

Developmental Coordination Disorder: Validation of a Qualitative Analysis Using Statistical Factor Analysis

Kathy Ahern

Kathy Ahern, RN, PhD, Lecturer, University of Queensland, Australia

Abstract:

This study investigates triangulation of the findings of a qualitative analysis by applying an exploratory factor analysis to themes identified in a phenomenological study. A questionnaire was developed from a phenomenological analysis of parents' experiences of parenting a child with Developmental Coordination Disorder (DCD). The questionnaire was administered to 114 parents of DCD children and data were analyzed using an exploratory factor analysis. The extracted factors provided support for the validity of the original qualitative analysis, and a commentary on the validity of the process is provided. The emerging description is of the compromises that were necessary to translate qualitative themes into statistical factors, and of the ways in which the statistical analysis suggests further qualitative study.

Keywords: *generalization, survey design, phenomenology.*

The author acknowledges the help of Robyne Lebrocque and Jim McKay in the preparation of this article.

Citation Information:

Ahern, K. (2002). Developmental coordination disorder: Validation of a qualitative analysis using statistical factor analysis. *International Journal of Qualitative Methods* 1 (3). Article 5. Retrieved DATE from <http://www.ualberta.ca/~ijqm>

Introduction

Developmental Coordination Disorder (DCD) in children is documented by various terms including *clumsiness*, *developmental dyspraxia* and *specific developmental disorder of motor function*, and it is generally accepted that children with DCD suffer adverse social and emotional effects. However, relatively little is written about the process of obtaining a diagnosis of DCD as most of the literature in this area focuses on the related field of learning disabilities (see, for example, Layton & Lock, 2001; Saramma, 2001; Watkins & Worrell, 2000). In the search for a diagnosis, the experiences of parents of these children have received relatively little attention, even though parental input is an important factor in the child's experiences (Chesson, McKay, & Stephenson, 1990).

Elsewhere, a phenomenological account of parents' experiences of raising a child with DCD during the search for a diagnosis has been described (Ahern, 2000). Themes identified in that study included parents' observations that their children were rejected by peers and were cautious and frightened in trying new experiences. Consequently, the parents were very protective, and made special allowances for the child.

As with all phenomenological research, the extent to which the findings can be generalized is not known. I attempted to investigate this issue by conducting a quantitative factor analysis in which themes identified in the phenomenological account of parenting a clumsy child were developed into a format that enabled quantitative collection of data via a mailed questionnaire. To this end, I devised a way in which qualitative and quantitative methods could be combined to develop a

clearer picture of the experiences of this group of parents. As Reinharz (1983) suggests, it is through research that experience and observation are transformed into consensually validated knowledge. She describes this transformation as a series of steps in which the private becomes increasingly public: from the individual to the researcher, to colleagues, and then to wider audiences. In this article, I have attempted to expand the transformation laterally, so that the individual's experiences are transformed into an instrument that can be used to capture the experiences of many different people who share the common experience of parenting a child with DCD. Ideally, this could expand the pool of researchers and clinicians studying this phenomenon, with quantitative researchers validating, extending, and quantifying the knowledge gained by phenomenologists and vice versa.

However, this endeavour was not fully realized in this study, and it left me with as many questions as it did answers. In this article, I describe the processes used to develop a questionnaire from phenomenological findings, discuss the compromises that were required, and describe how phenomenology and factor analysis complement one another.

Review of the Literature

The main feature of DCD is a serious impairment of motor coordination that cannot be explained by general intellectual retardation or any other neurological disorder. In order to fulfil criteria for this disorder, the child's fine or gross motor coordination should be significantly below the level expected for his/her age and general intelligence (American Psychiatric Association, 1994; World Health Organization, 1992). Secondary problems such as behaviour problems, low

fitness, poor self esteem and relationship problems with other family members are common (Coleby, 1995; Rose, Larkin, & Berger, 1994; Kadesjo & Gillberg, 1999).

It is generally accepted that the earlier the diagnosis of motor impairment, the sooner intervention can help to ameliorate the physical and emotional problems of DCD children (Schoemaker & Kalverboer, 1994). However, for most children the diagnosis comes later rather than sooner (Losse et al., 1991). The process by which children with DCD have been diagnosed has been under-investigated and there is a need for research to be undertaken to identify factors that may expedite the diagnosis of the disorder.

