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Clinical utility of the WeeFIM as a mandated outcome measure: Navigating the needs of the organization, client and clinician

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Clinical utility of the WeeFIM as a mandated outcome measure:

Navigating the needs of the organization, client and clinician.

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Abstract

Local outpatient pediatric occupational therapists expressed a need for evidence to support the use of the Functional Independence Measure for Children (WeeFIM) as a universal measure for evaluations in their facility. We summarized the evidence addressing the psychometrics of the WeeFIM and a comparison instrument, the Pediatric Evaluation of Disability Inventory (PEDI). We ultimately made a recommendation for the PEDI based on its better evidence history for children with autism. The collaborating clinicians received an organizational mandate to implement use of the WeeFIM. We surveyed them to better understand their knowledge translation process. Themes from surveys were inserted into the Knowledge Translation Access Process model (MacDermid & Graham, 2009), and we documented the steps clinicians took to apply the evidence in spite of organizational barriers. Survey results and analysis of knowledge translation suggest that the standardization of the evaluation process is highly valued by clinicians and any shortcomings of the WeeFIM that were identified in the published evidence can be addressed by the use of additional measures.

Executive Summary

This evidence project began with a meeting between these writers and a small group of local outpatient pediatric occupational therapists. A research question developed from initial conversations, as clinicians were in search of a universal measurement tool to provide outcome data. Consideration of the WeeFIM was already in process. A thorough review of the literature resulted in a recommendation to answer the question: Does the WeeFIM instrument, or an alternate tool, have the strongest psychometric properties for measuring functional outcomes in children with disabilities?

The strength of psychometric properties of the WeeFIM is well established in the descriptive research literature (Ottenbacher et al., 2000; Chen, Heinemann, Bode, Granger, & Mallinson, 2004). Limitations in the evidence for its use in an outpatient setting with children with autism spectrum disorder (ASD) were discovered. A review of a commonly compared measure, the PEDI, ensued, in order to identify a measure fitting population and setting needs. The literature included considerable evidence to support the psychometric properties of the PEDI and the PEDI-CAT as well (Dumas et al., 2012). With rigorous validity and reliability confirmed, the two measures were compared for clinical utility in the context of our collaborating clinician's setting and our recommendation was to use the PEDI.

Upon presentation of our findings, collaborating clinicians reported plans to implement use of the WeeFIM, as mandated by their employer, a large healthcare organization. After review of our recommendations and summation of the evidence, clinicians were surveyed to answer the question: how will the mandated use of the WeeFIM impact the OT process? Survey responses indicated that clinicians plan to accommodate gaps in assessment coverage through collecting new data using additional measures, as implementation of the mandate begins in the

coming months. They responded with demonstrated problem solving skills and creativity to balance the demands of organizational boundaries and the duty to provide client-centered treatment.

Translating evidence-based knowledge into clinical practice requires flexibility on the part of the organization, clinician and client. We adapted the Knowledge Translation Access Process model (MacDermid & Graham, 2009) to better understand the knowledge translation process when organizational barriers may exist. This issue is relevant as demands for mandated outcome measures increase with directives from the Affordable Care Act, and healthcare organizations are pressed to find clinically appropriate and client-centered measures for universal utilization.   Collaborating clinicians reported a desire for updated evidence and the creativity and problem solving skills to execute data-based decision making, even in the presence of dissonance between institutional policy and published evidence as found by us.

Focused Question

Does the WeeFIM instrument, or an alternate tool, have the strongest psychometric properties for measuring functional outcomes in children with disabilities?

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Clinical Scenario

An occupational therapist in an outpatient clinic is searching for a user-friendly, sensitive and benchmarked outcome measure to use with clients on an ongoing basis. With appointments limited to one-hour time slots, this occupational therapist is looking for an instrument that is

quick to administer and score, and that will allow for additional time during the evaluation session for some skilled observation during play-based activities. Since many of her clients have developmental disabilities, a large number with ASD, the instrument should have strong psychometric properties verifying its accurate measurement of these populations.

Review Process - Procedures for the selection and appraisal of articles

Inclusion Criteria: Peer-reviewed studies measuring the psychometric properties of the WeeFIM or a related assessment and functional outcomes for children with various impairments were included. In addition, peer reviewed articles comparing the psychometric properties of the WeeFIM to another related pediatric assessment were included in order to understand how similar assessments compare to the WeeFIM. We expanded our search to include the Pediatric Evaluation of Disability Inventory (PEDI) and the Pediatric Evaluation of Disability Inventory Computer Adaptive Test (PEDI-CAT). These articles needed to meet the same criteria listed for the WeeFIM to be included.

Exclusion Criteria: Non-peer reviewed articles and those published pre-1990 were excluded as the WeeFIM was developed in 1990. Articles studying another pediatric instrument not commonly compared to the WeeFIM were excluded along with assessments used with an adult population. Testing of the WeeFIM for psychometric properties completed in countries outside of the United States was excluded, as the WeeFIM was normed to American children. Systematic reviews with no new empirical data were excluded. Articles that solely used the WeeFIM as an outcome measure to test an intervention were excluded. In addition, studies evaluating an assessment's utility with children diagnosed with very rare conditions were excluded due to a small sample sizes and limited generalizability. We expanded our search to

include similar measures to the WeeFIM, the PEDI and the PEDI-CAT. These articles needed to

meet the same criteria as articles pertaining to the WeeFIM.

Search Strategy

Categories	Key Search Terms
Patient/Client Population	pediatric, paediatric, children, child, young person, young people, infant.
Instrument Properties	Psychometrics, validity, reliability, specificity, sensitivity, face validity, content validity, construct validity, criterion validity, predictive validity, concurrent validity, discriminant validity, ecological validity, convergent validity, test-retest reliability, intrarater reliability, interrater reliability, internal consistency
Comparison	WeeFIM, Wee Fim, WeeFIM®, Functional Independence Measure for Children, assessments, PEDI, PEDI-CAT, Computer Adaptive Test, Pediatric Evaluation of Disability Inventory
Outcomes	Functional independence, functional outcomes, functional, independence, outcomes, self-care, mobility, motor, cognitive, communication.

Databases and Sites Searched
OT Search
PubMed
Google Scholar
PRIMO
CINAHL

Quality Control/Peer Review Process

We began by meeting with our faculty chair George Tomlin to discuss and refine our question. We then contacted our library liaison, Eli Gandour-Rood to help us determine the search terms and databases we should consider. Next, we set up a group Zotero account, where we could individually add and organize our research findings. We then began searching for articles using various combinations of the search terms in the search strategy table above. Initially, we searched for articles related to the psychometrics of the WeeFIM using the Primo database of the Collins Memorial Library at the University of Puget Sound. We were led to a systematic review article (Mensch, Rameckers, Echteld, & Evenhuis, 2015). This article provided us several related articles such as Niewczyk and Granger (2010). We then searched the databases of PubMed, CINAHL, Google Scholar and OT Search using the aforementioned search terms.

After thorough analysis of the WeeFIM, we found that there was limited research explicitly identifying the psychometrics of the WeeFIM when used with children diagnosed with ASD. Due to an increased population of children diagnosed on the spectrum being seen in our clinician's setting, we expanded our search to include articles evaluating the psychometrics of the PEDI and PEDI-CAT to better make a comparative appraisal for or against the use of the WeeFIM.

We found 35 articles total identified through PubMed, CINAHL, Google Scholar and PRIMO. Three articles were rejected based on their intent to measure psychometrics when tests were administered on populations outside of the US. Approximately 10 articles were not accessible via the Collins Memorial Library. Twenty-two articles met our inclusion criteria, were accepted and reviewed.

Results of Search

Summary of Study Designs of Articles Selected for the CAT Table

Pyramid Side	Study Design/Methodology of Selected Articles	Number of Articles Selected
Experimental	___Meta-Analyses of Experimental Trials ___Individual Blinded Randomized Controlled Trials ___Controlled Clinical Trials ___Single Subject Studies	0
Outcome	___Meta-Analyses of Related Outcome Studies ✓ Individual Quasi-Experimental Studies ___Case-Control Studies ___One Group Pre-Post Studies	2
Qualitative	___Meta-Syntheses of Related Qualitative Studies ___Small Group Qualitative Studies ___brief vs prolonged engagement with participants ✓ triangulation of data (multiple sources) ✓ interpretation (peer & member-checking) ___a posteriori (exploratory) vs a priori (confirmatory) interpretive scheme ___Qualitative Study on a Single Person	1
Descriptive	___Systematic Reviews of Related Descriptive Studies ✓ Association, Correlational Studies __Multiple Case Studies (Series), Normative Studies ___Individual Case Studies	19
Comments		*TOTAL number of articles* **22**

