving this letter.

Thanking you in advance for your participation in our research.

Kind regards,

________________   __________________
Denise O’Riordan    Tricia Murphy
6.2. Appendix: Information Leaflet

**The researchers:**

Denise O’Riordan and Tricia Murphy are Final Year Physiotherapy Students in the University of Limerick. As part of the Final Year it is necessary to undertake a research project. The project will be supervised by their lecturer Dr. Amanda Connell.

If you require any further information before deciding, please do not hesitate to contact Dr. Amanda Connell at 061202958 or via e-mail at amanda.connell@ul.ie.

If you have concerns about this study and wish to contact someone independent, you may contact The Chairperson of the EHS Faculty Ethics Committee, Prof. Alan Donnelly, PESS Dept, University of Limerick.

---

**ALL INFORMATION IS KEPT STRICTLY CONFIDENTIAL AND ONLY USED FOR THE PURPOSES OF THIS PROJECT**

The project has full ethical approval from the University of Limerick Faculty of Education and Health Sciences Research Ethics Committee.

**Thanks for taking the time to read this leaflet.**
What does the project involve?

- This research project is being carried out in an attempt to explore the awareness and knowledge of primary school-teachers on the topics of Motor skill development, as well as Developmental Co-ordination Delay (DCD) in children.

- The project involves a group discussion with approximately six primary school teachers and is carried out by the researchers, Denise O’Riordan and Tricia Murphy, along with the supervision of their lecturer, Dr. Amanda Connell. The first researcher, Denise O’ Riordan will be investigating the school teacher’s awareness of DCD and the perceptions of its presentation in children. The second researcher, Tricia Murphy, will be investigating primary school teacher’s knowledge of different aspects of motor skill development in children.

- The discussion will take place outside of school hours, at a time and location that ensures the teachers are best facilitated. The discussion will take a maximum of ninety minutes and will be audio-taped from beginning to end.

What are the benefits of your participation in this study?

- The information provided by you during the project will be used to gain an insight into school-teachers’ knowledge and awareness regarding Developmental Co-ordination Delay (DCD) and motor development in children.

- An information pack on DCD will be provided to the teachers at the end of the discussion.

What are the risks?

- There are no extra risks compared to any other discussion group.

- If a participant is unhappy with disclosed information during the project, they can stop at any time during the project, without giving any reason.

Who else is taking part?

School-teachers who have graduated in the past 5 years or less, and who have at least one year experience of teaching children in Senior Infants or 1st class are being invited to take part in the project.

What happens to the information?

- This is a research project and there are strict rules regarding those who have access to the disclosed information and results.

- The results of the project will be used but information on individual participating school-teachers will remain confidential at all times.

- The results of the project will add to the existing literature on this topic.

What to do?

If you are eligible to partake and interested, please fill in and sign the “consent form” and return it to the Principal as soon as possible.

The project works on the basis of volunteers. If you do not wish to take part in this project, thank you for taking the time to read this leaflet.

What happens if I change my mind during the study?

All participants are free to change their mind or drop out of this study at any time. If you may wish to do so, please contact one of the researchers to inform us of your decision.
Informed Consent Form:

The Awareness of School-teachers of Developmental Co-ordination Delay (DCD), and the Perceptions of its Presentation in Children; Primary School-Teachers Knowledge of Different Aspects of Motor Skill Development in Children

Please read the following questions and tick the boxes that you agree with:

<table>
<thead>
<tr>
<th>Statements</th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>I have read and understand the subject information sheet.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I understand the purpose of this study and what the results will be used for.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am aware of how the study will be carried out, and the potential risks and benefits of the study.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I know that my participation is voluntary and I am free to withdraw from the project at any stage that I wish, without giving any reason.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I trust that all information that I enclose throughout the study will be used and stored in a confidential manner at all times.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The researchers conducting this study are Tricia Murphy and Denise O’Riordan. If you have any questions or queries before you sign this form, or at a later stage, please do not hesitate to contact: Amanda Connell@staffmail.ul.ie.