To this end, a phenomenological study (Ahern, 2000) identified four characteristics of children with DCD and their parents. The phenomenological analysis was used to accurately describe and interpret respondents' meaning and practices of parenting a DCD child and the sample consisted of 11 parents whose child was currently attending a movement remediation program. By studying this group of parents, person-related homogeneity was maintained (they all had life experiences in common) while variation in the target phenomenon was achieved (one parent had not been aware of this child's problems, one parent was aware but apparently unconcerned, one parent was extremely concerned at the social stigma that the DCD might cause, and most had come to the end point of remediation through diverse means).

While the child attended the weekly 3-hour program, I invited the parent to talk with me. Prior to each interview, I spoke to all parents, describing the research and answering their questions.

At this point, they were given informed consent forms to take away with them. These forms included that the person had the right to withdraw at any time, that all data would be de-identified in the analysis and reporting, that raw data would be held in a locked filing cabinet to which I had sole access, and that it would be held for seven years and then destroyed by burning.

I initially approached 15 parents (the total number of children in the program). To my surprise, they all enthusiastically accepted. It appeared that they were eager to talk to me about their experiences. I suspended data collection after 11 respondents (19 interviews) because no new information was elicited. Indeed, word of my interest got around among parents of children in other programs, and I had a further six requests from parents to be interviewed. It appeared that these parents wanted to have their experiences validated via their contributions to my research. I held an informal group discussion with the parents whom I did not include in my research. Their stories were strikingly similar to those of my respondents, and many expressed thoughts along the lines of “I didn’t want the other kids to say they didn’t want (my child) on the team”.

Interviews lasted from 45 minutes to two and a half hours. I transcribed them verbatim, incorporating my field notes, within 48 hours of each interview. Three of the respondents preferred to be interviewed in their homes, one in his office, and the rest in a private room while their child attended the program. Each interview was initiated with the same prompt: “Describe the process by which your child came to the remediation program. Start at the beginning and end at the present time”.

Analysis was carried out with the Ethnograph computer software. There were three encoding processes carried out on the data (Collaizi, 1976): significant statements were extracted from the transcripts; categories were formulated from the statements; these categories were then organized into themes.

Purpose

The strength of feeling demonstrated by these parents and the eagerness with which other parents sought to be included in the study surprised me. I wondered if most parents of children with DCD experienced similar emotions and reactions. Also, as a research methodologist, I wanted to explore a way in which a phenomenological analysis could be empirically tested. Therefore, I conducted this study to carry out statistical exploration of themes that would provide information on the generalizability and statistical stability of the qualitative analysis, thus addressing two of the limitations often attributed to qualitative research.

The purpose of this study was to describe the procedures undertaken in the development of the questionnaire that was derived from a published phenomenological study. Secondly, it was anticipated that information about the generalizability of the themes would be gained, and that a statistical form of triangulation could be explored.

Methodology

Participants

The participants in this study were the parents of children who had attended a clinically based remediation program for motor coordination. The program records were accessed and a questionnaire was mailed to all parents whose pre-school age children had been enrolled in the program in the previous six years. I chose a six-year period in order to maximise sample size while avoiding confounding issues of changes in the program assessment protocol. All children who attended the program had been assessed as having movement difficulties using the McCarron Assessment of Neuromuscular Development (MAND) (1982).

Development of Instrument

I developed the questionnaire from the preliminary categories identified in the phenomenological study. These included parents' perception of the child's motor behaviour, psychosocial abilities, coping strategies, self-esteem, and feelings. The questionnaire also included items on the phenomenological categories of parent's attitudes, concerns, feelings and interactions with professionals, and their adaptations in activities of daily living.

Although these themes constituted the major characteristics of one phenomenon, I had to develop the questionnaire in two parts because factor analysis requires a minimum of 20 cases per variable. I was unable to access more people in my sample, so I was obliged to enter data for analysis in two batches. Thus, the parents' feelings and their reports of their children's actions constituted two distinct sections of the questionnaire. This was a compromise. I had to split the

phenomenon into two separate parts to meet statistical assumptions, when the reality of the experience was of interconnected pain and frustration, mutually experienced by parent and child.

