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Cathryn Denise Rase
The University of Montana

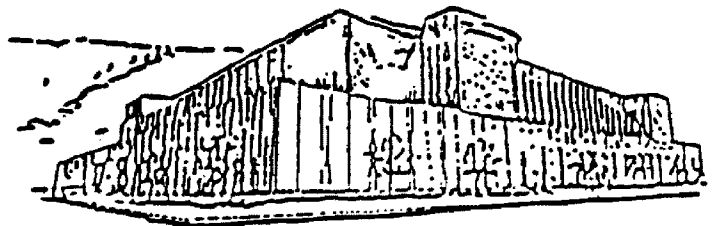
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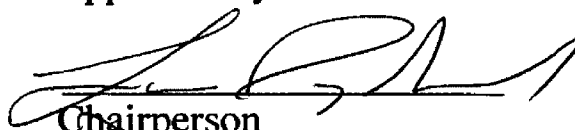
**EFFECT OF MODIFICATIONS TO THE PEABODY
DEVELOPMENTAL MOTOR SCALE TEST
ADMINISTRATION
ON THE OUTCOME OF SPECIAL EDUCATION
ELIGIBILITY RECOMMENDATIONS BY SCHOOL
THERAPISTS**

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presented in partial fulfillment of the requirements
for the degree of
Master of Science

Department of Health and Human Performance
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May 10, 2000

Approved by:



Chairperson



Dean, Graduate School

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Effect of Modifications to the Peabody Developmental Motor Scale Test Administration on the Outcome of Special Education Eligibility Recommendations by School Therapists (29 pp.)

Committee Chairperson: Laura Dybdal Ph.D.



Thirteen Montana (MT) public school-aged children with borderline motor delays were studied in a test/retest format using a modified administration of the Peabody Developmental Motor Scales (PDMS) compared with a strictly standardized version. The order of test presentation was randomized. The (PDMS) is a norm-referenced tool that is widely used by school occupational and physical therapists to determine eligibility for special education services, although it is often modified. An analysis of the frequency to which Z-scores fell 2.0 standard deviations below the mean on one method, and not the other, was made to determine the potential for clinical error in special education eligibility recommendations. In addition, two planned comparison analyses were conducted to determine any statistically significant test order effects and/or methodology effects. Significance was set at $\leq .05$. Two of the 10 subjects taking the FM Scale and four of the 12 subjects taking the GM Scale improved their standard Z-scores to the extent that their delays would not have qualified them to receive special education services in MT. Analysis of the raw scores for the test order was not significant [$t_{(1, 21)} = -.376$, $p = .711$, ns.]. Analysis of the raw scores for the two test methods suggested that, non-standardized test administrations were significantly different as compared with the standardized version [$t_{(1, 21)} = -5.071$, $p \leq .001$]. This study provides evidence that the commonly occurring modifications of the PDMS may be significantly affecting the outcome of special education eligibility recommendations by school therapists.

ACKNOWLEDGMENTS

I would like to thank Dr. L. Dybdal, Assistant Professor, Department of Health and Human Performance, University of Montana for her continuous direction, patience and encouragement throughout this project. I would like to thank Dr. L. Curry, Associate Professor, Department of Health and Human Performance, University of Montana and Ms. C. Gajdosik PT, Associate Professor, Department of Physical Therapy, University of Montana for their editorial insights and expert advice during the many phases of this study. I also thank the Missoula County Public School administration, data collecting therapists, and teaching staff for their time, enthusiasm and willingness to support me throughout this project. And I thank the school therapists of Montana public schools, and Dr. RJ Palisano for openly and honestly sharing their experiences with me on this delicate topic. Last, but certainly not least, I want to thank the children and their parents for taking the extra effort and time to be subjects in this study.

DEDICATION

This project would not have been complete without the ongoing love and support of all of my family and friends. I especially want to thank my husband, Lamar, and my children, Bethany and Benjamin, for never giving up hope. It is because of their encouragement that I have had strength to finish this project.

TABLE OF CONTENTS

| | |
|---|----------------|
| Chapter One: Introduction | Page 1 |
| Rationale for the Study (Preliminary Study) | Page 2 |
| Purpose of the Study | Page 3 |
| Research Hypothesis | Page 3 |
| Significance of the Study | Page 3 |
| Question Statement | Page 3 |
| Limitations | Page 4 |
| Design Rationale and Delimitations | Page 4 |
| Definition of Terms | Page 5 |
| | |
| Chapter Two: Review of the Literature | Page 8 |
| | |
| Standardized Testing: Validity and Reliability | Page 8 |
| Strengths of the PDMS | Page 9 |
| Weaknesses of the PDMS | Page 11 |
| PDMS Test Alterations | Page 12 |
| Implications of Altering the PDMS | Page 14 |
| Summary of the Literature Review | Page 14 |
| | |
| Chapter Three: Methodology | Page 16 |
| | |
| Subjects | Page 16 |
| Procedure | Page 16 |
| Data Analysis | Page 18 |
| | |
| Chapter Four: Results | Page 19 |
| | |
| Chapter Five: Discussion | Page 21 |
| | |
| References | Page 25 |
| | |
| Appendix | Page 27 |
| | |
| List of Tables | |
| Table 1. Difference in Z Scores (Method 1 and 2 by Subject | Page 20 |
| Table 2. Raw Data Scores of Standardized and Modified Administrations by Subject | Page 20 |
| Table 3. Frequency to which MT School Therapists Administer the GM-Scale of the PDMS Using Standardized versus Modified Methods | Page 29 |
| Table 4. Frequency to which MT School Therapists Administer the FM-Scale of the PDMS Using Standardized versus Modified Methods | Page 29 |