SIGNATURE                      BLOCK CAPITALS                      DATE
Teacher:                      __________________   ______________________  _________
Researcher:                   __________________   ______________________  _________
### Question Route:

<table>
<thead>
<tr>
<th>Question Type</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introductory</td>
<td>1. Before we begin, if everyone could just say their name, where they went to college, the classes that they taught and how many years teaching experience you have had so far?</td>
</tr>
</tbody>
</table>
| Transition    | 2. What is your understanding of motor skill development in children?  
   - Developmental milestones?  
   - Physical abilities of a child when the reach first class? |
| Key           | 3. What does the term “gross motor skills” mean to you?  
   - Describe/explain good gross motor skills.  
   - Describe/explain poor motor skills.  
4. What is your understanding of the term “fine motor skills”?  
   - In your opinion what are examples of poor fine motor skills in children?  
   - Can you think of any examples for good fine motor skills in children?  
5. The word “coordination” is used in describing movement. What does the term mean to you?  
   - How would you determine the difference between a child with poor coordination and a child with good coordination?  
6. “Balance” is part of a physical activity. How would you describe the term?  
   - How would you recognise a child with poor balance?  
   - How would you recognise a child with good balance?  
| Concluding    | 7. Anything else that you might like to add to your understanding of the term motor skill development? |
| Summary       | 8. We will recap on the main things that were said. Please feel free to agree or disagree with this summary. |
INFORMATION PACKAGE

The Awareness of School-teachers of Developmental Co-ordination Delay (DCD), and the Perceptions of its Presentation in Children

&

Primary School-Teachers Knowledge of Different Aspects of Motor Skill Development in Children

Designed by Final Year University of Limerick Physiotherapy Students

Denise O’Riordan
&
Tricia Murphy
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<td>3</td>
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<td>Motor Development</td>
<td>4</td>
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<td>References</td>
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</tbody>
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DEVELOPMENTAL COORDINATION DELAY (DCD)

Children with DCD are estimated to represent 5-6% of the school-aged population. DCD is defined by the American Psychiatric Association (APA) by the following criteria as below:

A. Performance in daily activities that require motor coordination is substantially below that expected given the child’s age and intelligence. This is marked by delays in achieving motor milestones (e.g. walking, crawling, sitting), dropping things, “clumsiness,” poor performance in sports, or poor handwriting.

B. These delays may interfere with the child’s academic achievement or activities of daily living.

C. The disturbance is not because of a general medical condition.

## TYPICAL MOTOR MILESTONES

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Milestones</th>
</tr>
</thead>
</table>
| 1-2         | • Walks unaided  
              • Kneels and crouches down to pick up objects  
              • Pushes ball with foot |
| 2-3         | • Jumps over small objects  
              • Rides tricycle for at least 2 meters |
| 3-4         | • Buttons series of three or four buttons  
              • Brushes teeth without assistance  
              • Puts on socks correctly |
| 4-5         | • Walks up and down stairs, alternating feet  
              • Zips jacket zipper independently  
              • Independent in toileting (tearing paper, washing hands, managing clothes)  
              • Fastens all fasteners  
              • Cuts paper along a line with scissors  
              • Ties and unties knots |
| 5-6         | • Dresses independently  
              • Baths or showers without assistance  
              • Catches small ball when thrown from a distance of 10 feet  
              • Rides bicycle without training wheels  
              • Cuts complex shapes with scissors  
              • Ties shoelaces independently |
| 6-8         | • Use fork, spoon and knife competently  
              • Makes own bed when asked  
              • Skips |
Motor development is the changes that occur in our ability to move over the lifespan. It also includes the processes and the factors that underlie these changes in movement ability. Cognitive, affective, motor and physical are components of motor development. These components are all interlinked, as illustrated below. Each factor influences the other factor. For example, has your performance in a written exam (cognitive component) ever been influenced by your emotional state (affective component)?

