

QEEG Sub-band Patterns Highlighting Visuospatial Vulnerability Across Cognitive Stages In Psychiatric High-risk Older Adults

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YeonJoo nam¹, Mose Hwang², Sungmin Son², JunHo Choi¹, June-ho Seo¹, Kim TaeHui¹.

¹Psychiatry, Wonju severance Christian hospital, Wonju-si, Korea, Republic of

²Industry-Academic Cooperation Foundation of future medicine, Wonju severance Christian hospital, Wonju-si, Korea, Republic of



INTRODUCTION	METHODS										
Cognitive decline in neurodegenerative diseases emerges through heterogeneous functional pathways rather than a single linear process. This heterogeneity complicates the distinction between subjective and objective decline in psychiatric high-risk older adults. This study explores potential QEEG sub-band markers to characterize these stages and improve screening precision.	• Participant - Aged ≥60 - Non-demented - Community-dwelling adults - Psychiatric high risk Patient Health Questionnaire-9≥5 or Generalized Anxiety Disorder-7≥ 5 or Insomnia Severity Index≥ 8 or having a history of psychiatric treatment	- Participant were categorized into 4 groups: <table><tr><td>Objective Decline</td><td>Short Blessed Test (SBT) ≥11</td></tr><tr><td>Spatiotemporal Decline</td><td>SBT < 11 and failed pentagon drawing</td></tr><tr><td>Subjective Decline</td><td>SBT < 11, intact pentagon drawing, and Subjective Memory Questionnaire-General (SMCQ-G) ≥ 2</td></tr><tr><td>control group</td><td>only psychiatric symptoms</td></tr></table>	Objective Decline	Short Blessed Test (SBT) ≥11	Spatiotemporal Decline	SBT < 11 and failed pentagon drawing	Subjective Decline	SBT < 11, intact pentagon drawing, and Subjective Memory Questionnaire-General (SMCQ-G) ≥ 2	control group	only psychiatric symptoms	• Analysis - Eye-closed qEEG sub-band power was analyzed using linear regression adjusted for education, gender, and age. ANOVA with Tukey HSD tests was used to identify inter-group differences. - Given the large variable count and sample size, p < 0.01 was adopted, while values between 0.01 and 0.05 were interpreted as statistical trends.
Objective Decline	Short Blessed Test (SBT) ≥11										
Spatiotemporal Decline	SBT < 11 and failed pentagon drawing										
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control group	only psychiatric symptoms										
RESULTS		DISCUSSION and CONCLUSIONS									
• 337 older adults (65.9% female) • Linear regression - Pentagon Drawing was associated with occipital beta powers (RMT_Oz: β= -0.146; RSMT_Oz: β= -0.144) with marginal trends in P4 alpha/beta clusters. - SMCQ-G was associated with relative low-beta at Pz (RLB_Pz: β= -0.150) and a cluster of absolute powers (alpha, beta, gamma) at C3 (e.g., ALB_C3: β= -0.162) - SBT trends with alpha bands in the left occipital region (RA_O1: β= -0.144; RSA_O1: β= -0.143)	• ANOVA with Tukey HSD - Significant group differences in absolute gamma and high-beta at the C3 regions. Broader statistical trends were noted across CP4, P4, and FT7 regions - AHB_C3, AG_C3, AB_C3 were significantly increased in the Spatiotemporal Decline group compared to both the Subjective Decline group and the Control group. - AT_C3 was significantly increased in the Objective Decline group compared to the Subjective Decline group.	QEEG sub-band patterns may help differentiate subjective and objective cognitive stages in psychiatric high-risk older adults. Subjective complaints correlate with generalized cortical attenuation and decreased parietal low-beta, potentially pointing to a subclinical desynchronization within this specific cohort. Meanwhile, poorer visuospatial performance linearly associates with increased occipital theta, which may indicate impaired visual and dorsal attention processing and thus tentatively highlight visuospatial vulnerability along heterogeneous pathways of cognitive decline.	The significant high-frequency surge observed in the spatiotemporal decline group at the left central region could represent a localized neurophysiological compensation unique to individuals with visuospatial deficits, possibly recruited to sustain deteriorating faculties. In contrast, the objective decline group demonstrates a pattern characterized by a elevation of absolute theta power. Mapping these discrete neurophysiological differences across distinct clinical groups could offer a basis for more informed screening strategies for early cognitive decline, though further validation is required.								