IS FALLS RISK AN INDEPENDENT CONTRIBUTOR TO EVERYDAY PROBLEM SOLVING AS MEASURED BY THE EPT IN COMMUNITY-DWELLING SENIORS?

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BACKGROUND
AGING POPULATION

- Aging = ↑ falls risk [1]
- 30% over 65yrs will experience 1 or more falls every year [2]
- Decreased quality of life [3]
- Direct cost of medical care associated with falls in Canada exceeds 2.4 BILLION [3]
FALLS

Risk Factors:
- Increasing age
- Decreased ability to participate in activities of daily living
- Muscular weakness
- Balance problems
- Medications
- Past and current level of physical activity
- Functional limitations
- Visual impairments [2,5-8]

Intrinsic vs Extrinsic [9]
Cognition

- Key risk factor [2]
- Impaired vs normal = 2x risk [2]
- Prospectively predicts falls in community dwelling and nursing home residents [10]
EXECUTIVE FUNCTION

- Definition: higher order cognitive processes that control, integrate and fine tune the more basic mental functions [11-12]
- Sub-processes: set-shifting, working memory, dual tasking, planning, organizing, self-monitoring [11, 13-14]
- Inter-related [13]
- Impaired Executive Functioning without impaired global cognition [11, 15]
Evidence

- Well-established relationship between poor executive function and falls risk among the elderly
  - Nevitt et al. [16]
  - Lord & Fitzpatrick [17]
  - Rapport [18]
  - Further Support [11, 19-20]
GLOBAL EXECUTIVE FUNCTION

- Problem solving [21-22]
- Instrumental Activities of Daily Living (IADLs)[23,21]

Measurement
- Self report [24, 25]
- Observed [24]
EVERYDAY PROBLEMS TEST (EPT)

- Objective, performance-based
- Domains
- Reliability 0.94
- Test-retest reliability 0.94
- Validity:
  - self-ratings of IADLs \( r=0.23, \ p\leq 0.05 \)
  - spousal scoring of IADLs \( r=0.24, \ p\leq 0.05 \) [24, 26]
Purpose

Purpose: examine the relationship between global executive functioning and falls risk
- Determine independent contribution of falls risk to EPT score

Hypothesis: Increased falls risk will correlated with lowers scores on the EPT
Methods
PARTICIPANTS

- Subset of Brain Power Study [27]
- 101 Community-dwelling women
- Age: 65-75
- Inclusion and exclusion criteria
DESCRIPTIVE VARIABLES

- Age
- Years of School
- Global Cognition
- Mood
INDEPENDENT VARIABLE

- Physiological Profile Assessment (PPA) - falls risk [1]
  - 5 validated measures of physiological function
    - Visual contrast sensitivity
    - Proprioception
    - Reaction time
    - Isometric quadriceps strength
    - Postural sway
  - Scores:
    - <0 = low risk
    - 0-1 = mild risk
    - 1-2 = moderate risk
    - >2 = high risk
DEPENDENT VARIABLE

- EPT- global executive functioning [26]
  - Covers 7 domains
    - Medication use
    - Shopping
    - Transportation
    - Meal preparation
    - Telephone use
    - Household management
    - Financial management
  - 42 item multiple choice test given by administrator
  - One point for each correct answer
  - Standardized guidelines and format
STATISTICAL ANALYSIS

- Data was analyzed using SPSS Windows 17.0
- Pearson Product Moment Coefficient
  - EPT, PPA, years of school, age, MMSE, GDS
- Multiple Linear Regression Model
  - To determine independent contribution of falls risk to EPT
  - Variables statistically controlled
RESULTS
DESCRIPTIVE VARIABLES

Table 1. Descriptive Statistics for Descriptors and Outcome Measures of Interest ($N=101$).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean ($SD$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Score</td>
<td>32.7 (6.5)</td>
</tr>
<tr>
<td>Age</td>
<td>69.3 (2.8)</td>
</tr>
<tr>
<td>Years of School</td>
<td>4.8 (1.3)</td>
</tr>
<tr>
<td>Total MMSE Score</td>
<td>28.7 (1.2)</td>
</tr>
<tr>
<td>Geriatric Depression Score</td>
<td>.58 (1.4)</td>
</tr>
<tr>
<td>PPA Score *</td>
<td>.40 (.80)</td>
</tr>
</tbody>
</table>