**Cognitive:** Human intellectual development
- Reading
- Problem-solving in Maths

**Affective:** Social and emotional aspects of human development
- Feelings of self-worth
- Ability to interact with peers in the class

**Motor:** Development of human movement and factors that affect development
- Handwriting ability
- Movement technique
- Level of maturity in running, throwing and jumping
- Rhythmic ability in dance activities

**Physical:** Bodily types of change
- Increase in the weight of the child
- Increase in the height of the child
- Range of motion at the joints
- Fitness levels or cardiovascular endurance
TYPES OF MOTOR SKILLS

Gross motor skills:
Gross motor skills are controlled movements by the large muscles or muscle groups. One relatively large muscle group, for example, is in the upper leg. The muscles in the upper leg are important for producing an array of movements, such as walking, running and skipping.

Fine motor skills:
Fine motor skills are movements mainly controlled by the small muscles or smaller muscle groups in the human body. Movements performed by the hands are considered fine movements because the smaller muscles of the fingers, hands and forearms are critical to the production of finger and hand movements. Examples of fine movements include drawing, sewing, typing or playing an instrument.

Additional Information:

- **Manipulation**, or use of the hands, is a very important aspect to fine movement. Manipulation can involve intrinsic or extrinsic movements. Intrinsic movements refer to the coordination of the individual digits of the hand in order to manipulate an object already in the hand. Extrinsic movements involve the management of an object that is already in the hand.

- A combination of gross motor movements and fine motor movements are important in some tasks, for example, throwing. The large muscles of the shoulder and the legs contribute to the desired accuracy of the movement, i.e. the distance and strength of the throw. The smaller muscles of the wrist and fingers are important for optimal precision of the movement, i.e. hitting the target. The degree of fine motor control is a good indicator of movement ability or perfection.

- As a child matures, the fine components of a skill become increasingly significant and defined.
HOW DO COORDINATION DIFFICULTIES OCCUR?

There is no simple answer to this question since motor coordination difficulties may arise for many reasons. Problems can occur at a number of different stages as we process information and use it to perform skilled movement. We are constantly receiving information from our environment through various senses (see Figure 1).

**Process 1:** The first possibility is that the child may experience difficulty interpreting and integrating the information that is being received through vision, touch, balance, and the position of joints or the movement of muscles.

**Process 2:** A second possibility is that the child has difficulty choosing the type of motor action that is appropriate for that situation. In order to select an action, a child must consider the context in which the action takes place (e.g., a child approaching a curb has to figure out that stepping up is kind of like climbing stairs).

**Process 3:** A third possibility is that the child may have difficulty forming a plan of action in the correct sequence. The child must organize the motor requirements of the task into a sequence of commands that tell the muscles how to perform the required action (e.g., when the child approaches a set of stairs, he or she must shift weight onto one leg before lifting the other).

**Process 4:** Finally, the message that is sent to the muscles must specify the speed, force, direction and distance that they are to be moved. When the child needs to move or to respond to something else that is changing in time or space (e.g., in order to catch or hit a moving ball), these messages must also change. A child may have difficulty monitoring this information or modifying the messages in order to guide and control the movement while it is taking place.

![Figure 1](image-url)

**ACTION PLANNING SYSTEM**

- **PROCESS 1:** Interprets and integrates
- **PROCESS 2:** Decides on a plan of action
- **PROCESS 3:** Organizes plan into motor components
- **PROCESS 4:** Message sent to muscles and action performed

**Receives information from the senses:**
- SIGHT
- SOUND
- BALANCE
- TOUCH

**Receives and modifies feedback**
CHARACTERISTIC FEATURES OF A CHILD WITH DCD

When describing children with DCD, it is important to recognize that they are a very mixed group. Some children may experience difficulties in a variety of areas while others may have problems only with specific activities. The following is a list of some of the more common characteristics that may be observed in a child with DCD.

😊 The child may have difficulty balancing the need for speed with the need for accuracy. For example, handwriting may be very neat but extremely slow.

😊 The child may have difficulty with academic subjects such as mathematics, spelling, or written language which require handwriting to be accurate and organized on the page.