In order to keep the questionnaire as close as possible to the phenomenological descriptions, I used verbatim statements of the interview participants whenever possible. This caused some unanticipated problems that emerged when the questionnaire was piloted. These are discussed later in this article. In addition, the parents in the phenomenological study talked in depth about their pain and frustration. As a result, all the items in the questionnaire were negative, which did not seem encouraging for parents to complete. Therefore, in order to maintain an equal balance of positive and negative items, eight statements were reversed. The phenomenological categories, with examples of items, are as follows:

Part A: the child

Motor development

- I had to help my child with buttons and shoelaces when he/she was six years old.
- My child could use scissors correctly in pre-primary (*reversed item*).
- My child had difficulty learning to ride a tricycle/bicycle.

Feelings, likes and dislikes

- My child did not like boisterous games.
- My child was more cautious than other children were.
- My child was generally secure (*reversed item*).

Relationships with other children

- My child was accepted by other children (*reversed item*).
- My child learned better in one-to-one teaching rather than in a group.

Behaviour at home

- My child gave up easily in physical activities.
- My child tried to distract me when I asked him/her to do something that he/she might find difficult.
- My child was generally hard working (*reversed item*).

Part B: The parent

Feelings

- I felt I needed to protect my child from having his/her feelings hurt by others.
- I felt that other children would not play with my child.
- I felt that my child would have problems at school because the teachers wouldn't understand him/her.

Adaptations for the DCD child

- I steered my child away from activities that I knew he/she would have difficulty with.
- I gave my child more attention than my other children.
- I fought for my child when I felt that he/she was not being treated fairly.

Perceptions of professionals

- Professional people didn't want to help my child.
- I think that some professionals don't understand how much my child suffers.
- When I approached a professional person with specific questions, the professional provided information and/or help (*reversed item*).

The items were measured by a five point Likert scale. Items in the questionnaire were assigned places according to the structure of the instructions, such as whether the participant agreed/disagreed or the frequency with which an event occurred. I decided to choose this pragmatic option because the alternative of having similar themed items placed together resulted in a confusing plethora of instructions.

A panel of five experts, including movement specialists and child development researchers, validated the questionnaire as per the protocol described by Lyn (1986). This entailed having the experts rate the content relevance of the items using a 4 point ordinal rating scale, where 1 connotes an irrelevant item and 4 an extremely relevant item. Only items rated as 3 or 4 by all five experts were retained. This meant that I followed the appropriate process to determine psychometric validity, but ended up excluding parent statements that had emerged as being important in the phenomenological study. For example, "My family is not very understanding of my child's problems" was not included in the questionnaire.

Pilot studies

The first pilot of the questionnaire comprised parents who had attended the current program (n=17). The purpose of this pilot was to identify problems in the instructions and instrument. As a result of this pilot, six items were modified, and the placement of items was adjusted.

The revised questionnaire was administered to a further twenty-seven parents a week later. Results of this administration resulted in further minor changes in item wording. Analysis of responses included assessment of missing data. There was no pattern to non-responses. This was a good sign, and indicated that the questions were clear. In the few cases where data were missing, I concluded that the parent had skipped a line rather than deliberately ignored the question, and I entered the mean response for the item into the database so that the participant would be included in the SPSS analyses. All cases were retained. Cronbach's alphas were carried out on the items within each theme to determine the relationship of items to themes. The themes *child's motor development*, *parent's adaptations* and *child's feelings* had an alpha level of 0.7 or above, indicating acceptable internal reliability of each theme. All items in the above themes were retained.

On the other hand, the theme *child's relationships with other children* scored poorly (0.35). This was surprising because this area was a major theme in the phenomenological analysis. After much discussion with colleagues and members of my panel of experts, I concluded that the problem was probably due to the overlap between the child's relationships and his/her behaviour. This actually supported the inter-relatedness that was evident between the themes in the

phenomenological study, but did not show in the same way in a psychometric instrument. In the end, I decided to delete the *relationships* theme from the instrument and move the item “my child learned better in one-to-one teaching” to the theme of *child’s behaviour*, which resulted in an alpha of 0.64.

More problematic were the items included in the theme of *parent’s feelings*. The alpha for this theme was 0.08, which indicated that the items were not conceptually related to each other at all. No one item in this theme influenced the internal consistency of the themes, so simple deletion of an item would not have improved the alpha. However, *parent’s feelings* had been identified as a theme in the phenomenological study, and had been validated through rigorous qualitative techniques. After much thought and consultation, I concluded that semantic differences might be contributing to the lack of correlation of the items and I decided to reword the items to more strongly reflect the feelings involved in the statement. The solution was simply to change the words “I think” to “I feel”.