CHAPTER ONE: INTRODUCTION

Federal legislation has clearly established the basis for the provision of special education services for children who have identified disabilities. The significant pieces of educational legislation mandating public education for all children with disabilities are the Education for All Handicapped Children Act (EHA) of 1975 (Public Law 94-142) and its Amendments of 1986 (Public Law 99-457). These public laws were re-authorized in 1991 and 1997 as the Individuals with Disabilities Education Act (IDEA). Presently all public schools in the United States are required to provide children with disabilities a free and appropriate public education, called special education. Special education is the individually designed instruction needed to meet the unique needs of children with disabilities.¹

Comprehensive and non-discriminatory assessment is the core process for determining eligibility for special education. In Montana (MT), determining eligibility is a process where members of a Child Study Team (CST) identify children who have disabilities from a comprehensive, multi-disciplinary psycho-educational evaluation. A child becomes qualified for special education after the CST determines a need and assigns a diagnostic label called a handicapping condition. School-based physical (PT) and occupational (OT) therapists often provide the sensory and motor portions of the comprehensive assessment. A child may be eligible for special education based upon a reliable and valid physical therapy or occupational therapy evaluation which indicates a severe physical delay (2.0 standard deviations below the mean) in gross (GM) and fine (FM) motor development that is negatively impacting the child's ability to learn.²

When gathering information for evaluation school therapists (i.e. OT and PT) often use standardized assessment tools for their sensory and motor testing.³ Therapists widely use the Peabody Developmental Motor Scales (PDMS)⁴, a standardized developmental motor test. Scaled scores from this test are frequently used to make recommendations regarding eligibility for special education. When a child's scaled score falls in the severe range of physical delay, school therapists often recommend consideration of a handicapping condition and eligibility to special education.

It is implicitly understood that standardized test administration is required whenever scaled scores, which are based upon normative data, are calculated. The authors of the PDMS allow experienced therapists to make test administration adjustments for children who have physical disabilities although they discourage the use of the norms for comparison.⁴

Rationale for the Study (Preliminary Study)

According to a survey, focus groups and a formal interview (unpublished) given by this author at the 1998 MT State School Occupational and Physical Therapists' Organization Meeting, therapists reported that they routinely altered the standardized administration method of the PDMS to meet the needs of the children they evaluate. Of the surveyed therapists, 91% stated that they altered the PDMS by changing the order of presenting criteria and adding additional instructions in the form of verbal cues, demonstrations and physical prompts, at least one half of the time. They reported that they used the resulting scaled scores to make special education eligibility recommendations equally often. In these therapists' professional opinions, altering the standardized methodology of the PDMS promoted better outcome evaluations for their

children with disabilities. These therapists were uncertain if their alterations significantly affected their resulting scaled scores (Appendix, pp.27).

Purpose of the Study

The purpose of this study was to determine if modifications to the standardized version of the PDMS affected scaled scores to the extent that therapists' recommendations for special education eligibility were also altered.

Research Hypothesis

If a significant difference in scores existed between modified and standardized PDMS test administrations, then school therapists may be unintentionally making errors in their recommendations for special education eligibility. If a significant difference did not exist, then the findings would suggest that the PDMS is valid even when applied in a modified manner.

Significance of the Study

Unintentional errors in the interpretation of the PDMS could be detrimental to the profession of OT and PT and diminish the best practice of school therapy. Until this question was addressed, school therapists who modified the PDMS remained uncertain about the reliability of their evaluative conclusions and recommendations related to special education eligibility.

Question Statement

Does modifying the PDMS test methodology affect a therapist's determination of a child's qualification for special education (due to the finding of a severe physical disability of 2.0 standard deviations below the mean) for school-aged children who have borderline FM and/or GM delays?

Limitations

Every research project has inherent limitations and weaknesses which the research and reader need to accept prior to accepting the findings and conclusions. This study was quasi-experimental and used a repeated-measures design.⁵

Subjects. This study was quasi-experimental because the study subjects could not be considered a true representative sample of the whole population. Children with suspected motor disabilities tend to be quite heterogeneous in regards to other factors such as cognition, language, and perception. Attempts to match them would have required a very large sample. The number of subjects in this study was very limited and they were recruited from a small rural community.

Repeated-measures. The study methodology was a test/retest of the subjects. This methodology could not control for variances in performances that may have been affected by the quality of the relationship established between the subject and tester over time.

