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Effects of environment on children's motor scores, eligibility status, and administration times

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A doctoral document submitted in partial fulfillment of
the requirements for the

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ABSTRACT

Effects of Environment on Children's Motor Scores, Eligibility Status, and Administration Times

by

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Best practices for assessing developmental skills in young children focus on naturalistic observation in everyday settings, but the effects of environment on test scores, eligibility status and administration time have not been explored. The Peabody Developmental Motor Scales-Second Edition (PDMS-2) was administered to 34 children aged 18 to 59 months in natural and pull-out settings. PDMS-2 total, gross, and fine motor quotient (TMQ, GMQ, and FMQ) scores were significantly lower in the natural environment ($p's \leq .014$). Based on our results, more children would qualify for services when tested in natural environments using TMQ and GMQ scores. It also took significantly longer to test children in the natural environment ($p=.044$). Pediatric service providers should consider the impact environment may have on children's scores and resource utilization when planning assessment. Further, use of standardized tests of discrete motor skills, such as the PDMS-2, may be more appropriate in pull-out settings.

INTRODUCTION

The importance of early and accurate identification of young children with developmental delay or disability has been demonstrated by a number of researchers (Litty & Hatch, 2006; Dawson et al., 2010) and is mandated by the Individuals with Disabilities Education Act (IDEA, 2007). Children whose developmental delays or disabilities are identified early demonstrate better outcomes than children who do not begin treatment until they are older (Hickman, Westcott McCoy, Rauh, & Long, 2007). The benefits of timely intervention are particularly evident for children who live in environments that further compromise their development (Edwards & Sarwark, 2005).

Of the children seen in early intervention, 37% receive physical therapy and 38% receive occupational therapy focused on optimizing their motor development (Hebbeler et al., 2007). Physical and occupational therapists working in public-funded early intervention (EI) or preschool settings share primary responsibility for the task of early and accurate identification of children with developmental delays. Clinicians routinely make decisions about how to carry out this charge in the face of shrinking resources and input from other stakeholders including children, families, early childhood educators, administrators, and policy makers (Bagnato, McKeating-Esterle, Fevola, Bortolamasi, & Neisworth, 2008).

Legal mandates provide minimal standards for determining program eligibility and monitoring progress of developmental delay or disability in young children. IDEA Part C specifies that children birth to three years-old served in EI programs must be assessed in their natural environments (IDEA, 2007). Natural environments include, but are not limited to, testing in children's homes, preschools, and daycare centers (Sheldon

& Rush, 2001). IDEA Part B requires that preschoolers aged three to five years-old be assessed in the "form most likely to yield accurate information on what the child knows and can do academically, developmentally, and functionally, unless it is clearly not feasible to provide or administer" (IDEA, 2007).

Pediatric service providers, such as physical and occupational therapists, developmental specialists, and educators must also consider contemporary best practice principles of "authentic" assessment when making decisions about the manner in which they test for developmental delay in children. Authentic assessment proponents suggest assessment of motor and other developmental domains include repeated and naturalistic observation of spontaneous behaviors within family routines to ensure appropriate use of increasingly scarce resources (Bagnato et al., 2008). The information gathered in this way is believed to better reflect children's abilities to perform meaningful activities that are age appropriate and functionally significant (Ames & Archer, 1988; McDonald, 1992).

Researchers have identified a number of variables that may best represent authentic assessment strategies. These approaches include testing a child in a natural environment with familiar distracters, motivators, and the input of family members (Macey, Bagnato, Salaway, & Lehman, 2007). Examples of tests of motor development that focus on typical performance of functional tasks in everyday life include the Test of Infant Motor Performance (Campbell, Kolobe, & Linacre, 2002) and the Pediatric Evaluation of Disability Inventory (Haley, Coster, Ludlow, Haltiwanger, & Andrellos, 1992). Motor subtests of general tests of development such as the Assessment, Evaluation, Programming System (Bricker et al., 2002) are not designed primarily as

stand-alone tests of motor development, but are purported to represent authentic assessment tools because they assess functional and meaningful skills used rather than distinct and isolated tasks (Macey et al., 2007).

There is a considerable amount of published evidence regarding the types of testing tools used for assessment (Tieman, Palisano, & Sutlive, 2005) and about the influence of environment on developmental outcomes (Hickman et al., 2007; Venetsanou & Kambas, 2010). There has been little investigation of the effect of environmental conditions on motor test scores of young children. Currently, research presents a somewhat conflicting picture of what may characterize best practice. McWilliam, Young, and Harville (1996) have reported that therapeutic interventions are most effective and less invasive when delivered using "push-in" models that utilize the classroom, rather than pulling children out of the classroom. Dockrell and Shield (2004) have reported that excessive noise in the classroom is a distraction and annoyance for the other children and teachers. They also reported in a different study that primary school children's performance, of tasks requiring speed, were negatively affected by noisy environments (Dockrell & Shield, 2006). It is not known how the potential distracters in natural environments influence outcomes of tests of motor development and how it affects children.