😊 The child may have difficulty with activities of daily living (e.g., dressing, using a knife and fork, folding clothes, tying shoelaces, doing up buttons and zippers, etc.).

😊 The child may have difficulty completing work within a normal time frame. Since tasks require much more effort, children may be more willing to be distracted and may become frustrated with a task that should be straightforward.

😊 The child may have general difficulties organizing his/her desk, locker, homework, or even the space on a page.

If a child in your class exhibits any number of the above characteristics, and if these problems are interfering with the child’s ability to participate successfully in school or on the playground, then it is important to discuss the matter with the parent or guardian and recommend a referral to the family GP or appropriate services that are available in your area.
### CHARACTERISTIC FEATURES OF A CHILD WITH DCD

<table>
<thead>
<tr>
<th>PHYSICAL</th>
<th>BEHAVIOURAL/EMOTIONAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>» The child may appear to be clumsy or awkward in his/her movements. She/he may bump into, spill, or knock things over. The child may experience difficulty with gross motor skills (whole body), fine motor skills (using hands), or both.</td>
<td>» The child may appear to be uninterested in, or to avoid, particular activities, especially those which require a physical response. For a child with DCD, motor skills are very difficult and require more effort. Repeated failure may cause the child to avoid participating in motor tasks.</td>
</tr>
<tr>
<td>» The child may have difficulty with printing or handwriting. This skill involves continually interpreting feedback about the movements of the hand while planning new movements, and is a very difficult task for most children with DCD.</td>
<td>» The child may experience secondary emotional problems such as low frustration tolerance, decreased self-esteem, and lack of motivation due to problems coping with activities which are required in all aspects of his/her life.</td>
</tr>
<tr>
<td>» The child may be delayed developing certain motor skills such as tricycle or bike riding, ball catching, handling a knife and fork, doing up buttons, and printing.</td>
<td>» The child may avoid socializing with peers, particularly on the playground. Some children will seek out younger children to play with while others will go off on their own. This may be due to decreased self-confidence or avoidance of physical activities.</td>
</tr>
<tr>
<td>» The child may show a discrepancy between his/her motor abilities and his/her abilities in other areas. For example, intellectual and language skills may be quite strong while motor skills are delayed.</td>
<td>» The child may seem dissatisfied with his/her performance (e.g., erases written work, complains of performance in motor activities, and shows frustration with work product).</td>
</tr>
<tr>
<td>» The child may have difficulty learning new motor skills. Once learned, certain motor skills may be performed quite well while others may continue to be performed poorly. The child may exhibit poor balance and/or may avoid activities which require balance.</td>
<td>» The child may be resistant to changes in his/her routine or in the environment. If the child has to expend a lot of effort to plan a task, then even a small change in how it is to be performed may present a large problem for the child.</td>
</tr>
<tr>
<td>» The child may have more difficulty with activities that require constant changes in his/her body position or adaptation to changes in the environment (e.g., baseball, tennis or jumping rope).</td>
<td>» The child may find activities that require the coordinated use of both sides of the body difficult (e.g., cutting with scissors, stride jumps, swinging a bat, or handling a hockey stick).</td>
</tr>
</tbody>
</table>
CONCLUSION

Teachers and parents who are with a child every day may be the first to notice the functional difficulties that the child is experiencing. It is important for the child to be examined at an early age in order to rule out other medical reasons for the clumsiness. Children with DCD who are not recognized may experience failure and frustration, are often perceived to be lazy or unmotivated, and may develop secondary complications such as learning difficulties, emotional, social and behavioural problems.