The revised items in the *parent’s feelings* theme were piloted again with another group of parents enrolled in a new term of the program (N= 12) and this time the theme achieved an alpha of .76. This meant the questionnaire was internally reliable, but as was the case previously, this was possible only at the expense of the verbatim statements provided by the parents who had lived through the experience of parenting a DCD child.

The final questionnaire was comprised of 66 items, which encompassed six major areas. These included: parents' adaptations, parents' feelings, child's motor development, child's feelings, child's behaviour and professionals' behaviour.

Procedure

A total of 215 questionnaires were mailed and 140 completed questionnaires were returned following a second mailing (response rate of 65%). Of the completed questionnaires, 13 participants met exclusion criteria (for example their child had cerebral palsy) and were not included in the analysis, leaving a final sample size of 127. Parents who had been involved in the interviews and pilot studies were excluded because of the possible effect of their prior involvement. Where two or more children in a family attended the program, the covering letter instructed parents to complete the questionnaire for their experiences with the first identified child. Although I regretted this decision because it meant my sample size was reduced, it was necessary for conceptual reasons. The phenomenon was of gaining a diagnosis for a child with confusing and sometimes contradictory symptoms. I assumed that if parents had a child who had been diagnosed with the condition, they would be able to avoid many of the problems they experienced with their second DCD child. Thus, only the first child diagnosed with DCD was included in the sample.

Analysis

The data were analyzed with the aid of the SPSS for Windows, version 10. Statistical testing of the phenomenological analysis was carried out by an exploratory factor analysis of the

questionnaire items. This meant that the themes that I had used to help with the development of the questionnaire were ignored in the analysis. Each item was analyzed with every other item regardless of the theme I had placed it in. In this way, the analysis would provide groupings of items based on statistical criteria alone. If the groupings were similar to those that emerged in the phenomenological analysis, it would provide a form of triangulation of the phenomenological analysis.

Results

Ninety six percent of the completed questionnaires were completed by mothers. Seventy one percent pertained to male children and 28% percent to female children. One parent did not state the child's gender.

Reliability and validity of the instrument

Cronbach's alpha was calculated for each of the themes upon which the instrument was based. Each theme had between five and seven items. *Parents' adaptations* had the highest alpha at .76; *parents' feelings*, .76; *child's feelings*, .71; *professionals' behaviour*, .71 and *child's motor development*, .61. *Child's behaviour* and *socialization*, combined into one group, had an alpha of .43. The alpha for the questionnaire as a whole was .87, indicating that the instrument was measuring a single domain, most likely the phenomenon of parenting a child with DCD. This was extremely gratifying, and indicated to me that both the phenomenological analysis and the questionnaire had accurately captured the domain of the parents' experiences.

In order to test the themes developed from the interviews, an exploratory factor analysis with Varimax rotation was carried out. The variables were entered in two separate analyses with the first group consisting of “child variables” such as the child’s feelings and behaviours. The second factor analysis was on the group of “parent variables”. As discussed earlier, the decision to split the items was based on statistical necessity. Factors in both analyses were retained according to the Scree test, which is based on the changing slope of the plotted factors.

In the analysis of the “child factors”, four factors accounted for 48% of the variance. Table 1 provides the factors and their loadings. Factor 1 accounted for 20% of the variance, Factor 2 accounted for 12%; Factor three 9%; and Factor 4 accounted for 7 % of the variance.

FACTOR	LOADING			
	F1	F2	F3	F4
1. Overwhelmed and avoiding situations				
Avoided sporting activities by being busy	.75			
Gave up easily in physical activities	.73			
Did not like boisterous games	.73			
More frightened than other children	.65			
More cautious than other children	.63			
Reluctant to try things he/she thought might be difficult	.61			
Avoided situations where he/she could get hurt	.57			
Tried to distract me when asked to do something he/she thought might be difficult	.54			
2. Needs much encouragement				
Needed more praise than other children		.81		
Learned better one-to-one		.75		
Was distractible		.74		
Was easily frustrated		.68		
Needed help with buttons and shoelaces		.61		
3. Milestones only were delayed				
Slow to crawl			.88	
Slow to walk			.86	
Difficulty learning to ride a tricycle			.65	
4. Angry				
Angry when he/she came last				.81
Was generally angry				.77

Table 1. Factors Extracted from 34 “Child Variables” (N=114)

Eight items were loaded onto the *Overwhelmed and Avoiding Situations* factor (F1). Five items loaded onto the factor of *Needs Much Encouragement*. The third factor, *Milestones only were Delayed*, consisted of three items while the fourth factor, *Angry*, had two. Each factor in the model had a moderate to strong loading between items.

