



Executive Summary

Relationship of Student Outcomes to School-Based Physical Therapy Service

PT COUNTS

Physical Therapy related Child Outcomes in the Schools (PT COUNTS) was a national study supported by the US Department of Education, Institute on Education Science (R324A110204). It was a prospective, multi-site observational study, undertaken to describe the changes in students' participation in school activity, self-care, posture and mobility, recreation and fitness, and academic outcomes and the relationships of these changes to identified characteristics of school-based physical therapy intervention, including service delivery models, activities, procedures, and dosage. As an exploratory study it has assisted in the identification of malleable factors associated with achievement of educational and functional outcomes by students with disabilities, age 5 to 12 years, receiving school-based physical therapy. We recruited 129 physical therapists (PTs) from 28 states in 59 school systems who completed the required training on the Collaborative Institutional Training Initiative (CITI), Goal Attainment Scaling (GAS), School Function Assessment (SFA), and School-Physical Therapy Interventions for Pediatrics (S-PTIP) data collection system. Of those PTs, 126 recruited students and 342 parents signed consent forms allowing their students to participate in the study.

In the fall of the 2012 the PTs administered the SFA and using the student's IEP goals developed GAS goals for each student. The research team reviewed these goals according to established decision rules and classified them in categories. Once the SFA and GAS were completed the PTs collected weekly S-PTIP data across 6 months of the school year. The S-PTIP was used to record the weekly interventions provided, activities used, student engagement in the therapy session, services to the student, and services on behalf of the student (services where the student was not present, i.e. consultation, collaboration and documentation). In the spring, the post-test GAS and SFA were completed. Final participation was 109 PTs with complete data on 296 students. The majority of students were 5 to 7 years of age (59%) (mean age=7.3 years, SD=2.0), white (n=213, 72%), and male (n=165, 56%). The diagnoses of the students were:

Medical Diagnosis	Number of participants	Percentage of sample*
Cerebral palsy	103	35%
Down syndrome	46	16%
Other genetic syndromes	40	14%
Global developmental delay	32	11%
Autism/pervasive developmental disorder	21	7%
Learning disability/ attention deficit hyperactivity disorder/ speech language disorder / developmental coordination disorder	16	5%
Developmental delay due to health conditions (e.g. heart disease)	15	5%
Myelomeningocele	10	3%
Vision and/or hearing impairment	6	2%
Traumatic brain injury	5	2%
Limb deficiency	2	1%

*Does not add up to 100% due to rounding.

The classroom setting for the students was general education for 31%, special education for 39%, or a combination for 30%. The major reason students missed service sessions during the year was student absence followed by school closure.

All data were entered into the Research Electronic Data Capture (REDCap) system. Descriptive statistics were calculated for all variables to describe the sample, the physical therapy services (cumulative counts of interventions utilized, minutes spent in activities, and types of service provision e.g. group versus individual sessions, services on behalf of the student), and the outcomes SFA scores, and GAS achievement. Student outcomes were compared based on gross motor function and age. An iterative process was then used to examine the relationship between the physical therapy services and student outcomes. This process included comparisons between groups defined by change in outcomes to determine the variables that were used in regression analyses.

Student Progress on Outcomes

The students generally improved on the subsections of the SFA, but not beyond the standard error of measurement (SME). Depending on the specific SFA outcome subsection 9-14 students' criterion change score was -5 points or less so they regressed, 134-157 students' criterion change score was between -5 and +5, which was not beyond the SME, and 123-148 students' criterion change score was above +5 points, which is beyond the SME for all but the *Task Support* category, thus indicating improvement. Students improved the most in *Participation*, followed by *Maintaining and Changing Positions*. Two-way ANOVAs were used to determine if change in criterion scores by SFA subsection differed by Gross Motor Function Classification System (GMFCS) level (I, II/III, IV/V) and by age (5-7, 8-12 years). Students who were less than 8 years of age with higher gross motor function (GMFCS levels I to III) improved more than students who were older and had lower gross motor function. There were statistically significant differences among the GMFCS levels with those having Levels IV/V (lowest functional ability) showing the least improvement in all SFA subscales except *Travel*.