The results of developmental motor skill tests have important implications for children and families because such scores may be used to determine eligibility for therapy services (Bagnato et al., 2008). Services including, but not limited to EI and school-based therapy, have long wait lists and limited public funding sources. Additionally, there is increased pressure on personnel to limit assessment time in order to

maximize the number of children they are able to evaluate. These factors may impact the ability of pediatric service providers to see a child more than once in a natural environment as it is recommended to ensure authenticity. It is critical that providers understand how variables within the environment may influence test administration time if they are going to overcome these barriers and meet the mandate for early and accurate identification.

It is especially important for early intervention specialists to understand how to test children in a manner that adheres to best practice, yields the most authentic score possible, and utilizes resources efficiently as children in many states and school districts are waiting for therapy services. The purpose of this study was to determine how test environment influenced children's motor test scores on the Peabody Developmental Motor Scales, Second Edition (PDMS-2), a widely used test of motor development. We hypothesized that children's motor scores would be lower in the natural environment resulting in increased eligibility rates and resource expenditures.

METHODS

Participants

Children with and without known developmental delay or disability were recruited from the Lynn Bennett Early Childhood Education Center (LBECEC), a preschool located at the University of Nevada, Las Vegas (UNLV) campus and from the surrounding community. Parents of 18 to 59 month old children enrolled at the LBECEC and in the community signed parent permission forms approved by the LBECEC Research Advisory Council and the UNLV Institutional Review Board. Child assent was assumed if the child cooperated with study procedures. Families also completed a study

questionnaire, which included demographics (Table 1) and information regarding their child's health conditions, development in all domains, and behavior. Of the 59 families who provided parent permission, 34 children completed all stages of testing, 32 were enrolled at LBECEC and two from the surrounding community.

Study design

In order to determine the effects of the environment on children's motor test scores, a crossover design with a two week washout period was utilized (See Figure 1).

Tests and measures

The PDMS-2 is a commonly used test for assessing fine and gross motor developmental skills in children (Folio & Fewell, 2000). Evidence supports the reliability and validity of the PDMS-2 in the assessment of motor skills in children from birth to five years of age (Folio & Fewell, 2000; Wiart & Darrah, 2001; Van Hartingsveldt, Cup, & Oostendorp, 2005).

The PDMS-2 manual has clear instructions for administration of individual test items and related scoring criteria. The authors are less prescriptive in describing the test environment, saying testing only should occur in a "normal" environment. The test is divided into five subtests: reflexes (birth-11 months only), stationary, locomotion, object manipulation (12 months and older), grasping, and visual-motor integration. From these subtests, three composite values may be constructed: fine motor quotient (FMQ) (grasping and visual-motor integration), gross motor quotient (GMQ) (reflexes, stationary, locomotion and object manipulation), and total motor quotient (TMQ) (combination of fine and gross). Subtest scores and composite quotient values may be compared to normative means and percentiles to determine whether or not motor skills

are developing as expected. The PDMS-2 manual suggests that average administration time is between 45 and 60 minutes (Folio & Fewell, 2000).

Prior to beginning data collection, examiners constructed a sequential score sheet that facilitated administration and recording of series of tasks based on equipment use, position or activity, grouped by subtests. For example, all tasks involving blocks were grouped together, and all tasks involving jumping were grouped together. This approach to data collection allowed examiners to minimize time spent flipping through the PDMS-2 Examiner Record Booklet in the child's presence, and required examiners to transfer scores to the PDMS-2 booklet after test administration was concluded. When testing could not be completed in one session due to lack of time, space or the child's attention; the remainder of the test was completed in another session within five days of the initial session (Chien & Bond, 2009). Upon test completion, data were transferred from the sequential score sheets to the PDMS-2 Examiner Record Booklet to facilitate scoring.

After administering the PDMS-2 to 15 children, the test administrators developed a hypothesis that test administration time varied under the two different environmental conditions. At that point in data collection, examiners began to record PDMS-2 administration time in minutes.

Procedures

Environmental conditions

The team administered the PDMS-2 to each child under two different environmental conditions. In the pull-out or quiet, isolated environmental condition, the child was "pulled-out" of their usual classroom environment and tested in an area in which the number of external distractions (e.g., other children, teachers, noise, toys) was

minimized for the duration of the testing. In the natural or open, chaotic environmental condition, children were tested in their usual classroom or playground environment that included external environmental distractions (e.g., classroom activities going on in the same area, other children sitting at the table playing, children playing on the playground). All children, regardless of test condition, remained in the presence of a familiar member of the preschool staff in accordance with LBECEC policy. During the pull-out condition, staff members were asked to minimize interactions with the child and examiners confined their interactions to conversations related to the test itself, repeating the directions for task completion, providing encouragement or feedback as necessary.

The order of environmental conditions for each child was randomly assigned by flipping a coin. All children were tested in the remaining condition two weeks later. This timeframe was used to allow for a wash out period that would minimize the effects of children having practiced the tasks without allowing sufficient time for actual maturation of motor skills to occur (Wiepert & Mercer, 2002).