	Authors	Study Objective	Study Design/ Participants	Test Administrator	Pyramid Evidence Level	AOTA Evidence Level	Sample Size	Psychometric Properties Analyzed	Conclusion/ Implication	Study Limitations
WeeFIM – Psychometric Study	Chen, Heinemann, Bode, Granger, & Mallinson, 2004	An exploratory investigation of functional outcomes measured by the WeeFim, in children in inpatient rehabilitation settings.	Retrospective cohort design, collecting data on patients from 12 facilities (medical/trauma centers, freestanding rehabilitation facilities & children's specialty hospitals) between 1996 -1998. Patient records were included if the length of stay was between 5days and 150 days and the patients were > than 12 mo old or < 20 yo.	Study did not specify the amount of training or title of professional who administered the test.	D2	IV	$N = 814$ $n = 465$ boys $n = 346$ girls	Data was manipulated into an interval scale using Rasch analysis. Multivariate analysis of covariance was used to compare the mean gains of the subscales of self-care, mobility, and cognition across impairment groups.	This outcome study determined that most children receiving inpatient therapy do improve in areas of self-care, cognition & mobility. Measuring functional independence levels can be a more meaningful way of documenting a patient's progress in rehab.	Some limitations of this study are only 12 of 32 facilities that met inclusion criteria participated in the study. Program philosophies and treatment goals may be different in the participating facilities in comparison to the non-participants limiting the generalizability of the study.
WeeFIM Psychometric Study	Chen, Bode, Granger, & Heinemann, 2005	To determine if the WeeFIM items include a unidimensional interval scale or distinct motor and cognitive scales. To compare the order of motor item difficulty across age groups.	Retrospective study using Rasch rating scale analysis (RSA).	Study did not specify the amount of training or title of professional who administered the test.	D2	IV	$N = 814$ $n = 465$ boys $n = 346$ girls with ABI, CP, and other dx in inpatient rehab from 4 to 150 days	RSA of motor items showed misfit of bowel (1.95) and bladder (2.0) items. Distribution of ratings was "reasonable", and results suggest order of motor item difficulty varies across ages.	WeeFIM motor and cognitive domains are separate scales, with bowel and bladders items misfit the motor domain for younger children and stair climbing a misfit for school-aged children. .	Motor limitations may relate to nature of impairment. Participating clinicians may or may not have completed WeeFIM training.

WeeFIM- Comparison to another instrument	Grilli, Feldman, Majmemer, Couture, Azoulay, & Swaine, 2006	1) To find the association between the WeeFIMs measure of functional status and the PeadsQL4.0 health related quality of life measure. 2) To investigate child, parent and service related factors that may be associated with these scores.	Correlational study. WeeFIM and PedsQL4.0 was administered to the parents of children age 2-5 years old with physical disabilities.	2 researchers administered the WeeFIM after receiving training. They also administered the PedsQL4.0. However, there was no mention if they were trained in administering the test.	D2	IV	N=115, Boys (n=79) Girls (n=36)	Total WeeFIM score had a statistically significant correlation with the total PedsQL4.0 score. (r=.39) at p < .05. There was a moderate correlation between the scores of physical health on the PedsQL4.0 with the self-care quotient of the WeeFIM. (r=0.28). The score on the WeeFIM cognition quotient and the PedsQL4.0 cognition quotient was the lowest correlation found. A spearman's r was used (rs=0.03).	The WeeFIM and the PedsQL4.0 measure similar physical areas of health and functioning, specifically the self-care and mobility subscales of the WeeFIM and physical health summary scores of the PedsQL4.0. However, the WeeFIM subscales and PedsQl4.0 psychosocial health scores seem to measure different constructs of the child's well-being.	The PedsQL4.0 has a section regarding school functioning. Many of the children in this study did not attend a school or school like system. This may have caused the researchers to underestimate these children's difficulties when measured in these areas.
WeeFIM – Comparison to another instrument	McBride, 2015	To compare WeeFIM ratings of cognition (Memory, Problem-Solving, Comprehension, Expression) with standardized neuropsychological test results of WASI and Children's Memory Scale	Retrospective analysis of archival data from children with severe TBI during inpatient rehab	Raters who completed the online WeeFIM system credentialing program	D2	IV	N = 52 children with TBI	Multiple regression analysis to find correlation between WeeFIM scores and the standardized Neuropsych scores. Significant relationship found between neuropsychological scores and WeeFIM total cognitive score (F(8,43)= 4.29, p<0.001; R = 0.444, adj. R = 0.306. Most notable was the high correlation with WeeFIM total cognitive score and delayed verbal recall.	Convergent validity of WeeFim cognitive test and neuropsychological scores suggest that neuropsychological scores could predict cognitive function in children who are post-TBI.	Based on a retrospective chart review versus a prospective study using a brief test battery.

WeeFIM – Psychometric study	McCabe & Granger, 1990	To establish content validity for the WeeFIM	Content validity via expert analysis using binomial distribution, CVI and conceptual adequacy analysis via 7 experts in different professional disciplines.	Test evaluated by nurse, OT, PT, MD and Psychologist	D2	IV	N= 8 pediatric rehabilitation experts with an average of 13 years' experience	Binomial distribution (p<.05) established that domains are associated with subdomains. Content validity index = .80, meaning that the items fit the domain associated with it. Conceptual adequacy measured and not found.	This initial attempt to establish validity of the WeeFIM provided the beginning steps for future research. Some elements of content validity were found with the exception of conceptual adequacy.	Few psychometrics of the WeeFIM had been established by the printing of this article and authors clearly express the need for further research including plans to ascertain criterion-related and discriminative validity.
WeeFIM – Psychometric study	Niewczyk & Granger, 2010	To investigate psychometric properties of WeeFIM 0-3, including measurement of rating difference between children with and without impairment; and, internal consistency and inter-item correlations, concurrent validity, predictive validity, construct validity and hierarchical properties of instrument and its domains.	Cross-sectional study	Rater type was mother, father, caregiver/other, healthcare provider, or combination.	D2	IV	N = 527 children ages 0-36 mo. n = 173 with impairments n= 354 without impairments	1-way ANOVA determined instrument measured impairment accurately (p<0.05). Cronbach's alpha was 0.95, confirming internal consistency. Predictive validity was found to be 89.4% correct using logistic regression. Rasch analysis established construct validity and Wright item-person maps were used to analyze hierarchy.	Psychometric strength in said categories was established. This functional assessment was developed to measure the skills that precede self-care and basic daily living tasks in children with disabilities and may be more suitable to detect change in this population with often slow and subtle changes.	Behavior domain was less sensitive for detecting impairment, although may still be clinically relevant for self-comparison. Due to limited sample size, racial distribution, diversity and severity of impairment types and sequential measurements were lacking. Longitudinal comparison, test-retest, interrater and intrarater reliability remain unknown.

WeeFIM – Psychometric study	Ottenbacher, Msall, Lyon, Duffy, Grander, & Braun, 1997	An investigation of interrater agreement & test-retest reliability of the WeeFIM for children with developmental disabilities.	A relational design was used to collect data on interrater agreement and test-retest reliability. Four conditions were compared. Same rater or different raters collecting pre and post test data over a short (3 - 7 day) interval or a long (20 - 30 day) interval. Participants are 11 to 87 months old with a mild to severe disability. WeeFIM interview took place in outpatient developmental rehab centers, school programs, and child's home.	The primary rater was a nurse practitioner with over 20 years of experience. Additional raters included rehabilitation practitioners with a minimum of 3 years' experience working with children with disabilities. Raters received training in test administration & scoring.	D2	IV	$N = 205$	Researchers determined interrater agreement and test-retest stability using Kappa statistics for individual test items and intraclass correlation (ICC) for sub components and total scores.	Kappa values for interrater agreement for each test item extended between .44 for grooming & .82 for transferring to toilet, indicating moderate to excellent agreement. ICC values for component scores ranged between .85 and 1.0, and indicate excellent reliability. The WeeFIM instrument was reliable across raters and time.	One variable that researchers did not control was the variety of settings the interviews took place including home, rehab centers and schools. Some of the interviews were conducted with people who were not considered the primary caregiver, which also may have affected the quality of information reported.

WeeFIM – Comparison to another instrument	Ottenbacher, Msall, Lyon, Duffy, Granger, Braun, 1999	Compare ratings of WeeFIM with VABS and BDIST to examine how a functional assessment scale relates to developmental evaluation of adaptive behavior. Not a construct validity analysis but instead results could offer user-friendly analysis since all three instruments may produce similar results with a few distinct items.	Correlational Study	Administered by a pediatric nurse practitioner.	D2	IV	$N = 250$, 11-87 mo. old with DD dx. n =250 WeeFIM, $n =$ 101 BDIST, n = 104 VABS	Outcomes from each test were compared to provide correlation data. 32 of 36 BDIST and WeeFIM results suggested strong relationships over r >.70, Many measured items showed significant correlation (e.g. WeeFIM self-care and BDST motor domain transfers $r =$ .86). Overall the VABS and WeeFIM have less overall correlation, but certain items (VABS Socialization and WeeFIM Communication (r =.86).	With strong evidence of correlation among most test items in all 3 tests, the authors suggest the WeeFIM is the fastest to administer at 15 min. and has the least training requirement, WeeFIM outcome data is user-friendly and easy to understand among different disciplines/families.	There is no conclusive research conducted to identify WeeFIM inter-rater reliability amongst different professions (e.g. one discipline may rate a child in an entirely different way from another professional group). A more thorough examination of the theoretical distinction between functional and development assessments is needed when considering findings.