On the GAS outcomes, on average, students achieved and slightly exceeded their expected goal attainment for their primary goal as well as the goals categorized as *posture/mobility*, *recreation/fitness*, and *self-care*. For the goals categorized as *academic*, students progressed but on average achieved slightly below their expected goal attainment. For the students primary goal, *posture/mobility* was the most common goal area (58%) followed by *recreation* (33%), *self-care* (5%), and *academic* (4%). The vast majority (93%) of students improved on their primary goal with 35% achieving goal expectations and 40% exceeding goal expectations. Two-way ANOVAs were used to determine if goal attainment differed by GMFCS level (I, II/III, IV/V) and by age (5-7, 8-12 years). Goal attainment did not significantly differ for students among GMFCS levels, diagnostic groups, nor between those receiving or not receiving outpatient physical therapy services. Students, 5 to 7 years of age had higher goal attainment for their primary goal than students 8 to 12 years of age.

Description of Services

Students typically received physical therapy services within the school setting (85%) with the majority of services provided by the physical therapist (88%) versus a physical therapist assistant also being involved in the provision of services. Neuromuscular interventions were the most frequent interventions provided. They were followed by musculoskeletal, mobility, and educational interventions. The least frequently occurring interventions were equipment, cardiopulmonary, sensory, positioning and integumentary. The primary physical therapy activities were physical education (PE)

/recreation, mobility, and prefunctional. Classroom activity, classroom and community mobility, and self-care were reported at low frequencies.

Students were seen for physical therapy an average of 26.8 minutes/week. The majority of physical therapy services were provided individually (23.3 minutes/week), separate from school activities (19.6 minutes/week). Very little time was spent on activities within the context of school (9.5 minutes/week). Therapists spent approximately 13.2 minutes/week on services on behalf of the student, which primarily included consultation/collaboration and documentation.

Relationship of Services to Outcomes

School Function Assessment

The SFA mobility subscales of *Travel, Maintaining and Changing Positions*, and *Manipulation with Movement* were combined into a Mobility composite. The subscales of *Clothing Management, Eating/Drinking*, and *Hygiene* were combined into an ADL composite. Stepwise regression was used to predict post-test scores, after adjusting for GMFCS, age group, and for the students' pre-test scores. For the regression analysis we examined how well the activities, interventions, and service provision types predicted the post-test scores within the *Participation* subsection, *Mobility* composite, *Recreation* subsection, and *ADL* composite. Results at $p < 0.05$ follow.

Participation: Scores increased significantly with higher average number of mobility interventions

Mobility Composite: Scores increased significantly with higher average number of mobility assistive interventions, higher total counts of motor learning and aerobic/conditioning interventions, and higher student engagement in the therapy sessions. Scores decreased significantly with increased PE/recreation activity minutes and increased frequency of positioning interventions.

Recreation: Scores increased significantly with increases in the total counts of mobility for playground access interventions, total counts of sensory processing interventions, and higher student engagement in the therapy sessions. Scores decreased significantly with an increase in the average number of orthoses and equipment interventions.

ADL Composite: Scores increased significantly with an increase in the average number of mobility and motor learning interventions.

In summary, there were generally better student outcomes across the subsections of the SFA with more mobility interventions and when students had higher engagement within the therapy session. Motor learning interventions and practice in the school environments (e.g. playground access intervention) also improved outcomes.

Goal Attainment Scaling

As the majority of students achieved or exceeded goal expectation, logistic regressions were used to determine the association of physical therapy services to exceeding goal attainment, adjusting for students' GMFCS level and age. Physical therapy service variables included in the model were selected based on services that differed between students who exceeded expected goal attainment and students who did not exceed expected goal attainment. Results at $p < 0.05$ follow, unless otherwise indicated.