Reliability

Inter-rater reliability was established by administering the PDMS-2 to five children whose parents had volunteered them to be tested and videotaped so the four examiners could view the testing of each child. For each subtest, each of the four examiners demonstrated excellent inter-rater reliability ICC (3,1) $\geq$ .988 (95% CI: .951 to .999). Intra-rater reliability was also established using the same five videotaped children. Raters viewed each video twice with a two-week washout period between viewings (Franjione, Gunther, & Taylor, 2003; Kolobe, Bulanda, & Susman, 2004). Intra-rater reliability was found to be ICC (3,1) $\geq$ .999 (95% CI: .989 to 1.000).

Data analysis

Data were analyzed using SPSS Version 18.0 statistical software (SPSS Inc., Chicago, IL, 60606). Three paired samples t-tests were used to determine the effects of pull-out and natural environments on TMQ, FMQ, and GMQ scores. In order to determine if the environment affected a child's eligibility status, a 2x2 contingency table was used to calculate the odds ratios, likelihood ratios, and pretest and posttest probabilities for eligibility at one standard deviation (SD) (quotient ≤ 85) below age-standardized means and two SDs (quotient ≤ 70) below age-standardized means (Folio & Fewell, 2000). Standard deviations are based on normative values from the manufacturers of the PDMS-2. These values were chosen as requirements vary from state to state. Lastly, an independent samples t-test was run to compare natural and pull-out environments on test administration time.

RESULTS

Effects of environment on developmental motor test scores

Children's composite motor quotient scores were significantly different in the natural versus pull-out environments (TMQ p=.003, FMQ p =.014, GMQ p = .011, See Figure 2). Children's scores were lower in the natural environment when compared to the pull-out environment for all three motor quotients (See Table 2 for means and standard deviations).

Effects of environment on eligibility status

Eligibility status for public funded early intervention or preschool services was tested at one SD (quotient ≤ 85) and two SD's below age standardized means (quotient ≤ 70) because requirements vary from state to state. Our results suggest that a child is 4.94

(95% CI=1.24 to 19.76) times more likely to be eligible in the natural environment for services based on the TMQ at one SD. Considering a 21% pretest probability and a 1.85 +LR, the posttest probability that a child will be eligible in the natural environment is 33% (See Figure 3A). For GMQ, the odds ratio revealed that a child is 3.43 (95% CI= 1.18 to 9.99) times more likely to be eligible in the natural environment for services at one SD. With a 34% pretest probability and a 1.74 +LR, the posttest probability that a child will be eligible in the natural environment is 47% (See Figure 3B). Eligibility status based on FMQ was not significantly affected by the environment; similarly TMQ and GMQ at two SD were not affected (See Table 3 and Figure 4).

Effects of environment on test administration time

Test administration time was significantly longer in the natural environment compared to the pull-out environment (p=.029). There was more variability in assessment time in the natural environment as evidenced by a 57 minute range versus a 22 minute range in the pull-out environment (See Figure 5).

DISCUSSION

These results demonstrate that the environment in which tests of motor skill development are administered to young children had a significant impact on their test scores. Collectively, children performed better in the pull-out condition in which they were removed from their natural setting and tested in a quiet environment. This finding calls into question whether testing children in their more natural settings is most advantageous when using tests such as the PDMS-2 that require children to perform therapist-initiated motor activities out of context. Although use of such tools may be inconsistent with best practice recommendation for authentic assessment (Bagnato,

2005), the PDMS-2 continues to be widely used in pediatric clinical practice by occupational and physical therapists (Wiart & Darrah, 2001; Van Hartingsveldt, Cup, & Oostendorp, 2005).

External distracters, such as noise or visual stimuli, that occurred in the natural environment may have decreased the child's attentiveness to the required task. Asking children to complete a novel motor task in a hectic environment may create a dual-task condition in which the child's motor performance is compromised by attending to a concurrent, competing stimulus. Researchers investigating the effects of dual-task conditions on postural control observed that quality of walking skills decreased when children were presented with concurrent cognitive or communication tasks (Cherng, Liang, Chen, & Chen, 2009). Similarly, when children were presented with a cognitive task, their postural sway increased, leading to a degradation of postural control (Laufer, Ashkenzi, & Josman, 2008). Further, children attempting to function in noisy and distracting classrooms had difficulty focusing on the primary task at hand, which in this case would be the test of motor skills being presented by a therapist (Choi, Lotto, Lewis, Hoover, & Stelmachowicz, 2008).

When interpreting these findings, it is important for pediatric service providers who administer standardized tests of motor skill development to consider whether they are actually measuring what they intend to measure. Holsbeeke, Ketelaar, Schoemaker, and Gorter (2009) found that specific environmental and personal factors influenced what was actually being tested in young children. These investigators identified three main constructs that can be tested when assessing motor ability: motor capacity (skills a child can demonstrate in highly controlled environmental conditions), motor capability (skills a

child can exhibit in natural environments), and motor performance (skills a child typically uses in natural environments). The differences between these three constructs lie largely in the amount of control being exerted over the child's environment. In the present study, the pull-out environment likely measures motor capacity where examiners exert a great deal of control. In the natural condition it is more probable that examiners were measuring motor performance as no control was exerted over available playground equipment, number of peers or caregivers present, weather, or other environmental variables. Holsbeeke et al. (2009) suggest that when therapists are performing a standardized test, they are exerting enough control that the best they can do is measure motor capability. Therefore, it may be ideal for pediatric service providers who wish to measure at the level of performance to choose tools that exert less control over the child's environment and that reflect the child's typical performance. Tools such as the Alberta Infant Motor Scales (Piper & Darrah, 1994), the Pediatric Evaluation of Disability Inventory (Haley et al., 1992), and other play-based assessment formats may come closer to measuring motor performance.