Rater bias. Data collectors were therapists who had years of experience using the PDMS. However, their personal biases towards either test method, or their responsiveness to the subjects being tested could not be controlled.

Design Rationale and Delimitations

Subjects. The subjects were recruited from public schools containing both children with and without disabilities in Missoula County, MT. The subjects were aged 36- to 83-months of age and had recently failed motor screening.

Repeated measures. Since subject numbers were a limiting factor, retesting the same subjects was deemed an acceptable methodology to create equivalency between the small groups.

Time between tests. When a long period of time occurs in a child's life between motor tests, there is potential for new skill development through maturation and learning. The test designers of the PDMS suggest that no more than five days be used to complete this test.⁴ To accommodate the data collectors' work schedules, no more than seven days between the two test sessions was allowed. No significant motor maturation or outside learning is believed to occur in a week.

Data Collectors. PTs and OTs who volunteered to collect data had at least 15 years of experience with extensive knowledge of the PDMS. They were all employees of MT public schools.

Definition of Terms

Ceiling Age Level. The age level "at which the child scores 0 or 1 on all items or scores 2 on only one item and 0 or 1 on the remaining items".⁴

Child Study Team (CST). In MT, the CST is a group of individuals who meet to process the identification of children who are demonstrating difficulties in the regular curriculum of a public school. The purpose of the CST is to determine whether a referred child has a disability by interpreting the child's comprehensive psycho-educational evaluation. The CST members include the child's parents, school administrators and educators. School therapists may also be included in the CST.²

Criterion-referenced test. A criterion-referenced test examines an individual's performance on a specific set of skills. Later test scores are often used as comparisons with the original test score to determine progress.¹

Disability. Under MT Law 20-7-401 MCA, disability is the label identifying a child who has been evaluated in accordance with the regulations of IDEA. At least one

of the following handicapping conditions must be identified: Autistic, Child with Disabilities, Cognitively Delayed, Deaf, Deaf-Blind, Emotionally Disturbed, Learning Disabled, Orthopedically Impaired, Other Health Impaired, Speech or Language Impaired, Traumatic Brain Injured or Vision Impaired.²

Individuals with Disability Education Act of 1997 (IDEA). IDEA is the federal law mandating special education and related services.⁶

Individualized Education Program (IEP). The IEP is the written educational plan for a child with a handicapping condition. It is developed and implemented in accordance with MT Law 34 CFR 300.341-300.350. Each public school district writes an IEP for identified children who have need for special education and related services. The IEP contains yearlong goals and objectives and delineates the services necessary to accomplish these. The IEP is a record of the process used to determine a child's classroom placement. The members of the IEP team are the child's parents, school administrators and educators. The school therapist may be a member of the IEP team.²

Norm-referenced test. A norm-referenced test is designed to examine an individual's performance in relationship to the typical performances of a larger sample of the population.¹

Occupational Therapist (OT). An OT is a person licensed to practice occupational therapy under MT Law 37-24-103(4) MCA. An OT in the school setting provides a related service for the assessment, consultation, and treatment of children whose disability, dysfunction, or developmental delay interferes with their ability to learn in the areas of fine motor function, sensory processing or activities of daily living.⁶

Physical Therapist (PT). A PT is a licensed person who practices physical therapy under MT Law 37-11-101(7) MCA. Physical Therapy is the evaluation, treatment, and instruction of human beings to detect, assess, prevent, correct, alleviate, and limit physical disability, bodily malfunction and pain, injury, and bodily or mental condition, by the use of therapeutic exercise, prescribed topical medications, and rehabilitative procedures for the purpose of preventing, correcting, or alleviating a physical or mental disability.⁶

Related Service. Under MT Law 34 CFR 300.16, a related service includes transportation and such developmental, corrective, and other supportive services as are required to assist a child with a disability to benefit from special education. It includes speech pathology and audiology, psychological services, physical and occupational therapy, recreation, including therapeutic recreation, early identification and assessment of disabilities of children, counseling services, including rehabilitation counseling, and medical services for diagnostic or evaluative purposes. The term also includes school health services, social work services in schools, and parent counseling and training.⁶

Reliability. Reliability refers to the extent of stability a test has to consistently measure over time and between raters.⁵

Special Education. Special education is the free and appropriate, specially designed instruction to meet the unique needs of a child with a disability. It includes instruction conducted in the classroom, in the home, in hospitals and institutions, and in other setting.²

Validity. Validity is the extent to which a test actually measures what it is purported to measure as determined by statistical and logical analysis.⁵

CHAPTER TWO: REVIEW OF THE LITERATURE

With the passage of Public Laws 94-142, (EHA) and 105-17, (IDEA), identifying children whose sensory or motor needs were negatively impacting their ability to benefit from their regular education became federally mandated.⁶ At this time, OTs and PTs were hired by public schools to provide expert professional services, both diagnostic and treatment oriented to meet the intent of the law. As diagnosticians, school therapists became members of the CST process. As treatment providers, they became designers and implementers of the IEP process.

