A Cluster Analysis on Cognitive Symptoms of Midlife Women: Racial/Ethnic Differences

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Conflicts of Interests

- The authors declared no potential conflicts of interest.

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A high prevalence rate of cognitive symptoms has been reported among middle women in their menopausal transition.

Little is known about the differences in cognitive symptoms among different racial/ethnic groups of midlife women.

Cluster analyses are known to help identify groups with similar characteristics, which subsequently clarify the association of specific factors to being included in the category.

- Most of the few cluster analyses have been done only by symptoms
- Cluster analyses by people help identify risk groups
Purpose

Aim

To identify the clusters of midlife women by cognitive symptoms.

To examine racial/ethnic differences in the clusters.
Method

♦ Samples-----midlife women (n=1054)
   ▪ Aged 40 to 60 years,
   ▪ Who were able to read and write English, and
   ▪ Who self-identified their ethnic identity as N-H White, Hispanic, N-H African American or N-H Asian.

♦ Sample size (n=1054)
   ▪ The least number of cases for a cluster analysis is no less than $2^k$ cases (k=the total number of variables), but preferably over $5*2^k$. (Formann)
Method

 Instruments

- Questions on background characteristics;
- Questions on health and menopausal status; and
- The Cognitive Symptom Index for Midlife Women (CMW)
  - Adopted from the Midlife Women’s Symptom Index (MSI).
  - Consisted of 20 items on cognitive symptoms.

<table>
<thead>
<tr>
<th>Primary Symptoms</th>
<th>directly reflecting changes in cognitive functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secondary Symptoms</td>
<td>strongly associated with changes in cognitive functions</td>
</tr>
<tr>
<td>Tertiary Symptoms</td>
<td>may influence cognitive functions</td>
</tr>
</tbody>
</table>
Method

♦ Data Collection and Analysis
  - Internet Survey

♦ Data Analysis
  - CMW development
    - Was adopted from the Midlife Women’s Symptom Index (MSI)
    - Items were selected based on a systematic literature review/analysis
    - All 20 items in the CMW were analyzed using the exploratory factor analysis (EFA).
    - A confirmatory factor analysis (CFA) was performed in order to obtain a factor structure that was well-adjusted to the data
Method

♦ Data Analysis

- CMW development
- To identify the clusters of midlife women by cognitive symptoms
  - Three domain scores of cognitive symptoms (primary, secondary, and tertiary symptoms) were included in a hierarchical cluster analysis (HCA).
  - Z scores of the sum of individual domain scores were calculated to standardize continuous variables and identify outliers.
  - Agglomerative schedule and dendrogram helped determine the number of clusters.
  - The data were subjected to K-mean cluster analyses to figure out the final cluster centers.
Method

Data Analysis

- CMW development
- To identify the clusters of midlife women by cognitive symptoms
- To examine racial/ethnic differences in the clusters
  - Individual independent variable was examined using a univariate regression model
  - Only independent variables whose p-values were less than .05 in the likelihood ratio chi-square tests were determined and included in a multivariable regression model
  - Racial/ethnic differences in cognitive symptoms in each cluster were examined using the analysis of covariance (ANCOVA) while adjusting the independent variables that were significantly different among the four racial/ethnic groups in univariate analyses.
Results

Characteristics of the Participants

- Age: 48.97 ± 5.69
- ≥ college degree: 88%
- Not hard to pay basics: 44%
- Married or partnered: 68%
- Had support from families or friends: 32%
- Had children: 51%
- Native Americans: 71%
- Normal BMI: 40%
- Early or late perimenopausal: 53%

Fig 1 Racial/ethnical characteristics of the participants
Results

♦ Factor analyses of the CMW

► EFA: Three factors were explored. The KMO was 0.95, and 56.52% of the variances were explained

► CFA: Chi-Square tests of model fit (1096.41, p=0.00) and Fit indexes (CFI=0.91, TLI=0.90, and RMSEA=0.00)
Results

Fig 2. Clusters of Midlife Women by Cognitive Symptoms

- Cluster 1  (low total symptoms) (17.3%)
- Cluster 2 (the low-moderate total symptom group with high tertiary symptoms) (21.2%)
- Cluster 3 (the high-moderate total symptom group with low tertiary symptoms) (11.7%)
- Cluster 4 (high total symptoms) (49.9%)

Cluster 1  (low total symptoms)
Results

Fig 3. Number of Cognitive symptoms by Clusters

- Total number of symptoms (0-20)
- Primary symptoms (0-8)
- Secondary symptoms (0-9)
- Tertiary Symptoms (0-3)

Fig 4. Severity of Cognitive symptoms by Clusters

- Total severity score (0-100)
- Subtheme 1 severity (0-40)
- Subtheme 2 severity (0-45)
- Subtheme 3 severity (0-15)
Results

♦ Differences in background characteristics among clusters

- Asian ethnicity (OR=0.21), being born in the U.S.(OR=14.70), having access to health care (OR=2.29), and pre- and peri- menopausal status (OR=0.02 and 0.19 respectively) were significantly associated with Cluster 2.