Of the “parent factors”, five factors were extracted which accounted for 52% of the variance. Item loadings ranged from moderate to strong for the first four factors (*Parents’ adaptations*, [which accounted for 11% of the variance], *Professionals’ behaviour* [11% variance explained], *Anticipation of rejection* [10 % variance], and *protective intervention* [10 % explained variance]). The fifth factor, *Something is Wrong* (which accounted for 9% of total variance), resulted in weak to moderate loadings. Table 2 provides details of the variables contributing to the parent related factors.

As can be seen from Table 2, Factor 5, has a fair degree of heterogeneity as shown by the diverse factor loading. The first three variables in the factor indicate the relationship between the parents’ experiencing of the child’s problems and the reason that help was sought. For this reason, the factor name of “something is wrong” was applied. The last two variables in the factor pertained to parents’ relationships with professionals; one expressing a strategy that was effective, the other expressing concern that a professional group would not be supportive.

FACTOR	LOADING				
	F1	F2	F3	F4	F5
1. Parents' adaptations					
Let child eat with his/her fingers	.73				
Gave child more direction	.68				
I gave my child more attention	.66				
I gave my child more time	.65				
I cut up my child's food	.65				
My child's siblings were jealous	.51				
2. Professionals' Behaviour					
Professional people didn't want to help my child		.83			
Professional people didn't understand how much my child suffered		.75			
When I approached a professional without knowing what the problem was, I was fobbed off.		.71			
When I approached a professional with specific questions, the professional provided information and/or help		.60			
3. Anticipation of Rejection					
I knew other people would hurt my child			.80		
I felt my child would have problems because the teachers wouldn't understand him/her			.69		
I felt other children would not play with my child			.67		
4. Protective Intervention					
I needed to protect my child from having his/her feelings hurt				.78	
Steered child from activities he/she would have difficulty with				.74	
I fought for my child when he/she was not treated fairly				.73	
5. Something is wrong					
I sought help because of my child's delayed milestones					.69
I gave my child more time					.58
I gave my child more direction					.46
When I approached a professional with specific questions, the professional provided information and/or help					.43
I felt my child would have problems because the teachers wouldn't understand him/her					.42

Table 2. Factors Extracted from 22 Parent Variables (N=114)

Discussion

Child factor analysis

As was the case with the phenomenological study, the factor analysis supported the existence of avoidance behaviours and the high degree of support required as common elements for a child with DCD. The factor analysis identified four factors, the first two of which reflected the themes extracted in the phenomenological study. The first of the child factors “being overwhelmed” is supported in the literature (Kristensen, 2000). Shoemaker and Kalverboer (1994) reported that “clumsy” children judged themselves less competent regarding physical skills and showed more anxiety than other children. This factor supports the finding in the phenomenological analysis (Ahern, 2000), where two-thirds of the children were described as avoiding activities and one third were described by their parents as having marked anxiety and fearfulness. The degree of anxiety included in Factor 1 was also congruent with Schoemaker and Kalverboer’s (1994) findings.

From the second child factor, “needs much encouragement”, it was apparent from the variables loaded onto this factor that the encouragement related to both motor problems and to the child’s distractibility and frustration. The combination of these variables in this factor highlights the concomitant emotional problems facing these children (Kadesjo & Gillberg, 1999). This also supports the findings of Ahern (2000) that parents need to provide a high degree of support to their DCD children. Parents in Chesson, McKay and Stephenson’s (1990) study reported that the overwhelming majority of parents believed that they responded differently to the study-child compared with other siblings by their tendency to give greater praise and encouragement.

Other factors that support the extant literature on DCD include the children's delayed tricycle riding, which was loaded onto Factor 3, and avoidance of physical activities. Delayed milestones such as crawling and walking have been reported as being a characteristic of DCD children in a number of studies (Hoare, 1994; Taylor, 1990). The existence of both child's avoidance of physical activity and his or her need for greater than usual amounts of encouragement has been identified in literature spanning almost 30 years. Ayres (1975) noted that some poorly coordinated children avoided situations requiring greater motor skills than they possessed.