Standardized Testing: Validity and Reliability of Diagnosing Disability

According to the American Psychological Association, acceptable practice for comprehensive evaluation of school-aged children requires that conclusions about a child's development must be based upon the results of assessments using standardized administration procedures.⁷ "Standardization", by definition of Montgomery and Connolly, "is the process of administering a test under uniform conditions to each child who is to be tested".⁸ Because quantifiable data are considered credible, standardized test scores are a significant portion of the comprehensive assessment information used to determine if a child has a disability.⁸

The Guidelines for the Provision of Occupational and Physical Therapy encourages MT school therapists to use valid and reliable standardized tests for motor evaluations.⁶ Standardization and objectivity are implicitly connected to the level of a test's validity and reliability.⁸ Norm-referenced and criterion-referenced tests that have been established as both valid and reliable are assumed to retain credibility with the general use of testers beyond the original authors, if the standardized methods of

application are followed.⁸ Campbell agreed that the use of standardized assessment tools is advantageous to the pediatric PT in assuring both reliable and valid results. However, she maintained that the profession is lacking “solidly designed”³ measuring instruments. She encouraged her readers to improve upon the existing clinical measurement tools.³

Most traditional approaches to motor evaluation incorporate standardized assessments such as the Peabody Developmental Motor Scales (PDMS). The PDMS is a norm-referenced tool with many individually administered criteria. It is divided into two components, the Gross Motor Scale and the Fine Motor Scale. Scaled scores are provided in tables within the test manual for both the FM and GM Scales. Scaled scores can be reported as T scores, Z-scores, developmental motor quotients or percentile ranks.⁴

Strengths of the PDMS

The PDMS has been well researched for validity and reliability.⁹⁻¹⁵ Palisano and Lydic state that the PDMS is appropriate for use with children having motor handicaps despite it having been normed exclusively on children without disabilities.¹⁴ Although the American Physical Therapy Association states that “because assessment tools are referenced to populations of healthy children, therapists must be keenly aware of the limitations of these tools when assessing students who have handicaps”¹, test designers Folio and Fewell clearly defend their norming population of children exclusive of disability. They state, “few test developers have included children with specific handicaps in their norming population. The variability of the impairments, the small sample size, and the cost of test development and standardization contribute to the decision of most developers to include only non-handicapped children in their norming

populations. Some examiners assume that a test standardized on non-handicapped children cannot be given to handicapped children. The authors feel that the PDMS can be used in assessing handicapped children by examiners who are very familiar with children who have various handicaps.”⁴ In their attempts to make the test usable with children with disabilities during the early stages of test construction, Folio and Fewell included children who were visually impaired, hearing impaired and deaf-blind. When test items were apparently difficult for these children, the “items were rewritten in an effort to minimize penalty for these impairments”.⁴

A significant strength of the PDMS is the number and extensiveness of the criteria for each of the GM and FM Scales compared with other commonly used motor development tests.^{16, 17} The GM Scale contains 170 items divided into 17 age levels. It includes tasks that are classified into the following five categories: reflexes, balance, non-locomotor skills, locomotor skills, and receipt or propulsion of objects (ball-handling skills). They are skills related to the large muscles of the body like running, skipping, jumping, somersaulting, balancing on a beam and catching, throwing, and kicking balls. The FM Scale contains 112 items divided into 16 age levels. It consists of tasks that are classified into the following four categories: grasping, hand use, eye-hand coordination and manual dexterity. They are skills related to the small muscles of the body like drawing, cutting with scissors, grasping and releasing small objects, and copying designs. In their 1995 article, Palisano et al. concluded that the literature was generally in support of the PDMS. They labeled it a “global” measure of motor development.¹²

Weaknesses of the PDMS

Although it is well documented that the PDMS is a widely used tool for measuring FM and GM development, Hinderer, Richardson and Atwater suggest that it is inherently disorganized and awkward in its standardized methodology of administration.¹⁸ For many children, this test is quite confusing in its standardized format. The standardized method requires the examiner to administer all of the test items in an age level before progressing to items at the next age level. On the surface this may appear to be reasonable, however the standardized method requires that test materials are introduced to a child, then removed, and perhaps reintroduced several times throughout the course of the test session. The result is a disjointed testing process that appears to lack basic organization.¹⁸ Added to this, the administration of each Scale (GM or FM) takes about 20 to 30 minutes, which is a long period of sustained attention for young children.