EARLY IDENTIFICATION AND INTERVENTION ARE KEY TO SUCCESS
REFERENCES


### 6.6. Appendix: Participant Characteristics

<table>
<thead>
<tr>
<th>PARTICIPANT CODE:</th>
<th>AGE</th>
<th>GENDER</th>
<th>NUMBER OF YEARS QUALIFIED</th>
<th>TEACHING EXPERIENCE TO DATE (CLASS-GENDER OF CLASS-YEARS TEACHING CLASS):</th>
<th>INCIDENCE OF A CHILD IN THE CLASS/SCHOOL</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>23</td>
<td>F</td>
<td>3</td>
<td>SI - mixed - 2 years; 3&lt;sup&gt;rd&lt;/sup&gt; - girls - 1 year.</td>
<td>Yes</td>
</tr>
<tr>
<td>A2</td>
<td>26</td>
<td>F</td>
<td>5</td>
<td>1&lt;sup&gt;st&lt;/sup&gt; - girls – 1 year; 4&lt;sup&gt;th&lt;/sup&gt; - girls - 1 year; JI - mixed - 2 years; SI - mixed - 1 year.</td>
<td>No</td>
</tr>
<tr>
<td>A3</td>
<td>24</td>
<td>F</td>
<td>3</td>
<td>SI - mixed - 3 years.</td>
<td>No</td>
</tr>
<tr>
<td>A4</td>
<td>23</td>
<td>F</td>
<td>3</td>
<td>SI - mixed - 1 year; 3&lt;sup&gt;rd&lt;/sup&gt; class - girls - 2 years.</td>
<td>No</td>
</tr>
<tr>
<td>B1</td>
<td>25</td>
<td>F</td>
<td>4</td>
<td>5&lt;sup&gt;th&lt;/sup&gt; - mixed - 1 year; 1&lt;sup&gt;st&lt;/sup&gt; - mixed - 1 year; JI/SI - mixed - 2 years.</td>
<td>Yes</td>
</tr>
<tr>
<td>C1</td>
<td>22</td>
<td>F</td>
<td>2</td>
<td>3&lt;sup&gt;rd&lt;/sup&gt; - mixed - 1 year; 1&lt;sup&gt;st&lt;/sup&gt; - mixed - 1 year.</td>
<td>Yes</td>
</tr>
<tr>
<td>C2</td>
<td>30</td>
<td>F</td>
<td>4</td>
<td>1&lt;sup&gt;st&lt;/sup&gt;/2&lt;sup&gt;nd&lt;/sup&gt; - mixed - 2 years; 5&lt;sup&gt;th&lt;/sup&gt;/6&lt;sup&gt;th&lt;/sup&gt; - mixed - 1 year; 3&lt;sup&gt;rd&lt;/sup&gt;/4&lt;sup&gt;th&lt;/sup&gt; - mixed - 1 year.</td>
<td>Yes</td>
</tr>
<tr>
<td>C3</td>
<td>24</td>
<td>F</td>
<td>2</td>
<td>1&lt;sup&gt;st&lt;/sup&gt;/2&lt;sup&gt;nd&lt;/sup&gt; - mixed - 2 years.</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*JI = Junior Infants; SI = Senior Infants; F = Female*
Once again I would like to thank you for your participation in my Final Year Project titled “Primary School Teachers’ Knowledge on Motor Skill Development”. I have attached a preview of the major themes and subthemes that emerged from the three focus groups conducted last semester. The themes are highlighted in black with supporting quotations shown below in italics. If you would read through the attached word document and ascertain whether you are in agreement with the themes, I would appreciate it. If you have any questions or objections please contact me at: amanda.connell@ul.ie. The purpose of this is to improve validity of the focus group study.

Kind Regards,

____________________

Tricia Murphy,

4th Year Physiotherapy Student, University of Limerick.
Primary School Teachers’ Knowledge on Motor Skill Development

Main Findings/Themes

The key theme identified was primary school-teachers’ knowledge on motor skill development (Diagram 1). Citations, with page numbers for reference to the transcripts, along with the participant and group number are displayed in order to illustrate the themes.
1. Variable Knowledge

1.a) Motor Skill Development

Group A were unable to define motor skill development and probing was required. Teachers in Groups A and B displayed uncertainty regarding the term and what the term involved, for example,

“...this might not be fully related to motor development but just putting on her shoes on her right foot or dressing herself, putting on her jumper the right way...maybe that is related to her motor development or maybe it wouldn’t be.” (A1, p.8)

“...their (the child’s) general movement, I suppose, that it wouldn’t be all over the place, that it would just be kind of regular and normal...” (B1, p.11)

Group C provided more detailed knowledge on the term, as evident in the example below.