Primary Goals: No service variables were significantly associated with students exceeding goal expectations. Minutes of services on behalf of student, $p < 0.10$, may warrant further investigation.

Posture / Mobility Goals: More minutes in self-care activities and services on behalf of the students were associated with exceeding goal expectations. An increase in 100 self-care activity minutes (5 minutes per week) increases the odds of exceeding goal expectations by 373%. An increase in 100 minutes of services on behalf of the student (5 minutes per week) increased the odds of exceeding goal expectations by 24%. Use of cognitive/behavioral training interventions was associated with not exceeding goal expectations. Every increase in 1 cognitive/ behavioral intervention decreased the odds of exceeding goal expectations by 10%.

Recreation / Fitness Goals: Greater use of functional strength and mobility for playground access and cognitive / behavioral interventions was associated with exceeding goal expectations. Every increase in the combined functional strength and mobility for playground access interventions increased the odds of exceeding goal expectations by 5.9%. Every increase in 1 cognitive / behavioral intervention increased the odds of exceeding goal expectations by 8.8%.

We were unable to conduct regression analyses with the *self-care* and *academic* goals because the number of goals was too small. Group comparative analyses revealed that for *self-care* goals, the students who exceeded goal attainment received more neuromuscular interventions, more physical therapy time with other students present, and less documentation time than those with lower goal attainment. Group comparative analyses revealed that for *academic* goals, the students who exceeded goal attainment received more mobility interventions than those with lower goal attainment.

Implications

The findings of this evidenced-based practice research study while not indicating causality does provide useful information for student outcome considerations as related to physical therapy service delivery.

Implications from this study include:

- Appropriate intervention planning requires good outcome assessments. Developing meaningful student goals is challenging but PTs were accurate in anticipating expected student progress. We recommend that goals reflect student participation in school activities and be integrated across domains.
- Using individualized outcome measures, such as GAS, to assess change in student performance, especially for students with limited functional movement, is recommended.
- Using standardized measures, such as the SFA, in addition to individualized measures captures performance on a board array of functional skills required for all students and promotes team collaboration.
- Need for PTs to reflect on how best to support progress of students older than 7 years of age.
- Need for PTs to reflect on how best to support goal attainment for students with cognitive and / or behavioral limitations.
- Need for PTs to consider if providing the majority of services through individual sessions, without other students, and separate from school activities reflects best practice.
- Consideration of cardiopulmonary interventions, as it was infrequently used but related to positive student mobility outcomes.

- Prioritization of the following interventions:
 1. Mobility interventions were predictive of both the SFA and GAS student outcomes. This substantiates their value and we recommend that school-based PTs prioritize these types of interventions especially within the context of school activities and access to school environments, e.g. mobility for playground access.
 2. Motor learning interventions were used frequently and also predicted two SFA outcomes (*Posture/Mobility, ADLs*). Motor learning emphasizes active practice by the student with intermittent feedback from the therapist.
 3. The more engaged the student was during intervention sessions the more positive the SFA *Posture/Mobility* and *Recreation* outcomes. This implies that active involvement of the student is important to these outcomes. This variable may indirectly reflect the intensity of student's activity within physical therapy sessions.
 4. Services on behalf of the student (consultation/collaboration/documentation) were predictive of positive GAS *posture/mobility* outcomes. Consulting and collaborating with teachers, parents, and others likely positively influenced student outcomes probably by providing an understanding of the student's goals involving physical therapy and educating others in the importance of providing practice opportunities for fluency and generalization of skills. Documentation requires a thoughtful review of what was and will be done with the student. This reflection might lead to more appropriate interventions with positive outcomes.

Recommendation for Future Studies:

An understanding of the intensity of students' activity within a therapy session, extent of student practice outside of the session, and expertise of the therapist in implementing the service should be assessed in future research. Strategies used by therapist to engage students within intervention sessions should be examined to provide more specific guidance to improve student outcomes

This project was funded by a grant from the US Department of Education, Institute of Education Sciences, R324A110204.

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