Another weakness of the PDMS is its dependence on verbal commands.¹⁸ A heavy reliance on verbal directions confounds and complicates the assessment of motor skills when a child's language or cognition is delayed. In a recently published study, researchers determined that children without disabilities also had difficulty understanding verbal directions given in the standardized version of this test. For criteria related to ball kicking skills, the standardized verbal instructions were changed from "kick the ball" to "kick the ball up", because most of the children who were non-disabled did not attempt to kick the ball "up" after the standardized instruction.¹⁹ Apparently, the verbal directions of the PDMS are not completely adequate for children with or without disabilities.^{4, 19}

Another criticism of the PDMS relates to its theoretical basis of understanding motor control and development. The PDMS was designed during a period when the theoretical basis of motor control hypothesized that motor skill development was directly and primarily correlated with neurological maturation. In the PDMS manual, validity is partially defended based upon the traditional theoretical construct that “motor development is orderly and sequential, and requires lower-level skill acquisition in order to build higher-level skills.”⁴ Contemporary theory of motor control and development suggest that motor milestones do not necessarily develop in a linear manner. Instead, multiple processes underlie motor skill development and milestones develop in overlapping and variable order with individual spurts and regressions.^{18, 19} A weakness exists when a standardized test, which was designed to assess a sequential motor development pattern is used in a manner that limits the evaluator from examining motor abilities outside of the prescriptive ordering of a developmental sequence. Because the authors of the PDMS assumed that motor development was linear, assessment of skills beyond the ceiling level was not allowed in the standardized test administration. Skills appearing above a ceiling level were not assessed.

PDMS Test Alterations for the Child with a Disability

Embrey and Yates found that pediatric PTs appropriately self-monitored interventions and made effective clinical decisions to modify treatments, especially under conditions of uncertainty regarding a child’s suspected language, perceptual, sensory or cognitive delays.²⁰ These researchers concluded that three characteristics best describe the experienced PTs’ clinical decision-making processes during therapeutic interventions. Firstly, these therapists appropriately managed and applied a base of clinical knowledge

that is common to their profession. Secondly, the therapists appropriately changed treatments within sessions to respond to the immediate emotional and social needs of the children. Lastly, these therapists suitably modified procedures within their treatment sessions to meet the totality of the child's needs, such as difficulties arising from language or cognitive delays. To these researchers, experienced pediatric PTs demonstrated sound clinical decision-making processes, which included modifying their treatment strategies when uncertainty existed about the multiple and complex delays of children under their care.^{20,21} While this research would suggest that appropriately modifying treatments to meet the needs of children is good practice, it does not address if these same modifications are best practice during assessment, especially within the framework of using a standardized test.

Apparently recognizing some of the test limitations of the PDMS, several authors^{4, 15,18,19} have suggested that more expedient and common sense methods of administering this test are needed. Hinderer, Richardson and Atwater suggested that the presentation of items be changed so that criteria are given as a unit related to the materials or equipment required.¹⁸ Doty, McKewen, Parker et al. altered verbal instructions to improve upon this test's understandability.¹⁹ Russell, Ward and Law have recently questioned the validity of requiring strict limitation on testing within ceiling scores for children who have disordered motor function.¹⁵

Clearly Folio and Fewell, the authors of the PDMS expected testers to provide modifications to their test when testing children with disabilities. They encouraged testers to "be sensitive to the needs of children with known handicapping conditions by

presenting instructions to them in a manner that insures they understand what is expected of them.”⁴

The modifications to the PDMS that have been suggested by the literature are the following:

- ♦ Alteration of the order of presented criteria in relationship to equipment.¹⁸
- ♦ Alteration of the instructions to meet the needs of children.^{4,19}
- ♦ Administration of appropriate criteria above ceiling age levels.¹⁵

Implications of Altering the PDMS

Montgomery and Connolly warn, “unless the criterion-referenced test is normed and administered in a standardized manner, it cannot be used to assign age levels as a normative test.”⁸ Folio and Fewell also forewarn the tester who modifies their test that “extreme caution should be exercised when tests are not administered by their standardized method,”⁴ especially for eligibility decisions such as determining special education qualification. In commenting about the implications of modifying the PDMS, expert researcher, Dr. Palisano, Ph.D. wrote in e-mail correspondence (March, 2000), “the manual is not very helpful in this regard (i.e. modifying the PDMS) as (the manual) states that if (you) modify (you) should not use norms. In clinical practice I make note of modifications and use my judgment in deciding how to report scores. If you are modifying only a few items (it) probably will not (a)ffect the decision making process.”

Summary of the Literature Review

Although the PDMS is considered a reliable and valid standardized instrument to measure gross and fine motor development, it is very difficult to administer to children with disabilities and consequently many therapists alter its standardized administration.

No literature was found that compared the reliability of this test administered in a non-standardized manner with a standardized version. Although experienced physical therapists appropriately modify therapeutic interventions to meet the needs of children with disabilities under their care,^{20,21} there is no research to indicate that the practice of modifying a standardized test is appropriate.^{1, 3, 5, 6-8} School therapists in MT were uncertain if their routine modifications of the PDMS were significantly affecting their recommendations for special education (Appendix, p. 27). An expert in the field of researching the PDMS stated that minimal modifications probably would not affect the process of determining eligibility for special education (R. J. Palisano, Ph.D., e-mail, March 2000).

CHAPTER THREE: METHODOLOGY

Subjects

Thirteen children between the ages of 3- and 7- years of age were recruited as subjects for this study from public schools in Missoula County, Montana after they had received motor screening that indicated borderline delays. Twelve children received testing using the GM Scales of the PDMS and 10 children received the FM Scales. Nine children received both Scales. Eleven of the 13 subjects had identified handicapping conditions. Three subjects had language or speech-only disabilities and eight had multiple delays in cognition, language or attention.