WeeFIM- Psychometric study	Ottenbacher, Msall, Lyon, Duffy, Ziviani, Granger, Braun, & Feidler, 2000	To investigate the responsiveness of the WeeFIM in detecting changes in functional status of children with disabilities.	Researchers used a prospective longitudinal design with correlation and responsiveness analysis. The WeeFim was administered to the child's caregiver 3 times over the year. Participants were 11mo to 7yrs old with mild (29%), moderate (54%) or severe (17%) disabilities and were receiving treatment or early intervention services in educational day programs.	Test was administered as an interview to a parent or caregiver by either an experienced nurse practitioner, unspecified a health professional, development specialist or rehab professionals with a minimum of 3 years of experience working with children with disabilities.	D2	IV	$N = 174$ $n = 63$ girls $n = 111$ boys	Five tests were used to measure responsiveness of the WeeFim. Reliability Change Index: a general purpose measure of clinical change. Proportional Change Index: a measure of developmental improvement in any of the WeeFIM domains. Effect Size Index: a measure relating magnitude of the change score to variability in scores. The final measures used were Standardized Response Means and Paired t-test.	All indexes of responsiveness found statistical significance of $p < .05$ or found reliable changes over time, with the exception of the sub category of transfers which had a skewed distribution that affected the results of some of the indexes. The results suggest that the WeeFIM is sensitive enough to detect changes in ADL function over time in children with disabilities.	Twelve percent of caregiver informants providing information on the children at the one year follow-up were not the same informants for the first 2 assessments which may contribute to a level of error measure. The health care professionals conducting the caregiver interviews was not always the same person each time the assessment was given and may have affected the way scores were interpreted.
WeeFIM – Psychometric study	Park, Kim, & Choi, 2013	To investigate the psychometric structure of the WeeFIM using factor analysis.	Analysis of the construct of the original version of the WeeFIM using Factor analysis. Participants were dx with CP and had a mean age of 9yrs 10m and received hospital based rehabilitation in Korea.	Measurements were taken by 6 PT's & 4 OT's with a min of 3yrs experience providing therapy to children with CP.	D2	IV	$N = 207$, $n = 138$ boys, n=69 girls	The internal consistency was excellent; Cronbach's alpha coefficient 0.98, 95% CI. Confirmatory factor analysis verified construct validity.	WeeFIM should not be used as an overall net score of ADLs in children with CP. The three factors of self-care, motor, & cognitive domains should be addressed in therapy separately.	The study focused on validity and reliability and did not include analysis of other psychometric properties. These results are not necessarily generalizable to other populations with diagnoses other than CP.

WeeFIM – Psychometric study	Sperle, Ottenbacher, Braun, Lane, & Nochajski, 1997	To examine reliability equivalence, using the intraclass correlation coefficient, of administering the WeeFIM via direct observation of performance and conducting a parent interview.	Analyzed the methods of administration of the WeeFIM for children 19-71 months diagnosed with developmental disabilities.	Test administered by an occupational therapist with WeeFIM training.	D2	IV	*N* = 30	Total ICC for WeeFim rating was .93 There was high consistency amongst the 2 administration methods, interview and observation.	No significant difference was found between scores from the two different administration methods. (Interview and observation) Information collected by an interview can be as effective and useful as observing performance.	Test was administered in different settings. Interviews were with parents not teachers. In a school setting parents and teacher may observe different roles and behaviors of the child, therefore affecting the results. There may be possible variations in results depending upon the profession administering the WeeFIM. (PT v. OT, etc.)
WeeFIM – Comparison with another instrument	Ziviani, Ottenbacher, Shephard, Foreman, Astbury, Ireland, 2002	To determine the concurrent validity of the PEDI and WeeFIM when used with children with DD or ABI.	Validity measured by Correlation	1 Occupational therapist	D2	IV	*N* = 41, 1.6 to 9.5 yo children with ABI, spina bifida and other DD.	Inter-rater reliability >.82; Key test items from the tests showed significant correlation, e.g. social function/ communication (*r* = .94), Social function/social cognitive (*r* = .94), self-care/self-care (*r* = .94).	Since PEDI and WeeFIM measure similar outcomes, researchers suggest consideration be made of the anecdotal differences between the two. PEDI offers thorough evaluation with details that aid goal setting but it takes an hour to administer. WeeFIM provides less detailed data but is quick to administer at 15 min.	Authors have history in support of the WeeFIM and write with a biased voice. Sample size is relatively small with little diversity of DD dx.

PEDI - Psychometric study	Coster, Kramer, Tian, Dooley, Liljenquist, Kao, & Ni, 2015	To evaluate the construct validity of the PEDI-CAT ASD including analysis of performance fit, domain and item fit, measurement variance, and correlation of CAT with full item set	Using confirmatory factor analysis, Comparative Fit Index, Tucker Lewis index, and the root mean square error of approximation (RMSEA) items were measured for fit and comparisons were made between full item PEDI-CAT score and ASD module score.	The test was administered on participant's home computer.	D2	IV	N = 365 parents of children with Asperger's syndrome, ASD, PDD-NOS ages 3 yo - 21 yo and 11 mo.	CFA daily activities domain = 0.98, social/cognitive domain = 0.93, responsibility domain = 0.97 (TLI, RMSEA also reported).	Very limited DIF in Daily Activities and Responsibility domains; Large number of DIF in Social/Cognitive likely because of the nature of ASD when compared to other disabilities measured by the full item PEDI-CAT. Criterion scores of ASD module account for those unique characteristics and support comparison to original PEDI-CAT.	Convenience sample was mainly white, upper class families, mostly mothers with sons with ASD.
PEDI - Psychometric study	Coster, Haley, Ni, Dumas, Fragala-Pinkham, 2008	To investigate score agreement, validity, precision, and response burden of a prototype CAT of the self-care and social function scales of the PEDI compared to the full-length version.	A computer stimulation analysis of cross-sectional and longitudinal retrospective data on children with and without disabilities between the ages of 6 mo and 17 yrs. Researchers examined three item-stopping rules for self-care and social function domains (CAT - 15, CAT - 10, and CAT - 5) and compared them to the full length assessment of the PEDI.	The test administrator was not indicated.	D2	IV	N = 881, n = 412 without disabilities, n = 469 with disabilities	A strong Pearson correlation was found between the CAT-10 and CAT-15 and full length item test indicating that the CAT scores accurately captured the information of the full-length test with fewer test items. Only the CAT 15 and full item pool met the discriminant accuracy criterion.	The use of the CAT can substantially decrease the time to administer without significantly reducing the precision and sensitivity.	Sixteen of the 65 social function items expressed differential item function, indicating that variables other than the latent variable such as dx or age were influencing the response.

PEDI - Psychometric study	Dumas, Fragala-Pinkham, Haley, Ni, Coster, Kramer,... & Ludlow, 2012	To investigate the discriminate validity, test-retest reliability, administration time and user satisfaction of the PEDI-CAT	Prospective field study targeting parents of children 3 - 20 yrs old with and without disabilities. Participants answered 15 items in each of the 4 domains. Re-tests were administered between 7 and 30 days after initial test.	The test was administered by a PT with a portable laptop computer at the clinic or in the participants' home.	O2	II	N - 102, n = 50 parents of children with disabilities, n = 52 parents of children without disabilities, sub-sample n = 25, n = 11 w/ disabilities, n = 14 w/o disabilities	The PEDI-CAT differentiated between children with and without disabilities in all four domains. Has high test-retest reliability in all four domains with a CI range between 91-1.00. The mean time to complete the CAT was 12.66 minutes.	The PEDI-CAT differentiated functional skills between groups of children with and without disabilities. The assessment can be administered in 12 minutes. Parents preferred the CAT compared to the full length pen and paper assessment. Almost all parents felt they provide meaningful information about their child.	Authors used a convenience sample to find participants for the study. About half of the participants felt they were asked questions that did not apply to their child.
PEDI - Psychometric study	Dumas, & Fragala-Pinkham, 2012	To evaluate concurrent validity and reliability of the PEDI-CAT mobility domain with the original PEDI-FS	Cross-sectional design. Parents of children with neurodevelopmental disabilities.	The PEDI-CAT ASD was administered on a computer. The PEDI FS was administered through interview, by whom was unspecified.	D2	IV	Parents/caregivers of children with neurodevelopmental disabilities. (N=35) Diagnosis included Autism (n=4) Cerebral Palsy, gross motor levels I to V (n=20). Genetic disorder (n=5) other neurological disorders (n=6).	Strong correlation between scores of the PEDI FS mobility scores and the PEDI-CAT mobility scores. (r=.82; p<.001) Intraclass correlation coefficients were between .3390 and 1. There was a 60%-100% agreement for 8 mobility items of the PEDI CAT and PEDI FS.	The PEDI-CAT and PEDI FS mobility sections have strong correlations between scaled scores. Both identify limitations in functional mobility with children. There is evidence that, when used with children with varied diagnosis and age range, there is adequate concurrent validity and reliability for the PEDI CAT in the mobility domain.	Two tests were completed by the participants in one day which may not be generalizable to a population who only takes one, affecting the validity of the study. Only 8 items were compared. The researchers may need to increase the number of items evaluated to determine concurrent validity. Larger sample sizes are needed to confirm the evidence found in this study.