- Being born in the U.S.(OR=17.49), low family income (very hard or somewhat hard to pay basics with family income, OR=2.51 and 1.66, respectively), having access to health care (OR=2.15), and pre- and peri- menopausal status (OR=0.01 and 0.23, respectively) were significantly associated with Cluster 3.

- The lack of social support (social support available at none of the time; OR=5.19), being born in the U.S. (OR=50.84), low family income (very hard or somewhat hard to pay basics with family income,OR=3.36 and 2.15, respectively), poor perceived general health (as unhealthy or don’t know; OR=2.77 and 4.49, respectively), and perimenopausal status (OR=0.18) were significantly associated with Cluster 4.
## Results

### Racial/Ethnic Differences in Cognitive Symptoms by Cluster

<table>
<thead>
<tr>
<th>Clusters</th>
<th>Symptoms</th>
<th>Hispanic M±SD</th>
<th>N-H Asian M±SD</th>
<th>N-H African M±SD</th>
<th>White M±SD</th>
<th>Total M±SD</th>
<th>F*(P)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Numbers of symptoms</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Cluster1</td>
<td>Tertiary symptoms (0-3)</td>
<td>0.49 ± 0.68</td>
<td>0.44 ± 0.64</td>
<td>0.88 ± 0.79</td>
<td>0.70 ± 0.72</td>
<td>0.62 ± 0.73</td>
<td>5.86 (&lt;0.01)</td>
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<tr>
<td><strong>Severity score</strong></td>
<td></td>
<td>1.29 ± 1.80</td>
<td>1.21 ± 1.78</td>
<td>2.35 ± 2.08</td>
<td>1.77 ± 1.92</td>
<td>1.64 ± 1.94</td>
<td>5.35 (&lt;0.01)</td>
</tr>
<tr>
<td>Cluster1</td>
<td>Tertiary symptoms (0-3)</td>
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</tbody>
</table>

a, b < c, d

a < c
Discussion

- **Asians** have lower numbers and severity scores of symptoms than other racial/ethnic groups. 
  - are consistent with those of the existing studies on menopausal symptoms

- **Whites** tended to have total numbers and severity scores of cognitive symptoms that were **similar to or lower** than those of African Americans.

- **Hispanics** have lower total numbers and severity scores of cognitive symptoms compared with **Whites and African Americans**.

Asian and Hispanic midlife women may not be the risk groups to target in terms of cognitive symptoms experienced during menopausal transition.
The racial/ethnic association might become prominent only when midlife women experience secondary and tertiary symptoms these symptoms could be heavily influenced by cultural attitudes related to the symptoms.

Race/ethnic differences may be linked to specific types of symptoms rather than total numbers or total severity scores of cognitive symptoms experienced during the menopausal transition.
Discussion

- The findings on significant differences in employment status, family income, level of social support, country of birth, race/ethnicity, BMI, perceived general health, diagnosed disease, access to health care, and menopausal status among the clusters are consistent with those in the literature.

- Self-reported health and menopausal status are other significant factors that have been reported to influence cognitive symptoms.

Midlife women who are from low socioeconomic status and who are post-menopausal would be the risk groups to target in terms of cognitive symptoms experienced during menopausal transition.
Discussion

- Those who were born in the U.S. were more likely to report cognitive symptoms compared to those who were born outside the U.S. in each cluster.
- Immigrants are a naturally selected group of healthy individuals who are highly motivated/driven

Immigrants would be less likely to have cognitive symptoms compared with non-immigrants
Limitations

- A broad definition of cognitive symptoms was adopted for this study.
- Internet surveys -- participants bias (highly educated and with high income)
- Subjective measurement of cognitive symptoms
- Impossible to interpret possible temporal and/or causal relations
- Clinical meanings of the findings reported in this paper are unclear with the given data
Future Research and Practice

♦ The findings need to be confirmed through further studies with diverse groups of midlife women across countries.

♦ The findings on racial/ethnic differences in the cognitive symptoms could provide a basis for health care providers to identify risk groups to promote better cognitive outcomes.

♦ The findings on significant factors influencing cognitive symptoms in different clusters could provide directions for future development of preventive and/or treatment interventions for cognitive symptoms of midlife women during menopausal transition.
Acknowledge your shortcomings and work to improve them.