“...their kind of awareness of their own muscles, their awareness of how to use them in their body” (C3, p.25)

Some teachers related the term motor skill development to an underlying condition.

“...normally find it in a child that would have another underlying problem like maybe autism....or dyspraxia” (A2, p.8)

All of the groups related motor skill development to physical abilities of the child such as writing tasks, cutting activities, PE (Physical Education), games and hand-eye coordination. Groups B and C referred to fine and gross motor skills as a part of motor skill development.

“Motor skill development, that’s to do with like their development of their muscles...there, is fine motor and gross motor...” (C2, p.17)
The amount of time spent practicing the task in different environments, such as the school or at home, was recognised by Groups B and C as a factor that influenced motor skill development. This was discussed more frequently and with greater intensity by Group C compared to Group B. Group C also referred to factors that limit the opportunity to practice.

“...cutting activities...at this age group they should be encouraged to do a lot of cutting activities, because *I find* (emphasis) anyway it is a skill that they will definitely improve on the more practice that they get...” (B1, p.13)

“An awful lot of it will depend of course on the infant teacher and how much practice.” (C3, p.20)

“...a child who does a lot of art at home with the parents...then obviously they are used to using those muscles and so they are used to it and so *they have* (emphasis) good motor skills” (C1, p.25)

“You can really tell from the kids, the difference between kids who have or who do extra-curricular activities outside schools against those who don’t” (C1, p.30)

“gone is the day were they spend all (emphasis) their time outside...now they have the DS, the playstation” (C1, p.29)

1.b) Fine Motor Skills

The teachers discussed fine motor skills most frequently and extensively, when compared to the other skills. They made reference to fine motor skills, such as cutting, pencil grip, as examples throughout the interviews. Definitions of the term included:

“...more tedious things, like threading and peg-boards and things like that, is it?” (A4, p.4)
"...doing work with your hands, and you know, being kind of exact with it." (B1, p.13)

Fine motor skills activities were described in great detail when identifying a child with poor fine motor skills, for example,

"Or if they were using a scissors, they wouldn’t be able to cut along the line drawn on the page. They would be cutting all over the place." (A2, p.4)

"...holding their pencil and tracing over a dotted line and just being able to stay on the line with their pencil and drawing some simple shapes but staying (emphasis) in control of the pencil." (B1, p.13)

"...the peg boards that we use in Maths...manipulating them that they will go into the place that they want them to go and that they have control over them" (B1, p.13)

However, there was still some confusion regarding the term, and components of speech were mentioned occasionally by one teacher as a fine motor skill. The other teachers in Group C agreed with her comments.

"I don’t know whether this is fine motor related to your tongue as well so the way you speak" (C2, p.23)

Fine motor skills were at times confused with gross motor skills by one teacher in Group A. The following example was given for identifying poor fine motor skills in a child.

"...in PE, not being able to catch a ball or maybe throw a bean bag and do simple two-hand catch..."(A1, p.4)

In addition, none of the other teachers in Group A disputed the above comment that fine motor skills involved throwing and catching a ball, even following the summary.
1.c) Coordination

The majority of teachers were least knowledgeable in defining coordination. Initially, Group A were unable to respond to the question and probing was required in order to elicit an answer. Some of the following responses were given for coordination:

“...the way the brain sends messages to the muscles, is it?” (A3, p.5)

“It is hard to explain” (C1, p.24)

“Are we right?” (C2, p.24)

Nevertheless, Group B gave a reasonably good definition for the term, describing coordination as:

“...a link between the message that the brain is sending and the movements that the hands are carrying out or feet or whichever part of the body they are using.” (B1, p.13)

However, most teachers associated correct activities to the term such as hand-eye coordination, ball activities involving kicking, catching and throwing, which they discussed descriptively.

