Age and Improved Attention Predict Work Attainment in Combined Compensatory Cognitive Training and Supported Employment for People With Severe Mental Illness

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Abstract: The objective of this study was to examine whether cognitive change and age predicted work outcome in the context of supported employment (SE) and compensatory cognitive training (CCT) in severe mental illness. Forty unemployed outpatients receiving SE (7 young [20–35 years], 15 middle-aged [36–50 years], and 18 older [51–66 years] patients) completed cognitive assessments at baseline and after 12 weeks of CCT. Logistic regression analyses showed that improvement in attention/vigilance significantly predicted work attainment ($B = 2.35$, SE = 1.16, $p = 0.043$). Young and older participants were more likely to obtain work than middle-aged participants ($B = 4.03$, SE = 1.43, $p = 0.005$; $B = 2.16$, SE = 0.93, $p = 0.021$, respectively). Improved attention and age group (young and old) were associated with better work outcomes after SE + CCT. Improving attention may be an important target for improving work outcome in severe mental illness. Middle-aged individuals may need additional support to return to work.

Key Words: Cognition, vocational outcome, cognitive training

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Cognitive impairments limit vocational functioning in patients with severe mental illness (SMI, including schizophrenia-spectrum disorders, bipolar disorder, and major depressive disorder; McGurk and Mueser, 2004; Tsang et al., 2010). Interventions combining supported employment (SE) with cognitive training seem to improve both cognitive and work outcomes in this population (Bell et al., 2005a; McGurk et al., 2009). However, not all patients obtain work, so identifying predictors of response could help focus therapeutic efforts to improve outcomes. Global cognition, executive functioning, and learning/memory may be modifiable factors that predict vocational outcomes in patients with SMI (McGurk and Mueser, 2006), and cognitive improvements during treatment may better predict work outcome than baseline cognitive functioning (McGurk et al., 2009). From a lifespan perspective, age is another important factor when studying work outcomes in people with SMI (Luciano and Meara, 2014). Although age is not necessarily a barrier to employment (Bell et al., 2005b; Catty et al., 2008; Twamley et al., 2012a) or cognitive training improvement (Bell et al., 2005a; Twamley et al., 2011; Wykes et al., 2009), some studies have shown that age moderates the effect of cognitive training on cognitive outcomes, with younger patients showing greater improvements in cognition than older patients (Bowie et al., 2014; Kontis et al., 2013). Similar results have been found when cognitive training has been combined with SE (McGurk and Mueser, 2008). Work skills assessed by an observer-rated scale seem to improve more in patients who are within their first years of the first-episode psychosis than patients with a more chronic course of the illness (Bowie et al., 2014). However, to our knowledge, the effect of age on work outcomes in job attainment and in the context of combined SE and cognitive training is unknown.

We aimed to explore cognitive changes and lifespan periods as predictors of work outcomes in a combined SE and cognitive training intervention for people with SMI. Given the exploratory nature of the research question and the scarcity of previous literature, we did not have an a priori hypothesis regarding which cognitive changes would be related to work outcomes. With regard to lifespan periods, we hypothesized that younger participants would have better work outcomes.

METHODS

The current study was part of a 2-year randomized controlled trial comparing the effects of SE with and without a 12-week compensatory cognitive training intervention (SE + CCT) in outpatients with SMI. Results regarding age as a moderator of cognitive change within the CCT condition have been published previously (Thomas et al., 2016). The inclusion criteria for the study were as follows: a) *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* diagnosis of SMI, b) unemployed but stating a goal of work, c) age 18 years or older, d) English speaking, and e) no presence of dementia or intellectual disability. Diagnoses were confirmed via comprehensive chart reviews by trained raters. Participants were recruited via clinician referral at the Outpatient Psychiatric Services clinic at the University of California, San Diego, and continued to receive their usual psychiatric care during the trial. All participants gave written informed consent, and the study was approved by the institutional review board. Participants included in the current analysis were those randomized to the SE + CCT group who completed the CCT intervention and for whom work outcome data were available ($n = 40$; 25 with severe mood disorders, 15 with psychosis; mean [SD] age, 47.2 [10.15]; 60% men). Participants received 12 individual 1-hour sessions of CCT from their employment specialist, in addition to SE sessions, during the first 12 weeks of the study. Compensatory cognitive training focuses on compensatory strategy teaching and habit learning in the domains of prospective memory, attention, learning, and executive functioning (Mendella et al., 2015; Twamley et al., 2012b). Compensatory cognitive training is a brief intervention that teaches strategies in the aforementioned domains via interactive, game-like activities to maintain interest and increase focus and motivation. Therapists elicit clients' personal goals and link the strategies taught to their specific goals to enhance intrinsic motivation. Home exercises are assigned to promote habit learning and strategy use in the real world.

Participants were administered an expanded MATRICS Consensus Cognitive Battery (Nuechterlein et al., 2008) at baseline and after CCT (3 months) and followed until 24 months. Work outcome was defined as obtaining a competitive job during the 24-month study. Cognitive predictors included the change between the standardized raw pre- and post-CCT (12-week follow-up) scores in the following cognitive domains: processing speed (Trail Making Test, part A; Symbol Coding), attention/vigilance (Continuous Performance Test–Identical Pairs), spatial working memory (Spatial Span), learning (Hopkins Verbal Learning Test–Revised; Brief Visual Memory Test–Revised), executive functioning (Neuropsychological Assessment Battery–Mazes; Wisconsin Card

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Sorting Test–64-card version [Kong et al., 2000], total correct and perseverative errors; Trail Making Test, B minus A; Letter fluency, FAS), and prospective memory (Memory for Intentions Screening Test, Raskin, 2004). Premorbid IQ was assessed with the Wide Range Achievement Test–III (Wilkinson, 1993). Additional measures included the Positive and Negative Syndrome Scale (Kay et al., 1987) and the Hamilton Depression Rating Scale (Hamilton, 1967).