Results from our study show that a greater number of children would qualify for services in the natural environment compared to the pull-out environment. By testing children in a natural environment, such as in a classroom or in an open play area, our data suggest that more children qualify for services when the services may not be necessary. In an economy with a narrowing budget and a constant focus on savings, cost-containment through accurate assessment appears to be influenced by what environment the child is tested in. Testing in a pull-out environment, may be a better option for correctly identifying individuals that need services.

The goal of EI is to optimize service outcomes. This includes minimizing impairments and maximizing child participation while operating within a limited budget. Research continues to support the use of EI as a means to optimize development throughout a child's life; however, maintaining cost of services at an economically appropriate level is a continuous struggle for EI centers (Doyle, Harmon, Heckman & Tremblay, 2009). Currently, federal funding mainly supports administrative costs for EI services while leaving the majority of the remainder of costs to individual states (Grant, 2004). With deficits in funding at the local and federal level, current strategies to reduce cost of EI aim to decrease the number of children that qualify for services through a variety of measures. One strategy currently in place to decrease eligibility of EI and decrease cost is to use a child's medical diagnoses (Grant, 2004). This practice calls into question whether or not children, who are most in need functionally, are actually receiving services. Our research suggests that utilizing a pull-out environment may more accurately identify children who are eligible for services based on functional ability. This may be more cost efficient and appropriate than qualifying children based on a medical diagnosis. Affording children eligibility for services based on function rather than medical diagnosis ensures that allocation of funding is being provided to those children most in need.

Beyond the purpose of assessment, practical considerations regarding utilization of resources must also be considered in planning motor assessment strategies. In the present study, administration of the PDMS-2 was significantly longer and more variable in the natural environment when compared to the pull-out environment. One reason for the increased administration time in the natural environment may have been that the

children and/or examiners were distracted by people or events in the area. Increased administration time means that pediatric service providers would logically see fewer patients. Moreover, shortages of qualified pediatric service providers contribute to children being placed on wait lists and failure of agencies to meet deadlines regarding assessment and establishment of service care plans (Hickman, Westcott, Long, & Rauh, 2011). Thus, clinical practices that stretch available resources by saving pediatric service providers' time may be more important than ever. From a limitation of resources and cost containment perspective, our findings suggest that administering tests of motor development in pull-out environments may be more efficient than testing in natural environments.

LIMITATIONS AND FUTURE RESEARCH

Testing children twice within a relatively short time frame may have allowed children to learn some of the motor tasks they were asked to perform. A two week washout period was used to minimize children's memory of the tasks without allowing enough time for maturation to have occurred. Additionally, time was only recorded for 19 subjects out of 34 tested. Ideally, researchers would have recorded time for all subjects; however, this became a research hypothesis midway through data collection.

Future research may benefit by looking at the impact of intervention longitudinally in both the natural and pull-out settings and long-term outcomes of those that are on the bubble of qualifying for services that may or may not have received intervention during their early years. Furthermore, this study should be replicated in a variety of environments as children qualifying for early intervention are often tested in a home setting to determine if they qualify for services. This study should also be repeated

using other standardized pediatric assessment tools, such as the Bayley Scales of Infant Development (Tieman et al., 2005) to determine if the results are generalizable across measures.

Despite the study's limitations, there are clear implications that are immediately translatable to clinical practice. Administering standardized tests of children's developmental motor skills in pull-out environments may improve tests scores and decrease over identification of children with motor delay or disability. Further, testing children in pull-out environments requires less time, which will allow pediatric service providers to utilize resources more efficiently.

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Table 1. Demographics.

Demographics	Children [N (%)]
Gender	34 (100%)
Male	22 (64.7%)
Female	12 (35.3%)
Age (months)	34 (100%)
18-24	4 (12%)
25-36	12 (35%)
37-48	8 (24%)
49-59	10 (29%)
Race	34 (100%)
Asian	2 (6.0%)
> 2 races	5 (14.7%)
Black/African American	1 (3.0%)
Other	1 (3.0%)
White	23 (67.6%)
Not specified	2 (6.0%)

Table 2. Comparison of scores for motor quotients and test administration time across environments. SD= standard deviation

Environmental condition	Composite Motor Scores			Administration time
	TMQ	FMQ	GMQ	Minutes
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Natural	92.76 (13.17)	97.35 (13.47)	90.79 (13.56)	46.68 (13.09)
Pull-out	97.50 (11.41)	101.68 (11.87)	95.21 (11.58)	40.42 (5.82)

Table 3: Eligibility status.