The subjects were free from illness prior to acceptance into the study. During the testing sessions they were well rested, clothed and fed. Informed consent was obtained from the parents of each of the children participating in the study.

The subjects were randomly assigned to one of two groups, Order A or Order B. Children assigned to Order A received a standardized version of the PDMS (Method 1) followed by a non-standardized version (Method 2) within a week. Children assigned to Order B received the same two versions within a week, but in the reversed order. A single therapist tested each child on the two occasions.

Procedure

Research Setting. The subjects were tested in a quiet and familiar room within their school, preschool, or daycare. As much as was possible, distracters such as other children or simultaneous activities, were eliminated. The examiners provided their own test equipment. All tests were scored on site.

Data Collectors. Five school therapists, (two OTs and three PTs) employed by MT public schools voluntarily collected data. The therapists received a one-hour long training session to review the study procedures.

Study Procedures.

- ◆ **Method 1, the standardized version of the PDMS, was administered exactly as described in the test manual. The manual was kept open at the test session at all times. Test items were presented at each age level until a ceiling age level was reached. No items were presented above the ceiling age level. The instructions and numbers of trials were followed exactly per the manual. Scoring procedures, including the use of the normed tables, were followed. Z-scores were calculated.**
- ◆ **Method 2, the non-standardized version of the PDMS, was administered following the same criteria as in Method 1, with the exception of the following modifications:**
 - 1. Test criteria were presented collectively by the piece of equipment (e.g. all block designs were tested as a unit; all tennis ball skills were tested as a unit).**
 - 2. Test items were presented above a child's ceiling age, if appropriate.**
 - 3. Trials were limited only by the child's desire to continue to perform. The child's best performance was scored on each criterion.**
 - 4. Directions were modified to fit the child's level of understanding, experience, cognition, language and sensory needs including any combination of additional verbal, demonstrative or physical cues.**

Instrumentation. The PDMS is an individually administered standardized test of GM and FM skills for children (birth through 7-years) which is scored based upon objective criterion-references. Methods 1 and 2 were scored alike; exactly as described

in the test manual.⁴ For each item, examiners ranked the child's performance with a 0, 1, or 2. To receive a score of 0, the tester determined that the subject did not, or could not perform the test item and in no way demonstrated that the skill was emerging. For a score of 1, the child's performance showed a clear resemblance to the criterion, but did not fully meet it. A score of 2 indicated that the child's performance completely met the item's criterion.⁴

Data Analysis

Specific to the purpose of the study, an analysis of the frequency to which Z-scores fell 2.0 standard deviations or more below the mean on one method, and not the other, was calculated to determine the potential for clinical error in special education eligibility recommendations. Descriptive statistics of the change in Z-scores between Methods 1 and 2 were derived.

In addition, two planned comparison analyses were conducted to determine the possible effects of test order (Orders A and B), as a counter explanation to the method difference. The second planned comparison was conducted to determine the possible statistical differences between the two methods (Methods 1 and 2). The 2 X 2 Mixed Design ANOVA (Orders X Methods) allows for a total of three planned comparisons to be conducted at $\leq .05$ level of significance. Since only two planned comparisons were conducted, significance was kept at $\leq .05$.

CHAPTER FOUR: RESULTS

Of the 12 children tested on the PDMS GM Scale, seven demonstrated an improvement and five demonstrated no change in Z-scores on the non-standardized version ($n = 12$, $R = .77$ (.77 - 0.0), $\bar{x} = .255 \pm .271$). Of the seven who demonstrated enhanced Z-scores, three improved to the extent that they would not have qualified for special education (Table 1).

Of the 10 children tested on the PDMS FM Scale, six demonstrated an improvement and four demonstrated no change in Z-scores on the non-standardized version when compared to the standardized version ($n = 10$, $R = 1.65$ (1.65 - 0.0), $\bar{x} = .392 \pm .477$). Of the six who demonstrated enhanced Z-scores, two improved their Z-scores to the extent that they would not have qualified for special education (Table 1).

Of the 12 children tested on the GM Scale, all demonstrated raw score improvement on the non-standardized version. Of the 10 children tested on the FM Scale, nine demonstrated raw score improvement on the non-standardized version. Analysis of the planned comparison of the raw scores for the order of test presentation suggested that order did not significantly affect the outcome of scores, [$t_{(1, 21)} = -.376$, $p = .711$, ns.] (Table 2). Analysis of the planned comparison of the statistical differences between the raw scores of the two methodologies suggested that non-standardized test administrations were significantly different than standardized administrations [$t_{(1, 21)} = -5.071$, $p \leq .001$] (Table 2).