PEDI - Psychometric study	Haley, Ni, Ludlow, Fragala-Pinkham, 2006	The primary objective was to determine whether the M-CAT or the U-CAT produces the most accurate or precise score estimate while requiring the fewest items of the mobility and self-care domain of the PEDI. The secondary objective was to compare the accuracy and precision of the M-CAT and U-CAT which selects items based on pervious responses to a random selection of items.	A retrospective study that used existing data on the mobility and self-care subgroups of the PEDI. The data was from three sample groups and was collected between 1989 and 2006. Participants were the parents of children between the ages of 6months and 17 years with and without disabilities.	The test rater was the computer program	D2	IV	N = 1259, n = 412 Original Sample, n = 378 Expanded-age Sample, n = 469 Clinical Sample	The M-CAT was found to have more precision and efficiency than the mobility and self-care group of the U-CAT. Equivalent estimation of mobility and self-care scores were achieved with 25% to 40% fewer items presented with the M-CAT than with the U-CAT.	The multidimensional item-response theory model produces an efficient and precise measurement for person scores. The M-CAT person results were easier to interpret because they are divided into subdomains of self-care and mobility. The efficiency of the M-CAT appears to reduce the burden of the respondent because they have fewer questions to answer.	A limitation of the study was the original and clinical sample groups were administered 73 self-care items and 59 mobility items whilst the expanded-age sample was administered 50 additional self-care items and 100 additional mobility items.
PEDI - Psychometric study	Haley, Coster, Dumas, Fragala-Pinkham, Kramer, Ni, & Ludlow, 2011	The purpose of the study was to build new PEDI-CAT item banks to be used with children to assess the accuracy and precision of the PEDI-CAT by examining the post-hoc simulations bases on the combined normative and disability samples in comparison to the administration of all items.	Computer simulation analysis of a prospective study on parents of typically developing children and parents of children with disabilities between the ages of birth to 21yo.	Test was administered through an online survey or by computer tablets in clinics.	D2	IV	N = 2,908, n = 2,205 parents of typically developing children, n= 703 parents of children with disabilities	A confirmatory factor analyses validated the four unidimensional content domains. The post hoc demonstrated excellent accuracy (ICCs > 0.95) with the full item banks. Item parameter estimates indicated a small bias in the CAT-10 and CAT-15 versions.	The PEDI-CAT appears to be an accurate and precise assessment of functional living skills for children from birth to 21 years of age. The 15 item CAT maintains accuracy while reducing the burden of respondents.	Most participants filled out the assessment online and did not have access to a test administrator to ask clarifying questions which may have affected their results.

P E D I - Psychometric study	Kao, Kramer, Liljenquist, Tian, & Coster, 2012	To compare the functional performance of children without disabilities, children with ASD, IDD and intellectual disabilities using the PEDI-CAT. In particular, this study addresses questions such as how scores vary by age cohort, how these children are measured in the social/cognitive, daily activities and responsibility domains and how do children with ASD compare to children with IDD and those without disability?	Secondary analysis of a previous cross-sectional design study. Participants were parents of children with ASD, IDD, and children without disability aged 0-21.	Test administered online for parents to complete.	O2	II	Children without disabilities (n=2,205) Male (n=1,126) Female (n=1,078) with ASD (n=108) Male (n=83) Female (n=25) with IDD (n=150) Male (n=88) Female (n=62)	**Social cognitive domain**- Children with ASD has statistically significant lower scores than those without disability aged 10 and 15. (p<.001) Children age 5 did not have statistically significant lower score than those without disabilities. No significant differences were found between children with ASD and IDD. **Daily Activities domain**- Children with ASD had statistically significantly lower scores at age 10 and 15 than those without disability (p<.001). No significant difference was found between children with ASD and IDD. **Responsibility domain**- children with ASD had statically significant lower scores than those without disabilities. There were no significant differences in scores between those with ASD and IDD.	The PEDI-CAT is able to identify a need for OT services for children with ASD, specifically for treatment regarding routines, and participation in daily activates. It is unable to discern significant differences in children with ASD and IDD at any age.	Did not evaluate relationships between the amount of adaptive behavior seen and the severity of impairments as measured by the PEDI-CAT. The diagnostic sample size were small possibly reducing the researchers ability to detect smaller differences. Further research is needed to identify the amount of variance in adaptive behavior scores caused by deficits in communication.

PEDI - Psychometric study	Kramer, Coster, Kao, Snow, & Orsmond, 2012	To explore the validity of the PEDI-CAT ASD via parent and rehab professional focus group and interviews.	A "pragmatic" qualitative approach	First author facilitated focus groups with a peer to take field notes.	Q2	V	$N = 38$, $n = 20$ OT, PT, SLP, SPED, Social Workers, $n = 18$ parents of children with ASD	Methods to enhance rigor include triangulation, peer checking, and member checking.	Themes emerged from parents' rating decisions including child's variability of performance (secondary to ASD), child's strengths, and the capacity (vs. the understanding) to execute an activity. Parents found the PEDI-CAT algorithm to be strength-based, as they were not exposed to answering a multitude of questions about what their child was not able to do.	Convenience sampling of homogenous primarily white, middle-class parents who had a pre-existing interest in adaptive measurement tools.
PEDI – Comparison to another instrument	Kramer, Liljenquist, Ni, & Coster, 2015	To measure test-retest reliability, concurrent validity of PEDI-CAT ASD and VABS-II, and gather parent feedback on the PEDI-CAT ASD.	Used nonparametric correlation with Spearman's to determine relationship between VABS-II and PEDI-CAT and qualitative component to identify parent perspective of PEDI-CAT ASD	Test rater is computer program	D2	IV	$N = 39$ parents of children with ASD 10-18 yo.	PEDI-CAT (ASD) test-retest ICC > 0.86; PEDI-CAT (ASD) and VABS-II moderate to strong correlation (r=0.57-0.81)	The PEDI-CAT ASD has excellent test-retest reliability. Domains of the PEDI-CAT ASD and VABS-II are moderately comparable, yet researchers suggest the PEDI-CAT ASD is more strength-based and user-friendly based on parent feedback.	Small and homogenous convenience sample. Parents verbalized answers instead of inputting for purposes of research and responses could have been affected by this factor.

P E D I - Psychometric study	Kramer, Coster, Kao, Snow, & Orsmond, 2012	To understand possible sources of response variation by evaluating the differential items function (DIF) in the social/cognitive domain of the PEDI-CAT (ASD) for children with autism.	Cross-sectional design. Convenience sample of parents of children aged 3-21 diagnosed with autism.	The PEDI-CAT ASD was administered online through a secure website.	D3	IV	N=365, Parents of children with autism.	All items evaluated had a wABC score that exceeded the criterion (wABC >0 .24). Meaning, there was a statically significant difference in scores between those with autism and those without disabilities. 16 items were found to be significantly easier for children with autism. 11 items were found to be more difficult. One item was not consistent with expected responses when compared to the standardized sample (non-uniform DIF).	The patterns of differential responses are consistent with the differences found in children with autism. Differential responses could be due to the different developmental sequences and patterns children with autism often experience. In addition, parents of children with autism may evaluate their child's functional performance differently from parents of typically developing children depending upon the severity of their perceived deficits. This could possibly cause them to choose ratings higher or lower than their children demonstrate.	The participants were chosen based upon convenience and may not be representative of a larger population due to possible selection bias. The researches declared a possible conflict of interest as one of the authors has been a paid consultant for CRE care which is the main distributor of PEDI-CAT.

Summary of Key Findings

Summary of Experimental Studies

 No experimental studies were found.

Summary of Outcome Study

 The PEDI-CAT provides an accurate assessment of functional living skills for children

from birth to 21 years of age and can differentiate between functional skill levels in children with

and without disabilities (Dumas et al., 2012). However, the PEDI-CAT was unable to

differentiate between a diagnosis of ASD and intellectual or developmental disorder (Kao et al.,

2012).

Summary of Qualitative Study

 Several themes emerged during a focus group on the PEDI-CAT ASD. There was a lot of

variability in the child's performance secondary to ASD. Parents reported a difference between

their child's strengths and the capacity to perform activities versus their child's understanding

and execution of an activity. Generalizability of skills in multiple environments with multiple

people was necessary to measure and finally, parents reported one strength of the CAT format

was that the algorithm did not continue to ask them questions about what their child was not able

to perform (Kramer et al., 2012).

Summary of Descriptive Studies

 The strength of psychometric properties of the WeeFIM is well established in the

descriptive research literature. The WeeFIM correctly predicts impairment status with 89%

accuracy for children who are 0-3 years of age (Niewczyk & Granger, 2010) and has sensitivity

for detecting changes of function in children with disabilities (Chen et al., 2004; Ottenbacher et

al., 2000). The WeeFIM meaningfully documented a child's progress in an inpatient

rehabilitation setting with notable gains in self-care, cognition and mobility (Chen et al., 2004).
The assessment can be given as skilled observation of the child's performance on ADL or by
interviewing the parent. Research suggests that both ways are equally effective (Sperle et al.,
1997).

The PEDI-CAT identified the need for OT services for children diagnosed with ASD and
demonstrated high test-retest reliability (Kramer et al., 2012). The 15-item CAT is as accurate as
the full-length version and reduces respondent burden (Coster et al., 2008; Haley et al., 2006;
Haley et al., 2011). In addition, parents of children with autism may evaluate their child's
performance differently from parents of typically developing children, depending upon the
severity of their perceived deficits. Specifically, the probability that a parent will rate their child
differently from another child with the same latent ability for this module was found to be large
in social/cognitive domains but small in the daily activities and responsibility domains (Coster et
al., 2015). However, criterion scores of the ASD module may account for these unique
characteristics (Coster et al., 2015; Kramer et al., 2015).