	Composite Motor Scores					
	TMQ at 1 SD	TMQ at 2 SD	GMQ at 1 SD	GMQ at 2 SD	FMQ at 1 SD	FMQ at 2 SD
Odds Ratio (95% CI)	4.94* (1.24-19.76)	1.00 (.06-16.67)	3.43* (1.18-9.99)	2.06 (.18-23.80)	2.68 (.63-11.30)	2.30 (.18-23.80)
Sensitivity (%)	79	50	70	67	70	67
Specificity (%)	57	50	60	60	53	53
+ LR	1.85	1.17	1.74	1.67	1.50	1.43
- LR	0.37	0.87	0.51	0.56	0.56	.62
Pretest Probability (%)	21	3	34	4	15	4
Posttest Probability (%)	33*	3.5	47*	6.5	21	5.6

*Significant change, + LR= positive likelihood ratio, - LR= negative likelihood ratio

Figure 1: Experimental Design

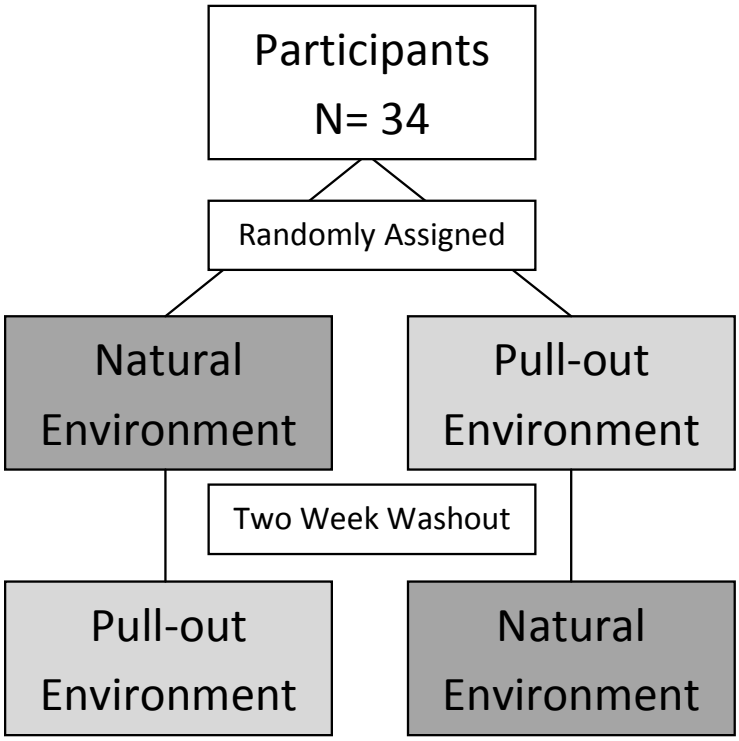


Figure 2: Effects of environment on TMQ, FMQ, and GMQ test scores.

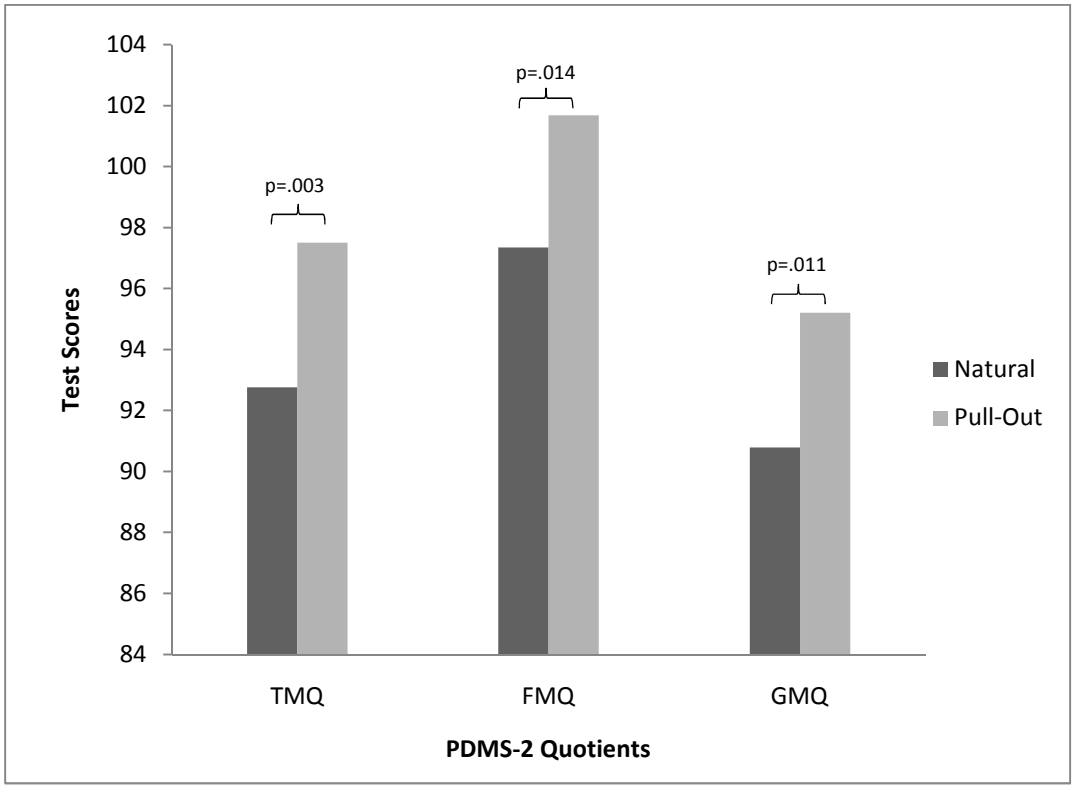


Figure 3A: TMQ at 1 SD nomogram.