The fourth child factor, anger, was surprising in that this has not emerged in the literature as a characteristic of DCD children, nor as a major theme in the phenomenological study. However, this factor had a relatively low Cronbach's alpha, which indicates, retrospectively, that the items "My child was angry when he/she came last" and "My child was generally angry" were possibly measuring somewhat different concepts such as situational (reactive) anger and a more generalised state of anger respectively. This finding highlights the difference between a statistical relationship discovered through statistical correlations and the themes of interrelated experiences uncovered through qualitative analysis. There is no doubt in my mind that the qualitative analysis provided a more accurate portrayal of the child's angry responses than did the statistical analysis in this instance.

Parent factor analysis

The parent factors supported findings in the extant literature. These factors included how the parents adapted to the child's needs by providing more time and help (Chesson, McKay &

Stephenson, 1990). The parents' anxiety that the child would suffer through other people's actions was also very similar to those described in Ahern's (2000) analysis, as did factors which indicated the parents' need to protect their children from outside threats (termed "defensive protectionism" by Ahern, 2000).

Unknown factors

Despite the similarities in findings between the phenomenological and factor analyses, only half of the variance was explained for both the child and parent analyses in this study. This indicates that there are other factors involved in families of DCD children that were not accessed via the questionnaire. The extent to which this might be due to differences in sample characteristics, gaps in the translation of the phenomenological results to survey format, or incomplete saturation in the phenomenological study is unknown. There was also a difference in the sample characteristics of the two studies: the phenomenological study collected data from parents whose children were currently attending remediation classes. The surveyed parents provided retrospective data about their children.

The process

In addition to the information gained about parenting DCD children, this study has provided valuable information about the processes by which statistics can be used to verify qualitative analyses. The main lesson to emerge is that using phenomenological findings in the development of a questionnaire is an exercise in compromise. In developing this questionnaire, I deleted items that could have been valuable in explaining variance to gain an acceptable level of

psychometric internal consistency. I juxtaposed differing items according to the kind of instruction they required, and I split the analysis of a phenomenon because of sample restrictions.

Additionally, I found that although I developed the questionnaire using the phenomenological categories, I didn't use the categories in the final analysis. However, I think that this was procedurally the best way to go. The structure provided by use of the categories was helpful to me, and I think to the experts who validated the questionnaire, because it insured that all elements of the phenomenological study were included.

Finally, I validated the questionnaire based on the evaluations of movement specialists. Of all the compromises I made, this is the only one I regret. I should have had at least one parent from the phenomenological interviews on the expert panel. It seems that I too was blinded by the fallacy that experts always know best.

Conclusion

I started this research intending to develop a questionnaire that could provide a means of providing statistical evidence about the generalisability of a phenomenological analysis. This study does provide supporting evidence that the parents of DCD children have many experiences in common. However, a major serendipitous benefit has been the insights I have gained in terms of the number and type of compromises that must be made, and of my role as researcher in making those decisions.

I feel this study has demonstrated that the combination of qualitative and quantitative methodologies complements each other, but it is not a perfect fit. There are still many

unanswered questions. For example, one question arising from this research is the cause of the unexplained variance, and this is where future research needs to be focused. In addition, the lack of clarity arising from the *angry* factor also raises questions. There is evidence that DCD children experience increased trait and state anxiety (Schoemaker & Kalverboer, 1994). The evidence from this study suggests that there is an element of trait and state anger operant in many of these children. This warrants further exploration, and I plan to return to the phenomenological transcripts to investigate if this was the case for the parents I interviewed. Interestingly, had it not been for the statistical analysis, I would not have thought that further qualitative investigation of *anger* was required. However, as a result of the above findings, I would also recommend that the issue of the children's anger be investigated ethnographically. I think that videotaping the children in a naturalistic setting would provide an opportunity to gain a fuller understanding of the processes involved in the anger experienced by DCD children.

The questionnaire described in this study was developed to measure parental experiences in the quest for a diagnosis for a problem where the signs and symptoms do not necessarily relate to the condition itself, but rather to the child's coping strategies. In this research, the condition was DCD. The extent to which these symptoms are operant in other difficult to diagnose childhood conditions remains to be investigated.

