Indications for and Use of the Executive Function Performance Test-Enhanced (EFPT-e)

Anna E. Boone, MSOT, PhD, OTR/L, FAOTA
Assistant Professor and Chair

Timothy J. Wolf, OTD, PhD, OTR/L, FAOTA
Associate Professor and Chair

Disclosures - Wolf
- Funding support
- Royalties and contracts
  - AOTA Press
  - City of Oslo, Norway
  - Courage Kenny Rehabilitation Institute
  - National Institutes of Health

Disclosures - Boone
- Funding support
  - National Institutes of Health
Cognitive Functional Evaluation (CFE)

- A systematic approach to evaluating the functional impact of cognitive impairments in everyday life activities

**Why Performance-Based Testing (PBT)??**

- Functional cognition
  - How the integration of cognitive processes support performance of meaningful occupations
  - Allows for use of cognitive strategies
  - Can vary based upon task and environmental components
  - Executive processes are heavily drawn upon for activities that are novel and complex
  - Routine, simple tasks performed in a static environment are performed with more automatic behaviors
  - SO... to most effectively measure higher-levels of functional cognition, we must use assessments that mirror the dynamic, complex activities of everyday life (ecological validity)

**Executive Function Performance Test (EFPT)**

- Performance-based assessment of executive function within a simple (1) cooking task, (2) bill pay task, (3) medication management, and (4) telephone use task

- Originally validated in stroke, but has been used in other neurologic populations including Parkinson’s, traumatic brain injury, multiple sclerosis, and schizophrenia
Why do we need an "enhanced" EFPT?

**Executive Function Performance Test-enhanced (EFPT-e)**

- A more complex version of the original EFPT, developed in effort to be more sensitive to mild cognitive impairment
- Shares 3 of the 4 tasks within the original EFPT (cooking, medication management, & bill pay), but added complexity results in increased cognitive load
- Identical scoring methods and hierarchical cueing system
  - Indirect verbal cues > gestural cues > direct verbal cues > physical assist > do for participant

### EFPT tasks

<table>
<thead>
<tr>
<th>Task</th>
<th>Controls</th>
<th>Mild CVA</th>
<th>Moderate CVA</th>
<th>Range of scores</th>
<th>0-25 for each subtest</th>
<th>0-20 for each EF component</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooking**</td>
<td>1.32 (2.8)</td>
<td>2.05 (3.06)</td>
<td>3.37 (1.77)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Using telephone***</td>
<td>0.08 (0.23)</td>
<td>1.38 (2.27)</td>
<td>6.57 (9.99)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medications***</td>
<td>0.62 (1.44)</td>
<td>0.60 (3.34)</td>
<td>5.06 (8.86)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paying bills**</td>
<td>0.23 (0.88)</td>
<td>1.92 (9.19)</td>
<td>4.43 (5.94)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EFPT components</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initiation</td>
<td>0.30 (0.8)</td>
<td>0.83 (1.67)</td>
<td>3.43 (1.14)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organization***</td>
<td>0.13 (0.34)</td>
<td>1.77 (2.03)</td>
<td>6.21 (8.39)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sequencing***</td>
<td>0.36 (1.55)</td>
<td>3.08 (2.90)</td>
<td>8.93 (7.87)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safety and judgment**</td>
<td>0.14 (0.47)</td>
<td>1.32 (2.19)</td>
<td>4.07 (5.67)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Completion**</td>
<td>0.11 (0.49)</td>
<td>0.68 (1.36)</td>
<td>3.57 (5.38)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Floor effect? Sensitive to milder versions of cognitive deficits?**

### EFPT Original vs EFPT-Enhanced

<table>
<thead>
<tr>
<th>Task</th>
<th>Original</th>
<th>Enhanced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooking</td>
<td>Simple oatmeal on the stove</td>
<td>Pasta on the stove</td>
</tr>
<tr>
<td></td>
<td>Requires measurement of four spices</td>
<td>- Additional organizational demands (e.g., retrieval of spices and pasta measurer)</td>
</tr>
<tr>
<td></td>
<td>Noodles and sauce must be done cooking at the same time</td>
<td></td>
</tr>
<tr>
<td>Medication Management</td>
<td>Find and follow the instructions to take 1 medication</td>
<td>Find and sort 6 medications in a weekly pill sorter</td>
</tr>
<tr>
<td></td>
<td>Ignore one distractor bottle</td>
<td>Ignore one distractor bottle</td>
</tr>
<tr>
<td></td>
<td>Ignore two over the counter bottles</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Prospective memory component to take medications as if it were Sunday evening</td>
<td></td>
</tr>
<tr>
<td>Bill Pay</td>
<td>Find and pay two bills</td>
<td>Find and pay all of the bills for the month (six in total) while balancing the checkbook</td>
</tr>
</tbody>
</table>
Psychometric Testing of the EFPT-e

- Cancer-related cognitive impairment (CRCI)
  - Excellent inter-rater reliability (ICC for overall and each subtest > 90)
  - Known-groups validity: moderate effects sizes present between women with breast cancer and community controls on the cooking subscale, total number of cues for cooking, total number of cues for medication management, and overall EFPT-e score
  - Concurrent validity: Little to no relationship with traditional neuropsychological measures

- Mild stroke
  - Currently collecting data

Indications for the EFPT-e

- Individual with suspected cognitive impairment
  - CVA, TBI, SCI, MS, CRCI, Parkinson’s, Alzheimer’s, etc.

- Particularly useful for individuals who score in the mild or cognitively intact range on neuropsychological measures
  - E.g. Montreal Cognitive Assessment score >26

- Goals that are reasonably attainable related to home IADL performance

- Inpatient, outpatient, or community settings

Now...how do we actually do this?
Initial Set-Up

- Manual will soon be available for public use. Email Dr. Wolf for early access.
- A list of needed materials for each task can be found in the manual; all can be bought and stored in a plastic box together.