Table 1. Difference in Z Scores between Methods 1 and 2 by Subject (Z scores from PDMS manual charts)

| Order | Difference in GM Z Score | Difference in FM Z Score |
|-------|--------------------------|--------------------------|
| A | | 0.00 |
| A | 0.71* | 0.00 |
| A | 0.00 | 0.00 |
| A | 0.00 | 0.00 |
| A | 0.50 | 1.65* |
| A | 0.00 | |
| A | 0.00 | |
| B | 0.00 | 0.27 |
| B | 0.35 | 0.47 |
| B | 0.28 | 0.48 |
| B | 0.77* | 0.45* |
| B | 0.15 | 0.60 |
| B | 0.30* | |

*Child would not have qualified for Special Education

Table 2. Raw Data Scores of Standardized (Method 1) and Non-Standardized or Modified (Method 2) PDMS Administrations by Subject

| Order | Method 1 GM | Method 2 GM | Method 1 FM | Method 2 FM |
|-------|-------------|-------------|-------------|-------------|
| A | | | 171 | 172 |
| A | 204 | 237 | 141 | 147 |
| A | 181 | 185 | 154 | 176 |
| A | 229 | 235 | 166 | 168 |
| A | 236 | 241 | 194 | 206 |
| A | 179 | 183 | | |
| A | 166 | 192 | | |
| B | 203 | 206 | 254 | 261 |
| B | 244 | 268 | 201 | 197 |
| B | 258 | 272 | 201 | 208 |
| B | 201 | 215 | 153 | 167 |
| B | 294 | 300 | 201 | 206 |
| B | 298 | 305 | | |

CHAPTER FIVE: DISCUSSION

The finding from this study that most children performed better on the PDMS when they received extra support in the form of modifications provided by an expert professional, despite the order of test presentation, may have been expected however the significance of this practice may be less obvious. Experts in the field of motor development, such as school therapists support children under their care by adapting interventions when delays in other areas such as cognition, language, or attention are negatively affecting motor performance. For example, a child with a dual disability in receptive language and motor development will likely have improved motor performance if a therapist adds demonstration and physical prompts to verbal instruction. Enhanced motor performance can be expected if a child who is highly distractible is provided improved organization and structure. A child who is demonstrating delays in cognitive development might benefit from repeated trials and practice. This study found that modifying the PDMS criteria by providing alternative directions, improved organization, unlimited performance trials, and additional test criteria above ceiling ages usually improved test scores amongst these subjects who had suspected motor disabilities.

Findings from an interview and focus groups preliminary to this study (Appendix, p.27) suggested that therapists regularly modify the PDMS believing that their adaptations promote improved motor performances of the children under their care. This study confirmed their beliefs. However, this study would also suggest that some children who have motor delays severe enough to warrant consideration for special education could be inadvertently missed with a modified administration of the PDMS. If

the norming tables are used to determine eligibility for special education from non-standardized administrations of the PDMS, this evidence suggests that therapists might be led to incorrect conclusions. This study found that the practice of modifying the PDMS might have undermined the chance for some children with motor delays to receive the special education services mandated by federal law.

Because of the limitations of this study, especially the limited number of subjects and the potential effects of the test/retest methodology, there is no conclusive evidence that modifying the PDMS results in significant differences in standardized scores. However, findings would suggest that therapists who use this test in a modified manner should be concerned about the reliability and validity of their findings.

Challenged to heed the words of Embrey, Yates, Nirider et al. it is important for experienced clinicians to “systematically self-monitor their clinical practice when making clinical decisions.”²⁰ These authors are speaking directly to PTs and OTs when they state “the responsibility of having years of experience carries an obligation to select and apply the most effective strategies for the children under your care. Continuously monitor your interventions with unbiased judgment. Don’t become complacent and routine in your clinical practice.”²⁰

School therapists’ evaluations are typically used for two distinct purposes, eligibility decisions and program planning. While standardized test methods are the accepted best practice for making reliable eligibility recommendations for children with motor delays, “when observing testing, and recording motor behaviors of severely and profoundly handicapped children or other children who do not respond to standardized procedures, the use of formal, structured, motor development tests often does not yield

the most desirable results.”⁴ When the results of standardized tests yield very low scores, assessment of the same skills in supportive and functional environments may yield higher baselines of motor development. Determining a child’s best performance is important to quality program planning when baselines of behavior are used to develop appropriate behavioral goals and objectives. But limited resources, including time and practicality generally restrict school therapists from conducting two tests, first in a standardized format for eligibility determination and then in a modified manner to produce best performances. Consequently, most therapists continue to use a single evaluation session and apply the results to the two distinct purposes of eligibility and program planning. Perhaps it is time for school therapists who use the PDMS to consider advocating for the resources necessary to complete two evaluations, one for eligibility determinations and another for program planning.

Since two evaluation sessions may never be feasible, the test designers remind evaluators that “the fact that the PDMS is norm-referenced should not preclude its use as a criterion-referenced measure of motor patterns and skills.”⁴ Reporting scores based upon criterion-referencing would not necessitate a comparison with the norming population and still give most school therapists adequate information to determine the significance of motor delays in relationship to chronological age. Recording scores in this manner would retain reliability and still provide information that is valuable in determining the need for special education as well as program planning.