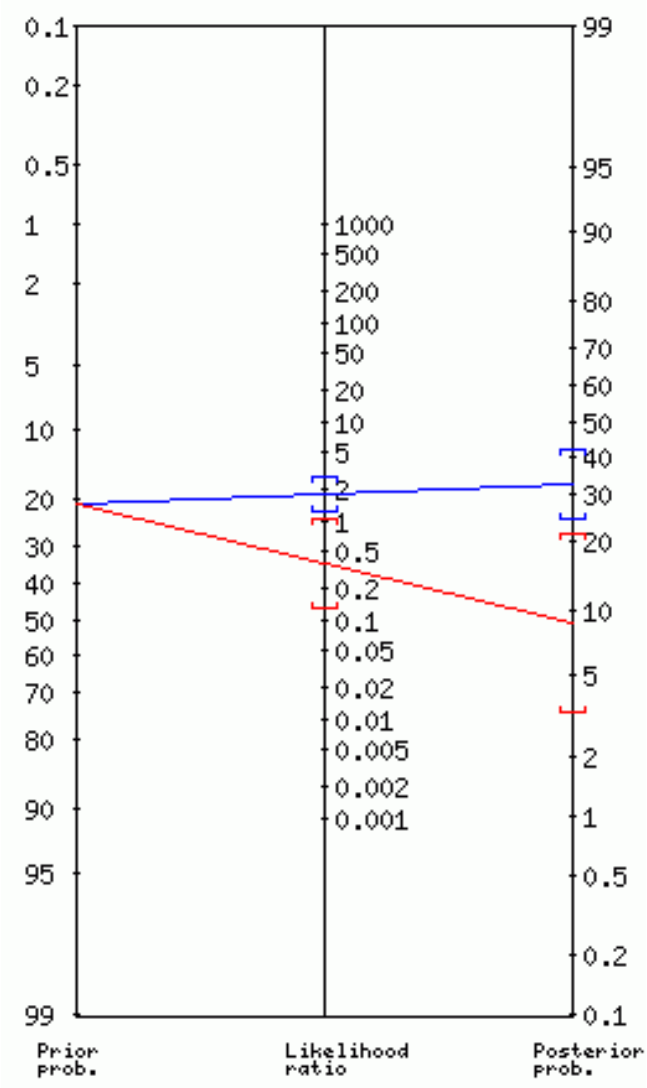


Figure 3B: GMQ at 1 SD nomogram.

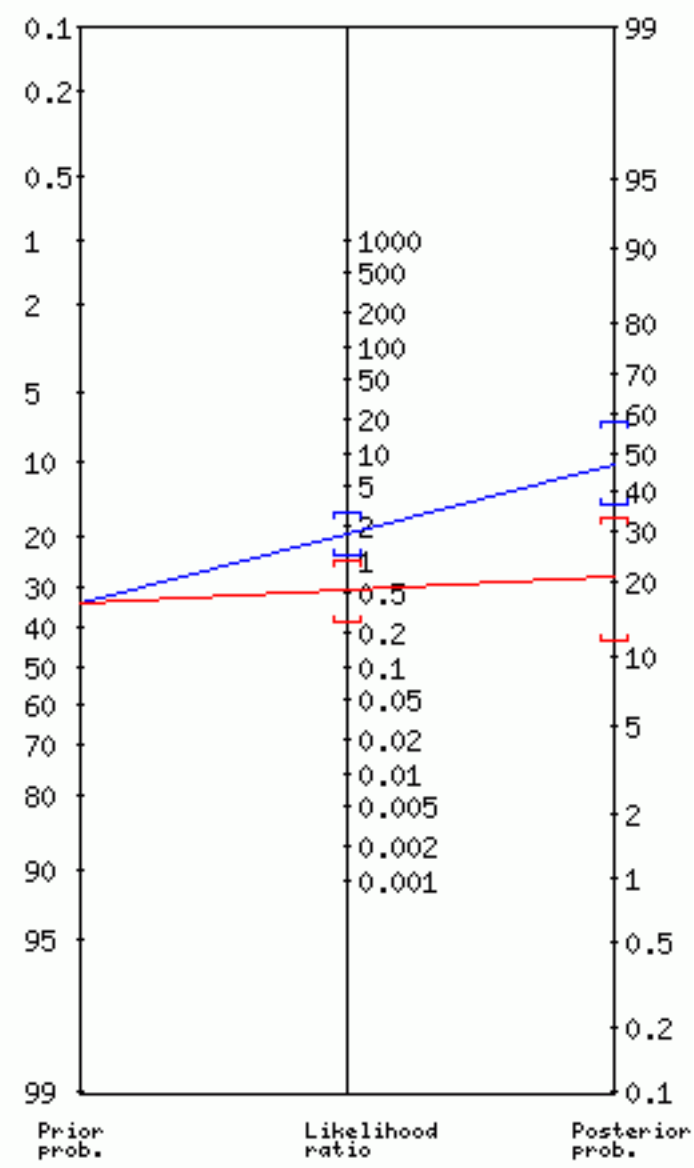


Figure 4: Effects of environment on eligibility status.

