Associations between Motor Abnormalities and Psychotic Symptoms in Non-Help-Seeking Individuals at Risk for Psychosis

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Background Facial and hand motor abnormalities have been found to be associated with psychotic symptoms and serve as effective predictors of psychotic onset in individuals at risk for psychotic onset. However, the existing research has mainly examined dyskinesia. Little is known about the association between parkinsonism, another salient motor problem presented in medication-free full-blown psychotic patients, and psychotic symptoms in at-risk individuals. Therefore, the purposes of this study were to examine (1) the existence of parkinsonism and dyskinesia in the face and the hand in at-risk individuals, and (2) associations of facial and hand motor performance with psychotic symptoms. The motion capture technique was used to objectively and sensitively detect parkinsonism and dyskinesia, which are subtle in individuals in the at-risk stage.

Methods The 16-item Prodromal Questionnaire with a cut-off score of nine was used to identify

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individuals at risk for psychosis from the general population. A total of 15 at-risk people (age = 17.81±3.17 years; seven females) and 21 healthy controls (age = 19.00±2.55 years; nine females) were required to execute the facial task (making posed expression of surprise) and the bimanual task (reaching for and grasping objects on the table by using both hands simultaneously). The Vicon eight-camera optical motion capture system was used to capture trajectories of reflective markers sticked to the right eyebrow and the ulnar styloid process of the participant's right hand when the participant executed the facial and hand tasks. The calculated kinematic variables were normalized movement time and normalized jerk, reflecting parkinsonism (bradykinesia) and dyskinesia. Larger values meant poorer motor performance and more severe parkinsonism and dyskinesia. The severity of psychotic symptoms was assessed using the Positive and Negative Syndrome Scale.

Results Compared with healthy controls, at-risk individuals had larger normalized movement time (face: t = -2.22, p = 0.038; hand: t = -2.04, p = 0.049) and larger normalized jerk (face: t = -2.17, p = 0.047; hand: t = -2.99, p = 0.005). In the total sample, normalized movement time showed a trend of correlation to the total symptoms (face: r = 0.31, p = 0.069; hand: r = 0.29, p = 0.087). Normalized jerk was correlated with negative symptoms (face: r = 0.36, p = 0.032; hand: r = 0.32, p = 0.056) and the total symptoms (face: r = 0.30, p = 0.081; hand: r = 0.46, p = 0.005).

Discussion This study found that at-risk individuals showed both parkinsonism and dyskinesia in the face and the hand. Because these two motor abnormalities are thought to involve different dopaminergic dysregulation in basal ganglia, the co-existence of both motor deficits in the same at-risk sample suggests that the mechanism of dopaminergic malfunction preceding psychotic onset is complicated and needs more investigation. Additionally, we found that parkinsonism appeared to be and dyskinesia was associated with psychotic symptoms despite a small sample size, which supports the neurological hypothesis proposing that motor abnormalities and psychotic symptoms derive from the shared deficits in basal ganglia. Future studies are also needed to examine if parkinsonism could predict psychotic onset in at-risk populations.

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