Implications for Consumers

The consumers of services at our collaborating clinician's facility are children from birth
to 18 years old with varied diagnoses, including cerebral palsy, Down syndrome, ASD,
neuromuscular disorders, spina bifida, torticollis, limb deficiencies and sensory processing
disorder. The patient population researched in the WeeFIM literature included individuals under
the umbrella of developmental disabilities and mostly replicated their client population, with the
exception of children with ASD. Research suggests that the WeeFIM could accurately measure
function across specific impairment issues and diagnoses (Niewczk & Granger, 2010), which
could be quite valuable for a general outpatient clinic such as our collaborator's facility.

Although there was no study dedicated to item fit of the WeeFIM for individuals with ASD, a

correlation to neuropsychological tests was found, suggesting sensitivity to neurobehavioral

performance issues in the Cognitive domain (McBride, 2015).

Since a significant number of clients at this clinic have a diagnosis of ASD and there were

no explicit findings in the literature measuring accuracy of the WeeFIM when applied to this

population, we expanded our search to include a thorough analysis of its commonly compared

instrument, the PEDI (Ziviani et al., 2002) and PEDI-CAT. With this population, the diverse

expression of symptoms presents a particular challenge to measuring adaptive and functional

performance. Identifying a tool that is sensitive enough to measure adaptive skills in children

with ASD that would also accurately measure those skills in children with an isolated motor

disability is a challenge due to the diverse expression of symptoms conveyed along the entire

continuum/spectrum of impairments. To remedy this issue, the PEDI-CAT's algorithm tailors

questions based on a client's specific impairment and strengths and the literature suggests that

patterns of differential responses are consistent with the ASD population (Kramer et al., 2015).

 Clientele at this clinic include people with diverse socioeconomic status, as clients have

Medicaid, Medicare, private insurance and self-pay for funding sources. It was determined that

correlations between socioeconomic status and scores were non-significant (Ottenbacher et al.,

1999), suggesting that the WeeFIM is a non-biased tool when testing children of diverse class

backgrounds. Similarly, studies have shown that the WeeFIM could not detect gender or racial

background (Ottenbacher et al[G10] ., 1999).   Research is lacking on the measurement of

socioeconomic and racial differences among respondents of the PEDI-CAT.

Pediatric clientele and their caregivers deserve high quality and family-centered

rehabilitative and therapeutic services. Since the WeeFIM and PEDI-CAT both measure level of

caregiver need, the respondent's perspective of the tool is essential when considering clinical utility. Families using the WeeFIM report ease of use (Ottenbacher et al., 1999), as do caregivers surveyed about the PEDI-CAT (Kramer et al., 2015). Certainly the timeliness of each 15-minute measure is appreciated by families, yet the strength-based structure of the PEDI-CAT allows caregivers to evaluate what their child is able to do instead of what they are not capable of doing (Kramer et al., 2012).

A major hallmark of the WeeFIM is its potential to measure caregiver burden throughout the lifespan, as a child transitioning to adulthood could be assessed using the adult-normed Functional Independence Measure (FIM). This information can be utilized for discharge planning in a hospital setting, as well as ongoing treatment planning in an outpatient clinic. The PEDI-CAT also includes caregiver feedback to identify needs for children with ASD up to 22 years of age, and this information can be used for treatment planning issues related to transition to adulthood and independent living. Identifying areas for caregiver support could provide needed information for respite care, healthier family routines and culture- goals more commonly focused on in an outpatient setting.

The predicament presented throughout the early literature of the WeeFIM posed the question whether a longer, more detailed outcome measure is more or less important than a faster measurement tool that provides similar but more limited data. For clients and their families, this conundrum could impact their ability to maximize the productivity of appointments, especially if the length and number of sessions are limited by insurance. The development of the PEDI-CAT was a response to this issue since the original PEDI offered a psychometrically rigorous and functional evaluation for a vast array of client issues with an hour administration time. Dumas et

al. (2012) and Coster et al. (2008) found that the PEDI-CAT produces scores that are as precise

as those using the domain's 1 hour, full set, pen and paper evaluation.

Should a family have no therapy limits, they may want a more comprehensive assessment

completed for their child regardless of the time needed to complete the evaluation. They may

have a child with a breadth of needs that cannot be measured in combination with other

impairments with just one test (e.g., sensory needs which are generally measured in a separate,

self-contained instrument). In some instances, a developmental assessment is needed to

determine eligibility for services. With such an array of factors to consider, family-centered care

must include options for outcome measures regardless of socio-economic background, insurance

limitations and impairment status.

Implications for Practitioners

The WeeFIM offers a quick, 15-minute option for measuring functional ability in the

domains of self-care, mobility, motor, communication and cognitive performance. The test can

be administered by a variety of health care professionals with minimal training. On a systems

level, clinic and hospital management along with 3rd party payers would likely embrace the tool

for its quick administration and resulting cost-effectiveness. This is especially relevant in the

culture of discharge-focused treatment planning in hospital and sub-acute settings.

The PEDI-CAT domains include Daily Activities, Social/Cognitive, Mobility and

Responsibility, and take no more than 15 minutes to administer. Items are rated by a child's

ability to complete tasks with adaptive support, which is a notion central to the work of

rehabilitation therapists. A tool that measures performance skills allows practitioners to assess

the efficacy of interventions that teach new ways to participate in occupation. The immediate

scoring mechanism provides norm-based T-scores, criterion-referenced scores and percentile

ranges immediately (Coster et al., 2015). Instant scoring can free up time for practitioners to

focus on documentation, treatment planning, intervention implementation and this time-saver is

likely a welcome rarity for clinic management as well. Criterion-referenced scores are most

effective for detecting change over time when administered to a child with a disability and this

element of the PEDI-CAT may be of utmost value to our collaborating clinicians. Quantifying

progress is critical to the work of rehabilitation professionals and the PEDI-CAT questions can

change with the client because of its dynamic algorithm.

For occupational therapists, the decision to use a certain tool depends on the client and

caregiver's needs, the frame of reference used and the clinical reasoning process. An assessment

of functional and adaptive performance is needed to measure a client's ability to perform ADL

and the level of assistance needed in relation to his/her peer group. If a clinician has already

decided to use a functional outcome instrument, consideration of the WeeFIM, the PEDI, PEDI-

CAT, VABS-II or PedsQL4.0 are likely options since they all have psychometric rigor and are

designed specifically to measure adaptive and functional outcomes of children with disabilities

(Grilli et al., 2005; Ziviani et al., 2002). Since significant correlations between the WeeFIM and

PEDI-CAT were found and both offer a fast option for clinicians to administer a test, the specific

needs of the setting must be considered. It is possible that the WeeFIM's heightened

psychometric rigor could be attributed to using targeted samples of children with motor issues

and acquired brain injury in an inpatient setting. Not surprisingly, there would be low numbers

of children with ASD hospitalized among those receiving acute rehabilitative care and being

sampled for WeeFIM normative data.

More likely, children on the spectrum are seen for ongoing care in outpatient clinics like the

one at our collaborating clinician's setting. In this vein, the PEDI-CAT may offer a better fit for

the outpatient practitioner since it can be used throughout treatment for setting objectives outside of discharge related goals. It could also be suggested that the WeeFIM as yet lacks the psychometrics when tested in an outpatient setting to justify its use.

At face value, each of the PEDI, PEDI-CAT and the WeeFIM appears to be a cost-cutting, user-friendly instrument with rigorous psychometric properties that can justify ongoing treatment, detect change and measure the efficacy of treatment. This is certain to be attractive to management, what with rising productivity demands and 3rd party payer limitations. However, it requires important clinical judgment to identify which meaningful tool should be utilized to measure specific performance items. Occupational therapists have ethical and theoretical commitments to a client-centered and occupation-based evaluation process and it would be imprudent to suggest that the PEDI-CAT or the WeeFIM would fit the needs of every practitioner for every client in every setting.

Implications for Researchers

Results of these preliminary findings should be taken with caution, as more research is needed to generalize the results across settings, professions and diagnosis. For example, there was very limited research available on the use of the WeeFIM with children with ASD. In addition, there may be variations in results depending upon the profession administering the WeeFIM. The WeeFIM can be completed through skilled observation. A physical therapist's observations may differ from an occupational therapist's observations. Finally, there was limited data in regards to the longitudinal value of the WeeFIM results. Further research is needed on these topics.

In regards to the PEDI and PEDI-CAT, further research is needed to evaluate the relationship between adaptive behavior measures and how the child functions in a natural environment such as home, school or in the community (Kao et al., 2013). There is a need for

further research to evaluate the compatibility and equivalency between the PEDI and PEDI-CAT (Dumas & Fragala-Pinkham, 2012). There were limited findings evaluating the sensitivity of the PEDI-CAT. Because the child's caregiver completes the PEDI-CAT, further research is needed to understand the cognitive process that parents of children with ASD use to evaluate their children's performance and if this process is similar to that employed by parents with children with other disabilities (Kramer et al., 2015a).

Qualitative research is needed to evaluate the caregiver's perceptions of the PEDI or PEDI-CAT, in regards to its level of difficulty or ease of use. In addition, there were limited racially and socioeconomically diverse samples used in the literature, limiting the generalizability of the results to a more diverse population. The responsiveness of the PEDI-CAT has not been studied and there are domains that still need to be expanded upon to be more inclusive of a wider array of disabilities and dysfunction. For example, there are no test items addressing functional mobility specific to power wheelchair users.