One of the recent changes in therapists’ response to the traditional understanding of motor control from a neuromaturational view to a systems approach is a shift in evaluation methods.¹⁹ There is now an emphasis on evaluating children in natural and

functional environments. In the future, it will be to the benefit of OTs and PTs to ask the following questions: Is the PDMS a measurement tool consistent with contemporary understanding of motor learning? Do the professions of PT and OT need to reconsider the widespread use of this test that is so frequently modified from its standardized methodology? Will the recently revised and re-normed version of the PDMS called the PDMS-2 better meet the needs of school therapists?

Or, is there a need to develop more appropriate skill assessment tools that meet the needs of school therapists' practice? ²²

Unless it is determined that altering the PDMS test methodology does not invalidate standard scores, therapists who modify this test would be prudent to avoid using the norming tables. Treating the test as a criterion-referenced tool is still a helpful use of the data from a non-standardized version. Despite the lingering questions of the reliability of modifying this tool, the PDMS continues to be a very helpful test for establishing baselines of motor development necessary for program planning the IEP. Future studies are needed to continue this discussion.

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APPENDIX 1: PRELIMINARY STUDY

Introduction

School therapists are a specialized group of pediatric physical (PT) and occupational therapists (OT) who widely use the Peabody Developmental Motor Scales (PDMS)⁴ in the psycho-educational evaluation process to make recommendations regarding eligibility for special education for children with physical disabilities. They also use this test for developing appropriate, educationally relevant treatment plans for children in schools.

Methodology

A preliminary survey was distributed to 32 Montana (MT) school therapists during their Montana OT/PT Organization Meeting in Butte, MT on October 15th and 16th, 1998 (unpublished). The survey was divided into two sets of questions, limiting the respondents to answering only those questions about the portion of the PDMS (FM or GM Scale) that they routinely administer. Twenty-three surveys (75%) were returned. The frequency to which therapists reported altering the PDMS was assessed using a five-point Likert rating scale with responses ranging from "never" to "always".

Following the survey, an individual interview with an OT who had over 15 years of experience working in a school setting and two small focus groups with five MT pediatric OTs and PTs clarified the findings of the survey.

Results

Of the responding surveyed therapists, 74% reported that at least one-half of the time they administer the PDMS in the standardized manner. However, 91% of these therapists reported that they also alter the directions and the order of presentation of the

criteria beyond the limits of the standardized methodology at least one-half of the time (Tables 2 and 3). The interview and focus groups elucidated the primary reason for this apparent discrepancy. These therapists reported that they believed minor alterations did not significantly affect standardized methodology. In support of their practice, these therapists believed that altering the PDMS gave them more information about “children’s actual abilities”.

Therapists also reported that they routinely administered all of the criteria related to a single piece of equipment in a unit. The standardized method requires that all test items be given at an age level prior to progressing to the next level. However, the OTs reported that they routinely administered all of the “scissors skills together” and the PTs reported that they routinely administered all of the “ball skills at the same time”. Although these therapists were aware that altering the order of administering the criteria was not consistent with the standardized methodology, they deemed this practice as more “expedient”.

Another commonly reported alteration in the standardized methodology which was reported by both OTs and PTs was the provision of additional directions in the form of verbal prompts, physical cues, signing, and demonstrations to “maximize a child’s performance.”

All of the therapists surveyed and interviewed reported that they regularly used scaled scores from the PDMS for the purpose of making disability determinations, eligibility for service conclusions, and program planning decisions. These therapists felt it was pertinent to recognize that they “only had time enough” to complete one evaluation which must be used for many purposes. They reported that when they modified the

PDMS, they were concerned about the validity of their own recommendations regarding eligibility for special education.

Discussion and Conclusions

According to the findings from this unpublished, qualitative research study, MT school therapists frequently alter the PDMS because they believe they are promoting more accurate evaluations of the children under their care. When presented with the test designer’s admonition to follow standardized methodology when eligibility or placement decisions needed to be made, these same therapists stated concern about the effect that their modifications were having on their professional recommendations.

Table 3. *Frequency to which MT School Therapists (OT/PT) Administer the GM-Scale of the PDMS Using Standardized or Modified Methods*

| | Never | Rarely | Half Time | Usually | Always |
|------------------|-------|--------|-----------|---------|--------|
| Standardize | 2 | 2 | 2 | 3 | 0 |
| Alter Order | 0 | 1 | 3 | 3 | 2 |
| Alter Directions | 0 | 1 | 1 | 6 | 1 |

Table 4. *Frequency to which School Therapists (OT/PT) Administer the FM-Scale of the PDMS Using Standardized or Modified Methods*

| | Never | Rarely | Half Time | Usually | Always |
|------------------|-------|--------|-----------|---------|--------|
| Standardize | 0 | 2 | 3 | 9 | 0 |
| Alter Order | 1 | 0 | 6 | 7 | 0 |
| Alter Directions | 0 | 5 | 5 | 4 | 0 |