References

- American Psychiatric Association (1994). *Diagnostic and statistical manual of mental disorders (4th ed.)*. Washington, DC. Author.
- Ahern, K. (2000). Something is wrong with my child: A phenomenological account of a search for a diagnosis. *Early Education & Development, (2) 1*, 187-201.
- Ayres, J. (1975). *Sensory integration and learning disorders (4th ed.)*. Los Angeles: Western Psychological Services.
- Chesson, R., McKay, C., & Stephenson, E. (1990). Motor learning difficulties and the family. *Child: Care, Health and Development, 16*, 139-143.
- Coleby, M. (1995). The school-aged siblings of children with disabilities. *Developmental Medicine and Child Neurology, 37*, 415-426.
- Colaizzi, P. (1978). Psychological research as the phenomenologist views it. In R. Valle & M. King (Eds). *Existential phenomenological alternatives for psychology*. New York: Oxford University Press.
- Hoare, D. (1994). Subtypes of developmental coordination disorder. *Adapted Physical Activity Quarterly, 11*, 158-189.
- Kadesjo, B., & Gillberg, C. (1999). Developmental coordination disorder in Swedish 7-year old children. *Journal of the American Academy of Child and Adolescent Psychiatry, 38 (7)*, 820-828.
- Kristensen, H. (2000). Selective mutism and comorbidity with developmental disorder/delay, anxiety and elimination disorder. *Journal of the American Academy of Child and Adolescent Psychiatry, 39 (2)*, 249-256.
- Losse, A., Henderson, S. E., Elliman, D., Hall, D., Knight, E., & Jonmans, M. (1991). Clumsiness in children. Do they grow out of it? A 10-year follow-up study. *Developmental Medicine and Child Neurology, 33*, 55-68.
- McCarron, I. T. (1982). *McCarron assessment of neuromuscular development (Rev.ed.)*. Dallas, TX: Common Market Press.
- Layton, C., & Lock, R. (2001). Determining learning disabilities in students with low vision. *Journal of Visual Impairment and Blindness, 95 (5)*, 288-299.
- Lynn, M. R. (1986). Determination and quantification of content validity. *Nursing Research, 35 (6)*, 382-385.

- Reinharz, S. (1983). Phenomenology as a dynamic process. *Phenomenology and Pedagogy*, 1 (1), 77-79.
- Rose, B., Larkin, D., & Berger, B. (1994). Perceptions of social support in children of low, moderate and high levels of coordination. *The ACHPER Healthy Lifestyles Journal*, 41 (4), 18-21.
- Saramma, T. (2001). A review of the Learning Disability Evaluation Scale (LDES). *Journal of School Psychology*, 39 (3), 279-284.
- Schoemaker, M. M., & Kalverboer, A. F. (1994). Social and affective problems of children who are clumsy: How early do they begin? *Adapted Physical Activity Quarterly*, 11, 130-140.
- Tabachnick, B. G., & Fidell, L. (1989). *Using multivariate statistics*. New York: Harper & Row.
- Taylor, M. J. (1990). Marker variables for early identification of physically awkward children. In G. Doll-Tepper, P. Dahm, S. Doll, P. von Selzam, (Eds.). *Adapted physical activity* (pp. 379-386). Berlin: Springer-Verlag.
- Watkins, M., & Worrell, F. (2000). Diagnostic utility of the number of WISC-III subtests deviating from mean performance among students with learning disabilities. *Psychology in the Schools*, 37 (4), 303-309.
- World Health Organization (1992). *The ICD-10 Classification of mental and behaviour disorders: Clinical description and diagnostic guidelines*. Geneva: Author.

Appendix 1

Below is the final version of the survey as it was distributed.

Please complete the following questions by either putting a tick (✓) in the appropriate box or by writing in the answer in the space provided.

1. Indicate the number of months it took from the time you were concerned about your child's coordination to getting the problem correctly identified.

1-6 months	<input type="checkbox"/>
7-12 months	<input type="checkbox"/>
13-18 months	<input type="checkbox"/>
19-24 months	<input type="checkbox"/>
Over 2 years	<input type="checkbox"/>
I was not concerned about my child's coordination (GO TO QUESTION 3)	<input type="checkbox"/>

2. Below is a list of people that you might have consulted about your child's coordination. Please indicate the order in which each person was seen **by writing 1, 2, 3 etc** in the space provided. If a particular person was never consulted regarding your child's coordination, be sure to leave a blank.

general practitioner	—
paediatrician	—
school health nurse	—
teacher	—
occupational therapist	—
psychologist	—
friend	—
other	— (specify) _____