There was limited research gathered in regards to comparing the psychometric properties of the WeeFIM to other instruments measuring similar constructs. Further research is needed directly comparing the psychometrics of the WeeFIM, the PEDI and the PEDI-CAT in order to make an accurate appraisal of which assessment is stronger in measuring functional outcomes in children with various disabilities.

Bottom Line for Occupational Therapy Practice/ Recommendations for Best Practice:

For many years occupational therapists have used a developmental model that identified and described developmental milestones of children. Developmental assessments provide valuable information, but are ineffective at assessing a child's functional performance in everyday tasks. Recently, there has been a movement in occupational therapy for evaluating independence in

functional ADL and implementing function-focused interventions. This initiative for assessing function has lead to the development of new instruments including the WeeFIM and PEDI-CAT. Both of these assessments have established psychometric rigor, can detect small changes in function across varied diagnoses, and can justify ongoing treatment.

Our research suggests that the WeeFIM is an invaluable and well-respected resource for tracking functional outcomes and documenting goal attainment in areas of Mobility, Self-care, Motor, and Cognition. The assessment has 18-items and can be completed efficiently within 15 minutes by either a caregiver or a trained healthcare professional. The WeeFIM has high quality psychometric properties with national normative data, is user friendly, sensitive to changes in function, accurate at assessing impairments, quick to administer and user friendly. Furthermore, the WeeFIM can help predict the burden of care for caregivers. The WeeFIM meets many of the needs specified by the collaborating occupational therapists with few exceptions. Little to no information was found for the use of the WeeFIM with children diagnosed with ASD which is the primary diagnosis seen at this clinic. Research on the WeeFIM has predominantly assessed inpatients at hospitals, which explains the lack of research on clients with ASD as they are frequently treated in outpatient settings.

Alternatively, the PEDI-CAT provides another option for assessing functional outcomes in four domains, Daily Activities, Mobility, Social/Cognitive and Responsibility. The assessment is used to identify functional delays and assist with developing client centered functional goals. Though the PEDI has existed for two decades the PEDI-CAT is relatively new. The PEDI-CATs innovative nature applies an item response theory that selects the fewest number of the most relevant items to estimate the client's ability to perform functional activities and provides results instantly. The instrument can now be completed in about 15 minutes, significantly reducing the

burden of the clinician or caregiver respondent. The PEDI-CAT has been normed from birth to

21 years and can be used across diagnoses and in multiple settings, including outpatient

rehabilitation. Furthermore, several articles were found supporting the use of the PEDI-CAT in

assessing children with ASD.

In summary, the WeeFIM and the PEDI-CAT are high quality, valuable instruments for

measuring outcome measures. However, the lack of research documenting the utility of the

WeeFIM in the outpatient setting and its use with the ASD population suggests the WeeFIM may

not be the most appropriate measure for use at our collaborating clinic. Contrariwise, the research

on the PEDI-CAT does support the use of the instrument with a wide age range of children and

adolescents with many diagnoses including ASD. The use of PEDI-CAT has been documented in

the outpatient setting. Therefore the PEDI-CAT is recommended over the WeeFIM.

References

Chen, C. C., Bode, R. K., Granger, C. V., & Heinemann, A. W. (2005). Psychometric properties

and developmental differences in children's ADL item hierarchy: A study of the

WeeFIM® instrument. *American Journal of Physical Medicine & Rehabilitation*, *84*,

671-679.

Chen, C. C., Heinemann, A. W., Bode, R. K., Granger, C. V., & Mallinson, T. (2004). Impact of

pediatric rehabilitation services on children's functional outcomes. *American Journal of

Occupational Therapy, 58,* 44-53.

Coster, W. J., Kramer, J. M., Tian, F., Dooley, M., Liljenquist, K., Kao, Y. C., & Ni, P. (2016).

Evaluating the appropriateness of a new computer-administered measure of adaptive

function for children and youth with autism spectrum disorders. *Autism*, *20*(1), 14-25.

Coster, W. J., Haley, S. M., Ni, P., Dumas, H. M., Fragala-Pinkham, M. A. (2008). Assessing

self-care and social function using a computer adaptive testing version of the pediatric

evaluation of disability inventory. *Archives of Physical Medicine & Rehabilitation, 89*,

622 – 629.

Dumas, H. M., & Fragala-Pinkham, M. A. (2012). Concurrent validity and reliability of the

pediatric evaluation of disability inventory-computer adaptive test mobility domain:

Pediatric Physical Therapy, *24*(2), 171–176.

Dumas, H. M., Fragala-Pinkham, M. A., Haley, S. M., Ni, P., Coster, W., Kramer, J. M., ... &

Ludlow, L. H. (2012). Computer adaptive test performance in children with and without

disabilities: Prospective field study of the PEDI-CAT. *Disability and Rehabilitation*, *34*,

393-401.

Grilli, L., Feldman, D. E., Majnemer, A., Couture, M., Azoulay, L., & Swaine, B. (2006).

    Associations between a functional independence measure (WeeFIM) and the pediatric

    quality of life inventory (PedsQL4. 0) in young children with physical disabilities.

    Quality of Life Research, *15*, 1023-1031.

Haley, S. M., Ni, P., Ludlow, L. H., Fragala- Pinkham, M. A. (2006). Measurement precision

    and efficiency of multidimensional computer adaptive testing of physical functioning

    using the pediatric evaluation of disability inventory. *Archives of Physical Medicine &

    Rehabilitation*, 87, 1223 – 1229.

Haley, S. M., Coster, W. J., Dumas, H. M., Fragala-Pinkham, M. A., Kramer, J., Ni, P., ... &

    Ludlow, L. H. (2011). Accuracy and precision of the Pediatric Evaluation of Disability

    Inventory computer‐adaptive tests (PEDI‐CAT). *Developmental Medicine & Child

    Neurology*, *53*, 1100-1106.

Kao, Y.-C., Kramer, J. M., Liljenquist, K., Tian, F., & Coster, W. J. (2012). Comparing the

    functional performance of children and youths with autism, developmental disabilities,

    and no disability using the revised pediatric evaluation of disability inventory item banks.

    American Journal of Occupational Therapy, *66*, 607–616.

Kramer, J. M., Coster, W. J., Kao, Y. C., Snow, A., & Orsmond, G. I. (2012). A new approach to

    the measurement of adaptive behavior: Development of the PEDI-CAT for children and

    youth with autism spectrum disorders. *Physical & Occupational Therapy in Pediatrics*,

    32(1), 34-47.

Kramer, J. M., Liljenquist, K., Ni, P., & Coster, W. J. (2015). Examining differential responses

    of youth with and without autism on a measure of everyday activity performance. *Quality

    of Life Research*, *24*, 2993–3000.

Kramer, J. M., Liljenquist, K., & Coster, W. J. (2015). Validity, reliability, and usability of the

      Pediatric Evaluation of Disability Inventory-Computer Adaptive Test for autism

      spectrum disorders. *Developmental Medicine & Child Neurology*, *58(3),* 255-261.

McBride, T. (2015). Neuropsychological scores and WeeFIM cognitive ratings of children with

      traumatic brain injury: A brief report. *Brain Injury*, 1-4.

McCabe, M. & Granger, C. (1990). Content validity of a pediatric functional independence

      measure. *Applied Nursing Research, 3*(3), 120-122.

Niewczyk, P. M., & Granger, C. V. (2010). Measuring function in young children with

      impairments. *Pediatric Physical Therapy*, *22*(1), 42-51.

Ottenbacher, K. J., Msall, M. E., Lyon, N. R., Duffy, L. C., Grander, C. V., & Braun, S. (1997).

      Interrater agreement and stability of the functional independence measure for children

      (WeeFIM™): Use in children with developmental disabilities. *Archive of Physical*

      Medicine & Rehabilitation, 79, 1309-1315.

Ottenbacher, K. J., Msall, M. E., Lyon, N., Duffy, L. C., Granger, C. V., & Braun, S. (1999).

      Measuring developmental and functional status in children with disabilities.

      Developmental Medicine & Child Neurology, *41*(03), 186-194.

Ottenbacher, K. J., Msall, M. E., Lyon, N., Duffy, L. C., Ziviani, J., Granger, C. V., Braun, S.,

      Feidler, R. C. (2000). The WeeFIM instrument: It's utility in detecting change in children

      with developmental disabilities. *Archive of Physical Medicine & Rehabilitation, 81*,

      1317-1326.

Park, E. Y., Kim, W. H., & Choi, Y. I. (2013). Factor analysis of the WeeFIM in children with

      spastic cerebral palsy. *Disability & Rehabilitation, 35,* 1466-1471.

Sperle, P. A., Ottenbacher, K. J., Braun, S. L., Lane, S. J., & Nochajski, S. (1997). Equivalence

    reliability of the functional independence measure for children (WeeFIM) administration

    methods. *American Journal of Occupational Therapy, 51,* 35-41.

Ziviani, J., Ottenbacher, K. J., Shephard, K., Foreman, S., Astbury, W., & Ireland, P. (2002).

    Concurrent validity of the Functional Independence Measure for Children (WeeFIM®)

    and the Pediatric Evaluation of Disabilities Inventory in children with developmental

    disabilities and acquired brain injuries. *Physical & Occupational Therapy in Pediatrics*,

    21(2-3), 91-101.

Involvement Plan

We discussed the next steps of our project with our collaborating clinicians. We first

discussed the idea of documenting the implementation process of the WeeFIM. The clinicians

will become credentialed in administering the WeeFIM by the end of April and begin the initial

pilot in May. The final implementation of the WeeFIM will begin in July. Due to conflicting

timelines and the due date for the finalized project, documenting the trial and implementation of

the WeeFIM is not feasible.

