Working Memory & Spontaneous Eyeblink Rate: Evidence for Eyeblink Rate as a Proxy Measure of Dopamine Function
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Background
- Dopamine has a variety of functions in the prefrontal cortex & striatum
  - Learning, motivation, addiction
- Research suggests a positive relationship between spontaneous eyeblink rate and dopamine functioning
  - Eyeblink rate recording is inexpensive and noninvasive

Animal Studies
- Studies on nonhuman primates have shown an association between eyeblink rate and PET measures of dopamine

Patient Studies
- Patients with the atypical dopamine levels associated with dopamine-related diseases show corresponding changes in eyeblink rate
  - e.g. schizophrenia, Parkinson’s disease

Pharmacological Studies
- Dopamine agonists and antagonists affect eyeblink rate
  - e.g. cabergoline

Practical Applications
- Diagnosis of dopamine-related disorders
- Assess patient response to drug treatment
- Understanding the effects of individual differences in dopamine on cognitive performance

Present Study

Working Memory & Eyeblink Rate
- Dopamine plays a critical role in working memory
- Working memory performance has been associated with dopamine function in patient, drug, and neuroimaging studies

Objective
- The goal of the present study was to examine the relationship between working memory capacity and eyeblink rate in order to add supporting evidence to the literature that suggests a link between eyeblink rate and dopamine function

Method
- Spontaneous eyeblink rate recording
  - EyeLink 1000 Plus eye tracker
  - Recorded over 1 minute period while participant fixated on a cross

Working Memory Measures
- Verbal Task: Operation Span
- Visuospatial Task: Symmetry Span

Results

Participants
- N = 41, analyses conducted on N = 35 (21 females)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>SD</th>
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<tbody>
<tr>
<td>Age (in years)</td>
<td>18.71</td>
<td>1.61</td>
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<tr>
<td>Eyeblink Rate (per minute)</td>
<td>13.44</td>
<td>9.30</td>
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<tr>
<td>Operation Span (total # correct)</td>
<td>56.42</td>
<td>11.35</td>
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<tr>
<td>Symmetry Span (total # correct)</td>
<td>29.78</td>
<td>7.96</td>
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Figure 1. No linear relationship was found between eyeblink rate and aggregated working memory scores. A larger sample is necessary to show a strong linear or curvilinear relationship.

Implications
- Performance on Operation and Symmetry Span was consistent with previous research
- Results do not currently support the hypothesis that there is a linear relationship between eyeblink rate and working memory scores
- More data are necessary to show possible linear or nonlinear relationships

Future Directions
- Increase sample size
- Additional working memory measures
- Studies relating working memory directly to PET findings

Contact
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