3. My child is a boy a girl
4. In the family, my child is the
 eldest middle youngest only child
5. I am the child's mother father other (*specify*) _____
6. In addition to co-ordination difficulties, my child also
- (a) was premature no yes
- (b) has speech problems no yes
- (c) has asthma no yes
- (d) has other health problems apart from normal childhood illnesses no yes(*specify*) _____
- (e) has learning difficulties no yes(*specify*) _____
7. The highest educational level I completed is
- primary school
- high school
- post high school diploma or certificate
- university/college
8. The highest educational level my partner completed was
- primary school
- high school
- post high school diploma or certificate
- university/college
9. At the time of my child's birth, my age was
- under 20 21-25 26-30 over 30
10. In general, did professional people that you consulted about your child seem to take the problem more seriously when you went alone, or when you went with another adult?
- alone with another no difference
11. How old was your child when his/her coordination problem was first identified by a professional person?
- under 4 4-5 5-6 6-7 over 7

Please indicate how strongly you agree or disagree with the following statements which relate to the time before your child attended The movement enhancement program:.

	strongly agree	agree	neither agree nor disagre e	disagree	strongly disagree
12. I had to help my child with buttons and shoelaces when he/she was six years old.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
13. My child could use scissors correctly in pre-primary.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
14. My child's brothers/sisters were jealous of the extra attention my child received from me.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
15. My child avoided situations where he/she could get hurt	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
16. My child was accepted by other children.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
17. My child encouraged other children of the same age who were participating in group activities.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
18. My child gave up easily in physical activities.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
19. My child was reluctant to try things he/she thought might be difficult.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
20. My child tried to distract me when I asked him/her to do something that he/she might find difficult.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
21. My child quietly avoided sporting activities by being busy doing something else.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
22. I gave my child more direction to carry out tasks than I think other children required.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
23. I gave my child more time to carry out tasks than I think other children required.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
24. I cut up my child's food.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
25. I steered my child away from activities that I knew he/she would have difficulty with.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>

	strongly agree	agree	neither agree nor disagree	disagree	strongly disagree
26. I let my child eat with his/her fingers.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
27. I gave my poorly coordinated child more attention than my other children.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
28. I fought for my child when I felt that he/she was not being treated fairly.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
29. I felt I needed to protect my child from having his/her feelings hurt by others.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
30. I deliberately sought out activities for my child that would get him/her fit.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
31. I made a conscious effort to foster a positive self-esteem in my child.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
32. I was the parent who did most of the running around in relation to my child's problems.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
33. The main reason I sought professional help in the first place was because my child's milestones were delayed.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
34. My child's behaviour, rather than his/her physical abilities were the reason I sought professional advice.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
35. I felt that other children would not play with my child.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
36. I felt that my child would have problems at school because the teachers wouldn't understand him/her.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
37. I knew that other people would hurt my child's feelings.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
38. Professional people didn't want to help my child.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
39. I think that some professionals don't understand how much my child suffers.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>

COMPARED TO OTHER CHILDREN

	strongly agree	agree	neither agree nor disagree	disagree	strongly disagree
40. My child did not like boisterous games	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
41. My child was more frightened than other children	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
42. My child was more cautious than other children	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
43. My child was thrilled when he didn't come last in a sports event.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
44. My child got very angry when he came last in a sports event.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
45. My child was generally happy.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
46. My child was generally lonely.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
47. My child was generally secure.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
48. My child was generally angry.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
49. My child generally related well to other people.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
50. My child was generally sensible.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
51. My child was generally hard working.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
52. My child was easily frustrated.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
53. My child was distractible.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
54. My child learned better in one-to-one teaching rather than in a group.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
55. My child needed more praise than other children.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
56. My child got anxious when he/she was compared to other children.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>

	strongly agree	agree	neither agree nor disagree	disagree	strongly disagree
57. I made a point of always praising my child's efforts, even if they were unsuccessful.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
58. When I approached a professional person without knowing myself what the problem was, I was fobbed off.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
59. When I approached a professional person with specific questions, the professional provided information and/or help.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
60. My child had difficulty learning to ride a tricycle/bicycle.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
61. My child was slow to crawl.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
62. My was child was slow to walk.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
63. My child was slow to talk.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
64. My child looked well coordinated when he/she ran.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
65. My child had trouble balancing on playground equipment.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
66. My child looked the most uncoordinated of all the children who attended the movement enhancement program.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>