We administered a survey documenting the clinicians' perspective of this change and

anticipated effects on the clinical process. Additionally, we recorded the knowledge translation

of the research we provided them and the implications of implementing a mandated outcome

measure.

There are many contextual factors surrounding the implementation of the WeeFIM. On

an organizational level, the hospital adminstration made the decision to administer the WeeFIM

to clients as a way of measuring patient outcomes and also to justify the effectiveness of therapy

to insurance companies and consumers. Measuring client outcomes may affect the receipt of

payment of therapeutic services from many insurance companies. As outcomes improve the rate

of reimbursement for therapeutic services may increase. The implementation of the WeeFIM not

only affects the organization as a whole but also has an effect on the therapists and the

consumers.

Many changes will need to be made on the departmental level. To facilitate the process of

implementing the WeeFIM, the clinic's Outcome Measures Group (OMG) will need to

coordinate a pilot study. Initially, the hospital administration planned to credential 6-7 therapists

at our collaborating clinician's site and 2-3 therapists at a neighboring outpatient clinic by the

end of April for this pilot project. The credentialing course on the WeeFIM will take about three hours. The OMG estimated that the pilot study will start in May before beginning data collection on the WeeFIM outcomes in July. There are many details that remain unresolved. One of the major questions is who will be evaluated using the WeeFIM. Will all new clients entering therapy be evaluated? What about clients undergoing reevaluation or clients who have been receiving ongoing services?

Change will also occur at the individual level. Now that the WeeFIM is a mandatory outcome measure, each therapist will have to make a significant adjustment for how she/he prioritizes additional assessments during the evaluation process. Therapists will also have to validate the use of the mandatory assessment in their documentation for each client.

We gathered data via a six-question, open-ended survey on clinician perspectives on the use of mandated outcome measures given to three OTRs in the OMG. We evaluated the following:

1) What do you perceive as the advantages of administering the WeeFIM to every client you evaluate?

2) What do you foresee as the challenges (or: disadvantages) of using the WeeFIM?

3) Will administering the WeeFIM change your initial evaluation approach? your outcome (re-evaluation) plan? If so, could you please describe how?

4) How will you measure skills and track outcomes for performance issues not captured by the WeeFIM (sensory issues, social skills)?

5) What effects do you think using the WeeFIM will have on the OT process at your facility?

6) Has the information in our CAT report increased your understanding of the assessment issues involved with clients of varied diagnoses? If so, could you please describe how?

Tasks/Products and Target Dates:

Task/Product (1a-f above)	Deadline Date	Steps w/ Dates to achieve the final outcome
Documented the process of knowledge translation by the practitioners	4/14/2016	Asked clinicians if they would be willing to participate in a survey
	4/20/2016	Provided clinicians one week to fill out and return surveys through email.
	4/22/2016	Analyzed clinician survey responses
Final Project	5/2/2016	Submitted Final Project
	5/6/2016	Met with Chair

After receiving the data, we summarized clinician responses and identified common themes or trends to better understand changes to clinical reasoning. Using models of implementation, we reflected upon the organizational factors that influence knowledge translation. The impact these changes have on the OT process was evaluated and reported in our final paper.

Knowledge Translation Activities and Products

MacDermid and Graham (2009), articulated the two extremes of a dilemma that clinicians face. Relying on generalized opinions or personal skilled observations alone to guide best practice can lead to inaccurate and false conclusions. However, it is also unrealistic for one to expect to only use high quality evidence to make clinical decisions. One reason for this is that high quality studies may not have been conducted and the evidence for or against a clinical protocol does not yet exist. The absence of evidence does not equate to false practice. However, clinicians are charged with using the best available evidence to support their process, while integrating the less discernible information such as patient and clinician values, experiences, and

expertise within their practice. "Knowledge translation is optimized when research informs practice and practice informs research" (MacDermid & Graham, 2009, p. 127).

In order to implement evidenced based practice, the knowledge extracted from the literature must be put into action within the clinical setting. To conceptualize our process of knowledge creation and knowledge translation of the literature review of the WeeFIM and PEDI, we adapted the Knowledge Translation Access Process model by MacDermid and Graham (2009). The model provides a visual representation of the steps taken to translate knowledge and overcome unforeseen challenges (see Figure 1). The inverted triangle at the center of the model illustrates the initial three-step process of knowledge inquiry, knowledge synthesis and the development of a product or final recommendation. Our first step of the triangle was to gather knowledge on the WeeFIM and PEDI. The second step was to synthesize the psychometrics of the outcome measures and their relevance for the collaborators' setting and population. The third step was to present our recommendation for the PEDI based on the evidence supporting its use with the ASD population.

The second part of the model illustrates the process of knowledge translation through the 8 steps of the "action cycle", the steps taken to implement evidenced based practice. The 8 steps of the action cycle include, identifying a challenge, adapting knowledge to the collaborators' clinical setting, assessing barriers to knowledge use, selecting and tailoring the process, monitoring the use of knowledge, evaluating the outcomes, and sustaining the knowledge use or repeating the cycle until evidenced based practice is achieved.

Step 1 of the action cycle identifies a clinical challenge defined by our collaborating clinicians that led to the gathering of knowledge resources. Collaborators identified a need for a strong outcome measure that could be used universally among diagnoses. Step 2: We applied the

evidence gathered to our collaborating clinicians pediatric outpatient setting with a primary

patient population of ASD. An absence of ASD diagnoses were discovered in our review of the

literature on the WeeFIM, thus the PEDI was recommended. Evidenced-based practice only

works when the evidence found is then enacted in clinical practice. However, this is not always

a straightforward or linear process and there can be unforeseen challenges and barriers that arise.

Step 3: Three primary barriers were identified: Pressure was placed on the institution by third

party payers and the Affordable Care Act to use a benchmarked measure to provide standardized

outcomes as evidence of high quality cost effective treatment. Second, hospital administrators

had already initiated the purchase to the WeeFIM prior to our recommendations. Last, high

productivity demands and limited time allotted for evaluations increases pressure on the therapist

to prioritize administered assessments over skilled observation. Step 4: The clinicians identified

ways to augment the evaluation process by using additional assessments that are more applicable

for the ASD population. Step 5: Clinicians will implement a pilot study for the WeeFIM to work

through problems before administering the WeeFIM throughout the entire practice. Step 6:

Clinicians will evaluate the effectiveness of the use of the WeeFIM as a universally used

standardized measure. Step 7: Clinicians will use feedback from the pilot and the data collected

and make adjustments to support the use of the WeeFIM as a standardized outcome

measure. Step 8: Clinicians will re-evaluate if the results from the data collection answer the

original question, Is the WeeFIM a strong outcome measure that can be used universally across

diagnoses? The action cycle can be repeated as needed until evidence based practice is achieved.

In order to evaluate clinician perceptions and the effectiveness of knowledge translation,

a survey was given to three collaborating occupational therapists. The three clinicians were

selected based on having received the evidence presented in the CAT about the utility of the

WeeFIM and the PEDI and also based on their knowledge about the occupational therapy

process and the institution's decision to purchase the WeeFIM. The collaborating occupational

therapists responded to the six survey questions (see Figure 2). Five themes were extracted from

the clinicians' responses to survey questions.

Theme 1: *Clinicians perceive the standardization of the assessment process as a*

major benefit of using the WeeFIM as a mandated measure. This theme was very

clearly articulated by all three respondents and is likely the underlying motivation

in asking the original research question.

Theme 2: *Using the WeeFIM could streamline goal writing and increase*

measurability. Some of the benefits cited by Therapist C for using the WeeFIM

included the potential for tracking progress of each patient, and comparing their

facility's data on outcome measures to that of other facilities across the US.

Theme 3: *It may be necessary to augment the WeeFIM with additional measures*

to detect social and sensory performance progress. Therapists A and C reported

the possibility of using additional assessments. Therapist C cited the Sensory

Processing Measure, Social Responsiveness Scale, Goal Attainment Scale and the

PEDI as specific assessments that could be used to evaluate sensory or social

skills. Therapists A and B talked about measuring sensory and social skills by

pairing them with a self-care goal or by tracking outcomes through goal

attainment.

Theme 4: *Many logistical details remain unknown.* Collaborators are in the

planning stage for initiating the pilot study, thus many details have not been

decided. Therapist A stated, "...we have not determined exactly when or who will

be administering [the WeeFIM]... if one therapist will administer the whole thing,

or if each discipline will administer parts. We also have not yet discussed/decided

how often we will re-administer or how this will work into re-evaluation."

Theme 5: *Clinicians used the knowledge obtained in the CAT report to better*

understand strengths/limitations of using the WeeFIM. Therapist B stated, "... we

may need to do our own research to compare [the] WeeFIM to other assessment

tools as the CAT report has found that there is a lack of research in using the

WeeFIM in an outpatient setting." Therapist C stated, "[The CAT Report]

highlighted the need to look at using other assessments for diagnostic groups

(autism, sensory processing difficulties) that the WeeFIM is not strong in

detecting change in."

