Test-Retest Reliability and Minimal Detectable Change of the Modified Fresno Test of Evidence Based Practice in DPT Students

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Background:

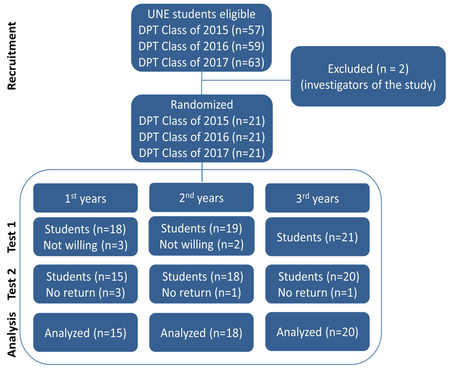
- American Physical Therapy Association identifies the need for Evidence Based Practice (EBP) at every level of education[1] Educators need an assessment tool to evaluate students.
- EBP: thorough and judicious use of the best current evidence in decision making about the care of individual patients[2]
- Modified Fresno Test (MFT): Validated for use with physical therapists to test EBP knowledge. [3]

Purpose:

1. To determine the test-retest reliability and minimal detectable change of the Modified Fresno Test in1st, 2nd, and 3rd year DPT students.
2. To compare mean MFT scores among the three student groups.

Setting and Participants:

UNE campus, Portland, Maine, DPT students with differing levels of EBP exposure.



Protocol:

- 13-item MFT 13: 8 short-answer, 2 math calculations and 3 fill-in-the-blank
- 11-item MFT: 8 short-answer and 3 fill-in-the-blank.
- 2 administrations, separated by 14 days
- 60 minutes to take the paper and pencil test
- Graded by hand by Michael Fillyaw, EBP expert, using MFT scoring rubric

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Results:

Table 1. Differences between test 1 and test 2 for each class

	1st Year					2nd Year					3rd Year				
	T1		T2		P-value	T1		T2		P-value	T1		T2		P-value
MFT Question (Possible Points)	Mean	SD	Mean	SD		Mean	SD	Mean	SD		Mean	SD	Mean	SD	
1. Form a clinical question (24)	11.1	5.1	12.8	4.8	>0.05	18.8	3.8	18.1	4.4	>0.05	20.2	3.7	18.2	4.7	>0.05
2. Sources of information (24)	15.5	6.6	13.1	4.9	<0.05	8	5.4	6.6	5.1	>0.05	9.6	4.5	7.4	4.9	>0.05
3. Study design (24)	8.6	6.9	6.9	5.8	>0.05	13.2	4.7	13.5	4.7	>0.05	16.7	5.4	12	5	<0.05
4. Search strategy (24)	8.2	2.8	8.7	3.6	>0.05	18.3	5.2	16.6	6.1	>0.05	16.3	4.7	15.6	5.1	>0.05
5. Relevance of study (24)	7.5	5.9	10.8	5.2	>0.05	12.4	5.8	9.9	4.5	>0.05	11.8	4.9	12	7.2	>0.05
6. Validity of study (24)	7	6.2	4.4	4.4	<0.05	8.2	6.8	5.9	5.3	>0.05	4	4.2	3.9	5.2	>0.05
7. Magnitude, significance of study (24)	3.9	2.8	3.6	3.2	>0.05	5.9	5.6	7.5	4.4	>0.05	7.6	4.8	7	4.9	>0.05
8. Questions for patient/family (8)	3.4	2.3	2.2	1	<0.05	2.6	1.5	3.1	1.6	>0.05	3	2	2.4	1	>0.05
10. Sensitivity, PPV, LR (12)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	1.4	2.3	1.3	1.8	>0.05
11. RR, NNT, p-value (16)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	3.5	2.1	5.4	2.6	<0.05
12. Confidence Interval (4)	0.0	0.0	0.0	0.0	>0.05	0.9	1.7	0.9	1.7	>0.05	1	1.8	2.4	2	<0.05
13. Best study design - diagnosis (4)	0.3	1	0.6	1.4	>0.05	0.2	0.9	0.2	0.9	>0.05	0.4	1.2	1.6	2	<0.05
14. Best study design - prognosis (4)	1	1.7	0.6	1.4	>0.05	0.4	1.3	0.2	0.9	>0.05	2	2.1	1.4	2	>0.05
MFT total 13-item (224)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	97.3	16.3	90.55	21.4	>0.05
MFT total 11-item (196)	71.8	16.6	65.3	15.1	>0.05	88.9	16.1	82.5	12.4	>0.05	92.5	16.0	83.9	20.2	<0.05

T1= MFT test administration 1; T2= MFT test administration 2; MFT= Modified Fresno Test; MFT total 13-item= sum of questions 1-8; 10-14; MFT total 11-item= sum of questions 1-8, 12-14; SD= standard deviation; PPV=positive predictive value, LR= likelihood ratio; RR= risk reduction; NNT=number needed to treat; NT= not tested

•The only statistically significant difference in mean total scores between test 1 and test 2 was on the 11-item MFT for 3rd year students.