“can’t kick the ball properly or even looking at a target and trying to coordinate like getting a ball into that (emphasis) target and knowing how far to throw it and what direction to throw it in and the force to throw it in” (C3, p.24)

2. Accurate Detailed Knowledge

2.a) Balance

Teachers displayed a good understanding of the term “balance”. They did not confuse the term with fine or gross motor skills or coordination.
“...a kind of control that the child...knows what part of their body...to put their weight on, we’ll say to ensure that they can stay balanced in whatever position they are in...”(B1, p.14)

“...able to get from A to B without banging off anything” (C2, p.23)

“...sitting in a chair and if they lean out of their chair to pick something up I have seen children literally fall out of their chair. So it is their ability to know (emphasis) when to stop leaning” (C3, p.23)

They linked correct activities to the term. The most frequently mentioned activities for balance were walking along a straight line, PE activities, and balancing on one leg.

“...doing gymnastics, balancing on one foot” (A4, p.7)

“...to stand on one leg and to put their hand on their head...” (B1, p.15)

3. Limited Knowledge

3.a) Gross Motor Skills

The teachers displayed less depth in their knowledge on gross motor skills with some ambiguous responses, spoken with little confidence and less frequently than the other skills. Definitions of the term included the following:

“Maybe if they use it with their main muscles, the bigger muscles in the body” (A3, p.3)

“...opposite to fine motor, is it?” (A1, p.3)

All teachers had a good idea of what gross motor skills involved, for example, linking the term with balance, running and jumping. In comparison to fine motor skills,
descriptions of poor gross motor skills lacked detail and clarity and were discussed less frequently.

“...they would have control over their movements and that...they would be able to hold their balance...” (B1, p.12)

“gross motor is in relation to...running, jumping, so their legs and their arms...” (C2, p.17)

“...they aren’t very awkward” (A1, p.4)

In addition, teachers in Groups A and B inaccurately linked gross motor skills to postural control and sitting balance in order to identify poor gross motor skills, for example,

“...ability to stay on their chairs...” (B1, p.13)

“the way they sit in the chair or in the class with you they get restless easily...they wouldn’t be able to sit properly in the chair” (A1, p.4)

4. Factors to be Considered

4.a) Knowledge Influenced by Experience

Teachers who were more confident discussing the topic (the dominant character in Group A and teachers in Groups B and C) had previous experience of a child with poor motor skills. However, the accuracy of their knowledge was the same level as other teachers with less experience. The dominant character in Group A confused gross motor with organisational skills, as did the teachers in Group C, for example,

“...even the way they have the copy in front of them. I think would be organisational skills maybe would be related.” (A1, p.3)
“and organizational things as well has got to do with it” (C1, p.21)

4.b) Ability to Identify a Poor Motor Skill

- Strategies

Observation of the child performing activities and daily activities were frequently mentioned by all teachers in order to identify a child with poor motor skills.

“a lot of it is just observation of their everyday movements really” (B1, p.12)

“PE like is a fantastic way to observe balance like properly” (C2, p.24)

A few teachers also linked the terms, in particular, coordination to the child’s ability to perform dressing activities and their general appearance.

“For hand-eye coordination...watching them buttoning up their coats or zipping up their coats.” (B1, p.14)

“Even the way they put their school bag on their back maybe falling over the side ...they would just have poor coordination” (A1, p.5)

Comparing the child to the core group in the class was a strategy used by some of the teachers (n=4).

“...gauge how the child is in relation to how the core group in your class are, like how they are getting on.” (C2, p.22)

- Limiting Factors

Some teachers (n=4) referred to the fact that there was no set tick-list or check-list to identify if a child had a poor motor skill, or what a child should be able to achieve with their motor skills when they reach first class.
“...there is no set checklist that we are given to ensure that they are able to do those things...” (B1, p.12)

As highlighted previously, their knowledge was incomplete for motor skill development, fine and gross motor skills and coordination. Hence, the accuracy of the teacher to identify a child with poor motor skills was limited by their level of knowledge.