Figure 1. Knowledge Translation Access Process Model

Adapted from MacDermid & Graham (2009)
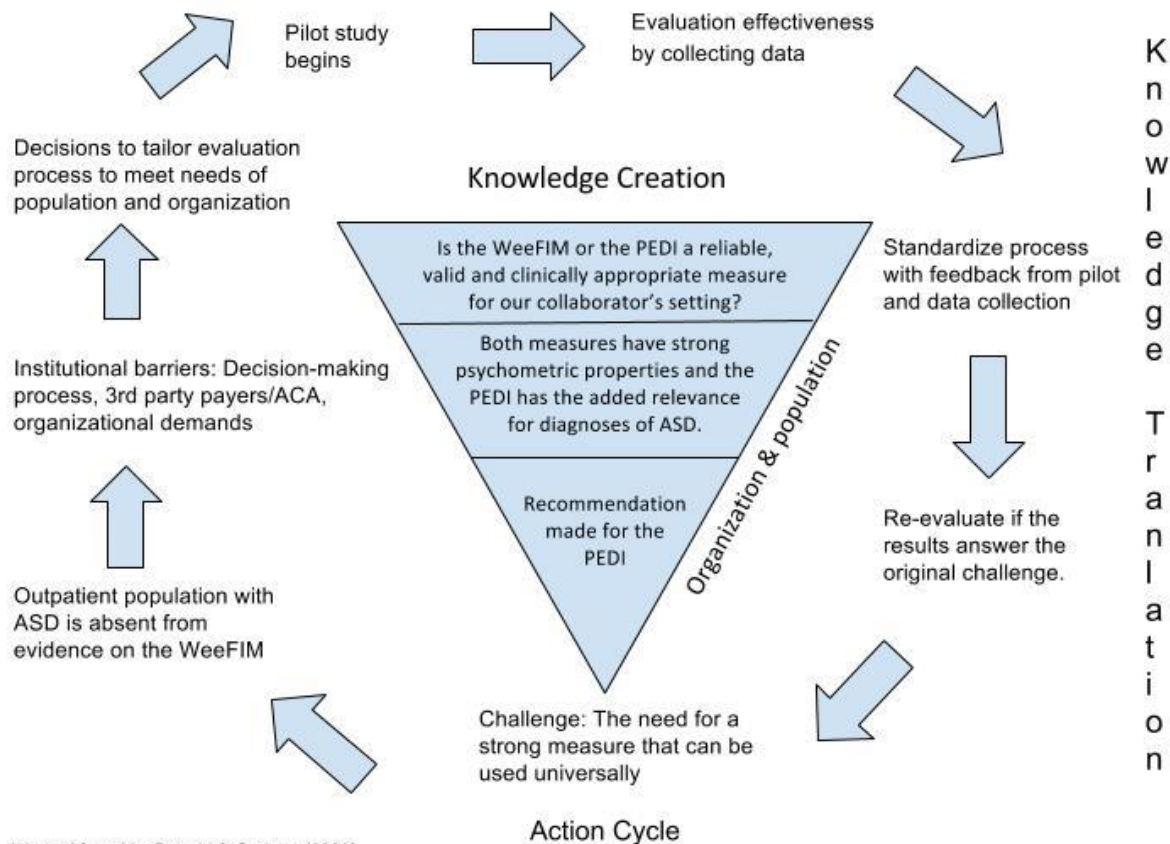
Schedule of Events

Task/Product	Deadline Date	Steps achieve the final outcome
Clinician Interview	9/17/2016	Interview clinicians regarding potential questions.
CAT Proposal	10/01/2016	Finalize PICO question and research strategy.
CAT Table Draft	10/27/2016	Gather applicable research Formulate and synthesize research.
Submit CAT Final	11/17/2016	Submit DRAFT CAT for faculty chair's review.
Clinician Meeting	12/03/2016	Report findings to collaborating clinicians.
Revised and Updated CAT	2/09/2016	Incorporate new findings into an updated version of the CAT.

Interview Clinicians on future involvement	2/23/2016	Meet with clinicians to identify knowledge translation product.
Involvement plan	3/08/2016	Develop strategy to implement knowledge translation project.
Revised Involvement plan	4/14/2016	Incorporate feedback from chair and create updated involvement plan.
Documenting the process of knowledge translation by the practitioners.	4/15/2016	Create survey to address knowledge translation process.
	4/20/2016	Disseminate survey to clinicians with one week deadline for response.
	4/22/2016	Analyze clinicians survey responses through identifying themes and use of knowledge translation model.
Submit Final Thesis.	5/2/2016	Turn in Final Project
	5/6/2016	Meet with Chair

Outcomes and Effectiveness

After submitting and discussing our findings with the clinicians, we monitored their perspectives on using a mandated outcome measure and how they plan on utilizing our findings despite organizational barriers to effective knowledge translation. We issued an anonymous, 6-question, open-ended survey to three OTRs via e-mail to gather qualitative data. We evaluated the following;

Figure 2. Survey Questions

1) What do you perceive as the advantages of administering the WeeFIM to every client you evaluate?

2) What do you foresee as the challenges (or: disadvantages) of using the WeeFIM?

3) Will administering the WeeFIM change your initial evaluation approach? your

outcome (re-evaluation) plan? If so, could you please describe how?

4) How will you measure skills and track outcomes for performance issues not

captured by the WeeFIM (sensory issues, social skills)?

5) What effects do you think using the WeeFIM will have on the OT process at

your facility?

6) Has the information in our CAT report increased your understanding of the

assessment issues involved with clients of varied diagnoses? If so, could you

please describe how?

We collected the responses, combined them into one document, and identified common

themes amongst the responses. With the use of the model of the Knowledge to Action Process

adapted from MacDermid and Graham (2009), we evaluated how the evidence we provided to

the clinicians is expected to be translated into future practice. In addition, we identified the

barriers and supports to the effectiveness of its translation.

There was a major institutional barrier to the effectiveness of the knowledge translation

process of the CAT findings. Our findings suggest the use of the PEDI over the WeeFIM as there

is limited evidence suggesting the utility of the WeeFIM in measuring social constructs, sensory

processing, and with those with ASD, a large population seen by clinicians in this setting.

However, the hospital administration chose to implement the use of the WeeFIM as a mandated

outcome measure for this facility. Despite this decision, knowledge of the limitations of the

WeeFIM with children with ASD was valued by the clinicians. It highlighted the need to tailor

evaluation to the needs of clients that were not met by the WeeFIM. The findings suggested the

importance of using additional measures when evaluating children with ASD and those with

sensory processing disorders in addition to the mandated use of the WeeFIM. One clinician

stated "It highlighted the need to look at using other assessments for diagnostic groups ….that

the WeeFIM is not strong in detecting change in." Another clinician expressed value in

understanding the WeeFIM's strengths and limitations when using it with varied populations.

Clinicians demonstrated the utility and efficacy of the evidence provided from the CAT

by attesting to its strengths and limitations throughout their responses. They verified its strength

as a standardized measure and acknowledged the need to problem solve how to best evaluate

client populations not normally addressed by the WeeFIM.

The gap in literature regarding the WeeFIM's utility in outpatient settings highlighted a need

for further research. The clinicians acknowledged the possibility of collecting data to evaluate

the effectiveness of the WeeFIM in outpatient settings as they begin to pilot its use. Once

implemented, they will evaluate again, with their own data, if the WeeFIM is a strong outcome

measure that can be used universally across diagnoses. Their findings would highlight its

strengths and/or weaknesses in an outpatient setting, ultimately giving rise to better evidence-

based practice.

Recommendations

Many of our recommendations for future projects fit in with the existing plan developed

by our collaborating clinicians.   Their current plan is to proceed with a pilot project. This will

involve select clinicians, credentialed by the WeeFIM, to begin administering the WeeFIM to

select clients so that potential issues can be identified and problems solved before the entire

clinic begins implementation. Incorporating feedback from the pilot could improve

standardization of the evaluation process.   Although this process will long be over before the

following cohort begins work on this project, they may be able to review the evidence for

standardization of evaluation processes and/or the impact of mandated outcome measures on the

OT process. Barriers could be identified and recommendations made to support the clinic to

meet both client and organizational demands.

The clinicians have suggested the possibility of collecting data to develop evidence to

support the use of the WeeFIM in an outpatient setting. This could involve an analysis of how

the WeeFIM measures the functional skills of children with ASD. Succeeding cohorts could be

involved in data analysis so that the clinicians can re-evaluate if the WeeFIM truly is evidence-

based for use in an outpatient setting.

If future projects involve another CAT, students could consider comparison of social

skills or sensory processing measures as our collaborating clinicians have asked for this

information throughout our process and intend to continue use of these measures alongside the

WeeFIM. There may also be a need to review the validity and reliability of patient reported

outcomes versus benchmarked outcome measures administered by a healthcare provider. The

Outcome Measure Group at the Clinic likely has additional questions that can be addressed by

future cohorts.

References

American Occupational Therapy Association. (2015). Occupational therapy code of ethics.

American Journal of Occupational Therapy, *69* (Suppl._3), 6913410030. doi:

10.5014/ajot.2015.696S03.

American Occupational Therapy Association. (2014). Occupational therapy practice framework:

Domain and process (3rd ed.). *American Journal of Occupational Therapy*, *68*(Suppl.

1):S1-S48. doi: 10.5014/ajot.2014.682006

MacDermid, J. C., & Graham, I. D. (2009). Knowledge translation: Putting the "practice" in

evidenced-based practice. *Hand Clinic, 25,* 125-143. doi:10.1016/j.hcl.2008.10.003

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