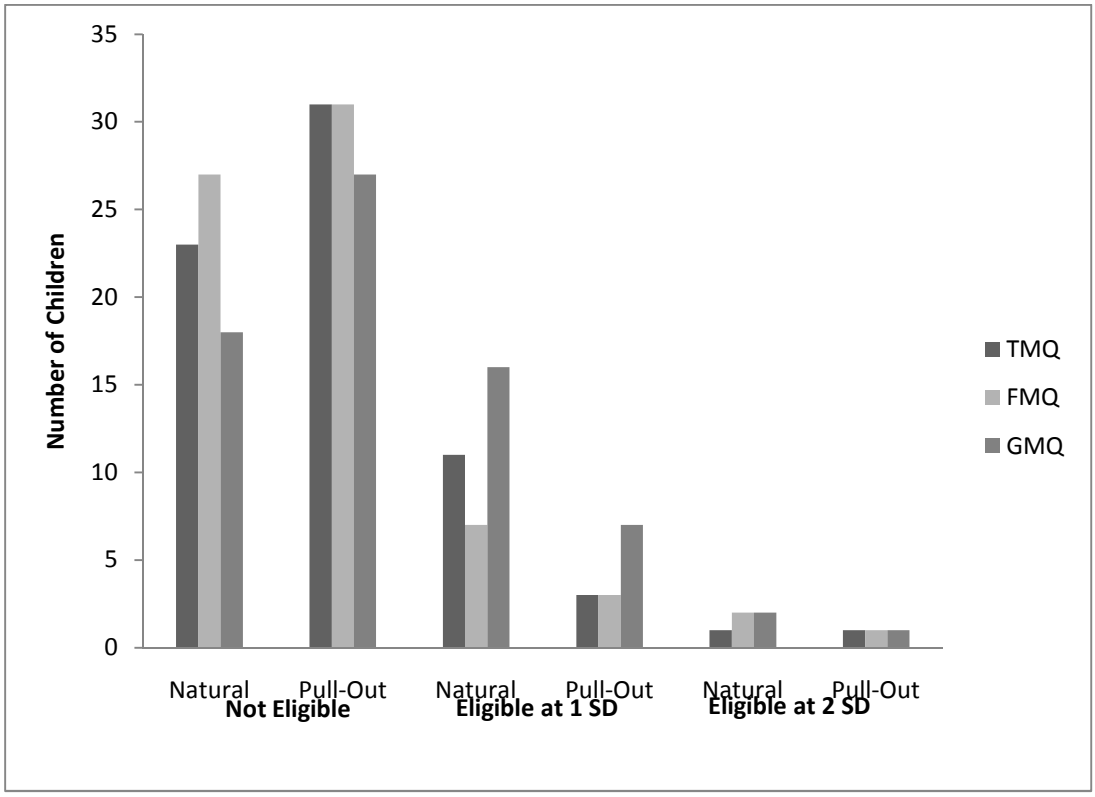
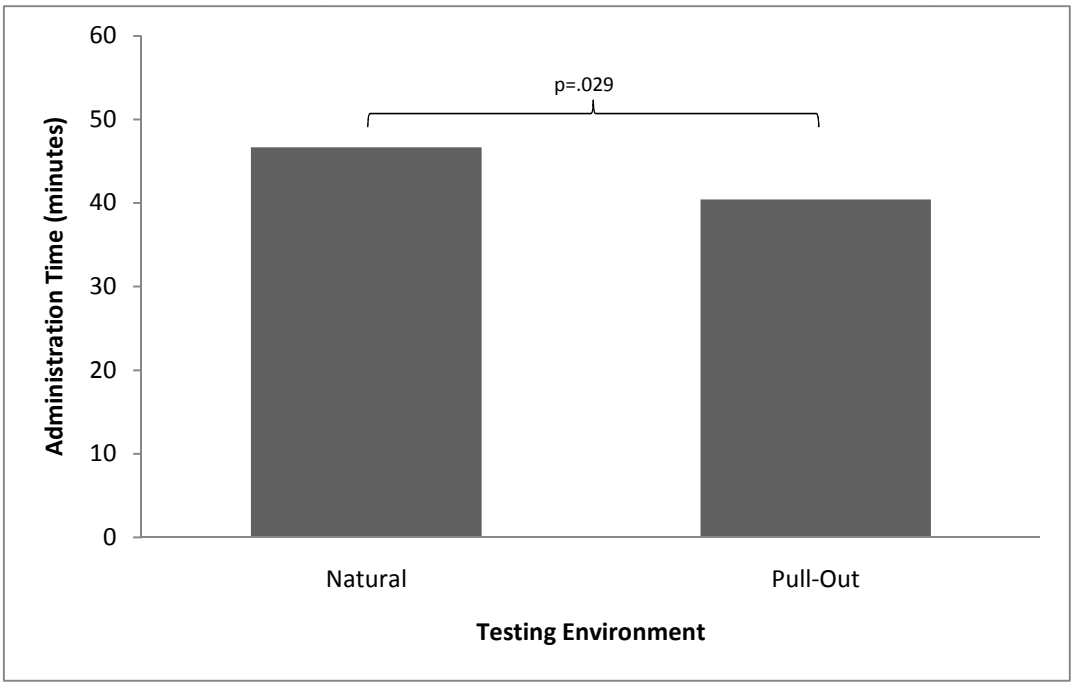


Figure 5: Effects of environment on test administration time.