Table 2. Comparison of each question and total score among classes

	1st Years		2nd Years		3rd Years		P-value	Bonferroni Test
MFT Question (Possible Points)	Mean	SD	Mean	SD	Mean	SD		
1. Form a clinical question (24)	12.8	4.4	18.4	4.1	19.2	4.3	0.000	2015≠ 2017; 2016≠2017
2. Sources of information (24)	15.3	5.0	7.3	5.2	8.5	4.8	0.000	2015≠ 2017; 2016≠2017
3. Study design (24)	8.1	6.5	13.3	4.7	14.3	5.6	0.000	2015≠ 2017; 2016≠2017
4. Search strategy (24)	8.9	3.0	17.4	5.7	15.9	4.8	0.000	2015≠ 2017; 2016≠2017
5. Relevance of study (24)	9.6	5.9	11.2	5.3	11.9	6.1	0.274	No differences
6. Validity of study (24)	6.0	5.8	7.1	6.1	4.0	4.7	0.049	2015≠ 2016
7. Magnitude, significance of study (24)	3.8	3.0	6.7	5.0	7.3	4.8	0.004	2015≠ 2017; 2016≠2017
8. Questions for patient/family (8)	2.9	1.9	2.8	1.5	2.7	1.6	0.845	No differences
10. Sensitivity, PPV, LR (12)	NT	NT	NT	NT	1.3	2.0	NT	NT
11. RR, NNT, p-value (16)	NT	NT	NT	NT	4.5	2.5	NT	NT
12. Confidence Interval (4)	0.0	0.0	0.9	1.7	1.7	2.0	0.000	2015≠ 2017
13. Best study design - diagnosis (4)	0.4	1.2	0.2	0.9	1.0	1.8	0.039	2015≠ 2016
14. Best study design - prognosis (4)	0.8	1.6	0.3	1.1	1.7	2.0	0.002	2015≠ 2016
MFT total 13-item (224)	NT	NT	NT	NT	93.9	19.1	NT	NT
MFT total 11-item (196)	68.5	15.9	85.7	14.5	88.2	18.5	0.000	2015≠ 2017; 2016≠2017

MFT= Modified Fresno Test; MFT total 13-item= sum of questions 1-8, 10-14; MFT total 11-item= sum of questions 1-8, 12-14; SD= standard deviation; PPV=positive predictive value, LR= likelihood ratio; RR= risk reduction; NNT=number needed to treat; NT= not tested

•ANOVA: significant difference in mean total score for the 11-item MFT among three student groups.
•Bonferonni post hoc analysis: second and third year groups were different from the first years.

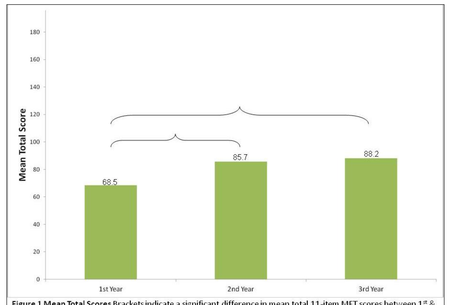

Figure 1 Mean Total Scores Brackets indicate a significant difference in mean total 11-item MFT scores between 1st & 3rd and 1st& 2nd year students.

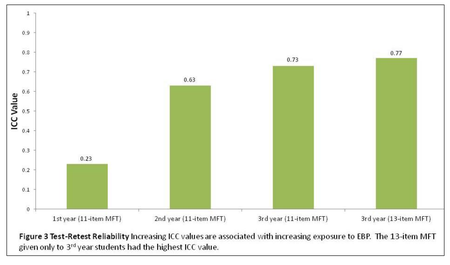

Figure 3 Test-Retest Reliability Increasing ICC values are associated with increasing exposure to EBP. The 13-item MFT given only to 3rd year students had the highest ICC value.

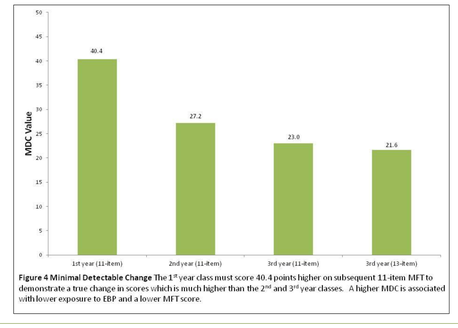

Figure 4 Minimal Detectable Change The 1st year class must score 40.4 points higher on subsequent 11-item MFT to demonstrate a true change in scores which is much higher than the 2nd and 3rd year classes. A higher MDC is associated with lower exposure to EBP and a lower MFT score.

Discussion:

- Mean total MFT scores increase with increased levels of EBP exposure[3]
- No difference between 2nd and 3rd years. This could be due to lack of 3rd year student effort.
- A higher ICC is associated with a higher MFT score.
- 3rd year ICC (0.73) is considered good test-retest reliability. 1st year (0.23) and 2nd year (0.63) ICCs are considered poor to moderate test-retest reliability.[5]
- ICC depends on variability among participant scores and agreement of scores from test 1 to test 2.[5]
- MDC is inversely related to ICC.

Conclusion:

- The 13 and 11-item MFTs have good test-retest reliability for UNE's 3rd year DPT students.
- The 11-item MFT exhibited poor to moderate test-retest reliability for 1st and 2nd year DPT students.
- Of the 3 classes, 1st year UNE DPT student's had largest MDC. To show meaningful change, a 1st year must score 40.4 points higher or lower. In comparison, 3rd year a student must score 23.0 points higher or lower.
- Future research is needed to assess the test-retest reliability of the validated 13-item MFT for students in the 1st and 2nd year classes of a DPT program.

References:
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