Table 1 reports the descriptive statistics for our variables of interest. Overall this group of community dwelling senior women had a PPA score of 0.4 indicating a mild falls risk.
**CORRELATION COEFFICIENTS**

- **Table 2. Pearson Product Moment Coefficients Between EPT, Age, Years of School, MMSE, GDS, And PPA**

<table>
<thead>
<tr>
<th>Variables</th>
<th>EPT</th>
<th>Age</th>
<th>Years of School</th>
<th>MMSE</th>
<th>GDS</th>
<th>PPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPT</td>
<td>1.00</td>
<td>-0.147</td>
<td>0.366*</td>
<td>0.388*</td>
<td>-0.044</td>
<td>-0.260*</td>
</tr>
</tbody>
</table>

Table 2 shows the correlation coefficients of those variables included in the multi-variable regression model. Of these variables, years of school, MMSE score and PPA score were significantly associated with EPT score ($p < .01$).
## Linear Regression

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>R²</th>
<th>R² Change</th>
<th>EPT Score</th>
<th>Standardized β</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Unstandardized B (SE)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model 1</td>
<td>.218</td>
<td>.218</td>
<td>-.119 (.219)</td>
<td>-.050</td>
<td>.589</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td>1.38 (.502)</td>
<td>.268</td>
<td>.007</td>
</tr>
<tr>
<td>Years of School</td>
<td></td>
<td></td>
<td>1.55 (5.15)</td>
<td>.292</td>
<td>.003</td>
</tr>
<tr>
<td>Total MMSE Score</td>
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<td>.035 (.442)</td>
<td>.007</td>
<td>.936</td>
</tr>
<tr>
<td>Geriatric Depression</td>
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<td></td>
<td>.022 (.217)</td>
<td>.009</td>
<td>.920</td>
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<tr>
<td>Score</td>
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<td>1.48 (.486)</td>
<td>.287</td>
<td>.003</td>
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<tr>
<td>Model 2</td>
<td>.279</td>
<td>.061</td>
<td>1.51 (.498)</td>
<td>.283</td>
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<tr>
<td>PPA Score</td>
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<td>.017</td>
<td>.846</td>
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<td>-2.08 (.735)</td>
<td>-2.54</td>
<td>.006</td>
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</table>
DISCUSSION
RECAP

- Falls risk independently contributes to global executive function as measured by the EPT
- First study that has examined the independent contribution of falls risk to global executive function in community-dwelling older adults
PAST STUDIES - DIFFERENCES

- Correlation between EPT and GDS
  - We found no significant correlation to exist
  - Cahn-Wiener [28] reported depression as a significant contributor to observed IADL performance
    - We: Excluded participants with clinical depression

- Correlation between EPT and Age
  - We found no significant correlation to exist
  - Marsiske and Willis [29] found age to account for 17% of the variance on EPT
    - We: used a univariate model, Willis used multivariate model
Past Studies-Similarities

- Increased falls risk is associated with decreased executive function
- Consistently recognized in the literature [1,30]
NOVEL FINDINGS

- Even **mild** falls risk is associated with **reduced** everyday problem solving ability
IMPORTANCE

- Decreased score on EPT may represent difficulties performing IADLs [28,31]
- Willis [26] competence in performing IADLs is essential to independent living within the community
- Inability to adequately achieve these tasks of daily living has been associated with: [21,32]]
  - Institutionalization
  - Decreased quality of life
  - Increased mortality
IMPLICATIONS-SCREENING

- Need comprehensive screening for executive functioning when working with seniors
- Earlier identification of those having difficulties managing IADLs
IMPLICATIONS-INTERVENTION

- Currently interventions tend to focus on physical barriers to independence [15]
- However, ability to problem solve is also necessary for independence
- Clinicians need to focus on both the physical and ability to problem solve
LIMITATIONS

- Cross-sectional design therefore unable to establish causality/directionality
  - Current evidence suggests that reduced physical function and cognitive function are co-occurring conditions
- Population: generally healthy community-dwelling female seniors between ages of 65-75
FURTHER RESEARCH

- Establish causality
- More heterogeneous population
- Feasibility of EPT use for clinicians
REFERENCES


Questions