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Biomedical IRB – Full Board Review
Approval Notice

NOTICE TO ALL RESEARCHERS:

Please be aware that a protocol violation (e.g., failure to submit a modification for any change) of an IRB approved protocol may result in mandatory remedial education, additional audits, re-consenting subjects, researcher probation suspension of any research protocol at issue, suspension of additional existing research protocols, invalidation of all research conducted under the research protocol at issue, and further appropriate consequences as determined by the IRB and the Institutional Officer.

DATE: May 23, 2009

TO: **Dr. Robbin Hickman**, Physical Therapy

FROM: Office for the Protection of Research Subjects

RE: Notification of IRB Action
Protocol Title: **Parent/caregiver-Researcher Interactions in Developmental Motor Evaluations in young children (PRIDE)**
Protocol #: 0903-3067

This memorandum is notification that the project referenced above has been reviewed by the UNLV Biomedical Institutional Review Board (IRB) as indicated in Federal regulatory statutes 45CFR46. The protocol has been reviewed and approved.

The protocol is approved for a period of one year from the date of IRB approval. The expiration date of this protocol is April 20, 2010. Work on the project may begin as soon as you receive written notification from the Office for the Protection of Research Subjects (OPRS).

PLEASE NOTE:
Attached to this approval notice is the **official Informed Consent/Assent (IC/IA) Form** for this study. The IC/IA contains an official approval stamp. Only copies of this official IC/IA form may be used when obtaining consent. Please keep the original for your records.

Should there be *any* change to the protocol, it will be necessary to submit a **Modification Form** through OPRS. No changes may be made to the existing protocol until modifications have been approved by the IRB.

Should the use of human subjects described in this protocol continue beyond April 20, 2010, it would be necessary to submit a **Continuing Review Request Form** *60 days* before the expiration date.

If you have questions or require any assistance, please contact the Office for the Protection of Research Subjects at OPRSHumanSubjects@unlv.edu or call 895-2794.

Lynn Bennett Early Childhood Education Center
Research Pre-Proposal

Your Name and Affiliation: **Robbin Hickman- University of Nevada Las Vegas Physical Therapy Department**

Primary Investigator: **Dr. Robbin Hickman PT DSc PCS**

Title and Affiliation of Primary Investigator: **Assistant Professor UNLV Physical Therapy Dept**

Contact Information (Phone & Email): **office phone: 702-895-1055; email: robbin.hickman@unlv.edu**

Anticipated Starting Date: **5/01/2009 (on approval from IRB and Bennett Center review committee)**

Anticipated Ending Date: **5/01/2011**

Please type a brief statement describing the purpose of the proposed study:
The purpose of this study is to determine the most optimal environment for the administration of the Peabody Motor Developmental Scale Version-2 (PDMS-2) with regard to therapist behaviors.

Please give a brief description of the participants including: children by ages, gender and any other defining characteristic; parents and/or siblings; and staff:
Children ages 18 months to 4 years 11 months and their parents/guardian or caregivers.

Please indicate the number of research sessions, the anticipated length of each session and the associated total length of time each participant will be involved particularly if that involvement requires time missed from regular class or intervention activities:
2 research sessions, 2 hours max for 1st & 1.5 hours max for 2nd. May be done as pull-out during class time or outside of class time. Parents or staff must be present.

Is this research funded by a grant, contact or other source? Is so indicate source of funding award number and funding period.
Pro-ed Inc will furnish a PDMS-2 test kit for research purposes. No other funding yet.

What information/data is needed from the LBECEC re subjects (test scores etc.):
All information for this study will be collected during the 2 sessions.

Please type below statement assuring that the investigators plan to share their findings with staff and parents of the LBECEC and Research Advisory Council including how and in what format they will do so:

Scores of the PDMS-2 will be shared with and interpreted to the parents/guardians upon completion of all sessions upon request. We will provide a copy of the PDMS-2 summary form with a brief explanation of strengths and challenges and answer questions. Staff will only get info at parent request.

VITA

Graduate College
University of Nevada, Las Vegas

Derrick Mittelstadt

Degrees:
Bachelor of Sciences, 2007
University of Wisconsin, La Crosse

Doctoral Document Title: Effects of Environment on Children's Motor Scores, Eligibility Status, and Administration Times

Doctoral Examination Committee:
Chairperson, Dr. Robbin Hickman, PT, DSc, PCS
Committee Member, Dr. Merrill Landers DPT, OCS