Pre-Test Questions

- Do you cook? (yes/no)
- Do you use the stove to cook meals? (Yes/No)
- Have you recently made pasta on the stove? (Yes/No)
- Will you be able to make pasta? (by yourself, with verbal guidance, physical assist, won’t be able to do)
- Do you take medication (Yes/No)
- Can you tell me where you keep your medications? (Yes/No)
- When do you take your medicine? (Morning, afternoon, evening, before bed, more than 1x/day, other times)
Pre-Test Questions

Do you use a daily pill box (Yes/No)

Will you be able to take the medicine? (by yourself, with verbal guidance, physical assist, won't be able to do)

Do you pay your bills? (Yes/No)

Does someone help you with your bills? (Yes/No)

Do you know how to use a checkbook? (Yes/No)

Will you be able to pay the bills? (by yourself, with verbal guidance, physical assist, won't be able to do)

Why do we ask these questions???

Administration Principles

• There should not be a conversation during the assessment.

• The administrator must balance between allowing the client enough time to process without allowing them to make a mistake.

• The scripted instructions, hierarchical cueing system, and scoring methods should be used to maintain reliability and validity of the assessment.

Hierarchical Cueing

• Indirect verbal cue

• Gestural cue

• Direct verbal cue

• Physical assist

• Do for participant
Funding support

National Institutes of Health

Hierarchical cueing

Direct vs Indirect verbal cueing...

<table>
<thead>
<tr>
<th>Mistake</th>
<th>Direct verbal cue</th>
<th>Indirect verbal cue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forgot calculator in box</td>
<td>Get the calculator from the box</td>
<td>Is there anything you forgetting?</td>
</tr>
<tr>
<td>Left the spoon on the</td>
<td>Place the spoon on the spoon rest</td>
<td>Is there anything you need to consider?</td>
</tr>
<tr>
<td>hot pot</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Only places a AM/PM</td>
<td>You should place also place the medicine in the PM slots.</td>
<td>Is there another way to do that?</td>
</tr>
<tr>
<td>medicine in the AM</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Executive Function Components

- **Initiation**: The start of a motor activity that begins a task
- **Organization**: Gathering and arrangement of items to facilitate effective/efficient task performance
- **Sequencing**: Proper ordering and execution of steps necessary to complete a task
- **Judgment/Safety**: Use of reason/decision making to avoid physically, emotionally, or financially dangerous situations
- **Completion**: The inhibition of motor performance, driven by knowledge of task completion

---

What executive component category?

- Forgetting the checkbook register in the box
- Continuously washing/drying dishes after all other cooking tasks have been finished
- Staring at the administrator after the instructions have been completed
- Pouring water in the pot without measuring
- Leaving a burner on
### What executive component category?

<table>
<thead>
<tr>
<th>Initiation</th>
<th>Organization</th>
<th>Sequencing</th>
<th>Judgment/Safety</th>
<th>Completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forgetting the checkbook register in the box</td>
<td>Continuously washing/drying dishes after all other cooking tasks have been finished</td>
<td>Pouring water in the pot without measuring</td>
<td>Looking at the administrator after the instructions have been completed</td>
<td>Scoring the clothes in the dryer</td>
</tr>
</tbody>
</table>

### Scoring

- **Subtask scores** (cooking, medication management, and/or bill pay) may be calculated by summing the highest level of cuing required for each of the executive constructs within the task.

- **Overall EFPT-e score** is equal to the cooking subscore + medication management subscore + bill pay subscore.

- **Executive construct scores** may be calculated by summing the highest level obtained for a given executive construct across the three tasks.
  - E.g. Overall initiation score = Cooking initiation score + Medication initiation score + bill pay initiation score
Scoring

<<Insert Scoring Video>>

Cooking subtask

Cooking Instructions for Pasta and Sauce

**Pasta**
- Bring pasta measure water, put % serving of pasta into % cups of boiling water
- Boil pasta for 5 minutes
- Strain water and place pasta in bowl

**Sauce**
- Pour % cup of tomato sauce into pot
- Add % tsp of oregano
- Add % tsp of basil
- Add % tsp of garlic powder
- Add salt and pepper to taste
- Heat pasta sauce on medium heat for 5 minutes, stirring frequently

Cooking

<<Insert Fidelity Cooking Video>>
Common cooking mistakes

• Leaving the spoon in the pot
• Not putting the sauce on medium heat
• Not measuring water
• Heating the sauce before placing the noodles in boiling water
• Incorrect measurement of spices
• Not using the pasta measurer

Medication Management

<<Insert Fidelity Med Video>>

Medication Management
Common medication management mistakes

- Including the asking of the two questions within the time
- Forgetting to take Sunday PM meds
- Trying to take the distractor med
- Thinking they are supposed to take the medicine on an empty stomach

Bill Pay

<<Play Fidelity Video---1 mistake>>

Interpretation

- Amount & type of assistance needed to function safely
- What executive processes are affected and how they influence functional performance
- Capacity for independent functioning
Interpretation

- If client is able to respond appropriate to give cues in the lower level of the hierarchy (indirect verbal, gestural) they will likely respond well to cognitive strategy based interventions:
  - Cognitive Orientation to daily Occupational Performance
  - Multicontext Approach

- If the client is consistently requiring direct verbal cues or higher levels of the cueing hierarchy, a direct skill training approach may be more relevant:
  - Neurofunctional Approach

- Indirect treatment approaches may also be required. Family training regarding the types of cueing required to support performance in client specific tasks/environments may be useful.