Participants were grouped into three developmental stages accordantly to the lifespan period: young adults (20–35 years), middle-aged adults (36–50 years), or older participants (51–66 years). Age groups included 7 young, 15 middle-aged, and 18 older participants. Analysis of variance (ANOVA) was used to examine baseline differences among age groups. Logistic regression analyses using forward stepwise entry were conducted with job attainment as the dependent variable and change in cognitive domains, the age group, and the interaction of these variables as potential predictors. Several covariates were included in subsequent logistic regression analyses to control for potential confounders.

RESULTS

No significant differences between age groups were found in any sociodemographic, clinical, or work-related variables beyond the expected differences related to age (Table 1). Regarding baseline cognition, younger participants had higher scores than the both middle-aged and older participants in the global composite score (mean difference = 0.52, $p = 0.018$; mean difference = 0.60, $p = 0.005$, respectively) and in the learning domain (mean difference = 0.89, $p = 0.045$; 0.92, $p = 0.030$, respectively) (Table 1). During the study, 19 participants (47.5%) obtained a job. Regression analysis showed a statistically significant model (chi-square = 16.02, $p = 0.001$) in which variance in job attainment was predicted by improvement in attention/vigilance ($B = 2.35$, SE = 1.16, $p = 0.043$) and age, with younger and older participants being more likely to obtain work compared with middle-aged participants ($B = 4.03$, SE = 1.43, $p = 0.005$; $B = 2.16$, SE = 0.93, $p = 0.021$, respectively). The age group was the first variable introduced in the model and explained a 29% of the variance in job attainment. The final model including both variables explained the 44% of the variance in the outcome. Changes in the other cognitive domains did not add significant predictive value to the model (p's > 0.064), and neither the interaction of change in global cognition with age group nor the interaction of any specific cognitive domain with age group were statistically significant (p's > 0.057), suggesting that age did not have a differential effect on work outcome as a function of change in cognition. The main results were maintained after controlling for baseline differences between groups (global cognition, $p = 0.132$; learning, $p = 0.154$) and other potential confounders such as baseline attention/vigilance ($p = 0.296$) and premorbid IQ ($p = 0.549$). Among clinical variables, diagnostic, baseline depressive symptom severity, and positive and negative symptom severity (p's > 0.456), as well as baseline differences in number of years worked during adult life ($p = 0.862$), were not significant predictors.

DISCUSSION

The main results of this study were that improved attention and age group (younger and older participants) were associated with better vocational outcome in attainment after a combined treatment of SE + CCT. These results, if replicated, could help to tailor vocational interventions in patients with SMI. The results support previous literature showing that cognitive functioning at follow-up is a stronger predictor of vocational outcomes than baseline cognitive performance (McGurk and Mueser, 2006; McGurk et al., 2009). They suggested that improving attention may be an important target. It is known that attention is one of the most important cognitive skills in community and work functioning (Bowie et al., 2008; Green et al., 2000).

TABLE 1. Baseline Sociodemographic, Clinical, Work-Related, and Cognitive Characteristics

	Young Adults, Mean (SD)	Middle-Aged Adults, Mean (SD)	Old Adults, Mean (SD)	F	p
Variables					
Premorbid IQ	106 (6.51)	103.53 (5.63)	106.50 (6.29)	1.03	0.368
Years of education	12.43 (2.44)	13.07 (2.58)	13.61 (1.82)	0.75	0.480
Clinical variables					
Duration of illness, yr	15.86 (6.31)	21.27 (11.0)	34.22 (13.90)	8.06	0.001
No. hospitalizations	3.29 (2.43)	3.07 (2.97)	2 (2.20)	0.99	0.379
Total CPZE	257.14 (252.37)	200 (428.54)	262.96 (654.31)	0.06	0.938
PANSS positive symptoms	13.86 (7.71)	12.73 (4.67)	11.33 (4.81)	0.64	0.532
PANSS negative symptoms	12.14 (3.98)	11.73 (3.92)	13.44 (5.81)	0.53	0.591
PANSS general symptoms	29.29 (9.45)	28.71 (5.01)	27.72 (8.33)	0.13	0.876
HDRS depressive symptoms	15.71 (9.01)	19.40 (8.97)	15.83 (10.15)	0.67	0.519
Work-related variables					
No. years worked during adult life	5.86 (3.63)	14.23 (6.70)	27.19 (11.66)	16.55	<0.001
Months worked in past 5 yrs	23.14 (17.61)	18.71 (17.99)	29.83 (20.79)	1.33	0.277
Cognitive domains[a]					
Processing speed	0.02 (0.29)	−0.08 (0.58)	0.03 (0.48)	0.23	0.797
Attention/vigilance	0.65 (0.53)	0.02 (0.84)	−0.05 (0.81)	2.10	0.137
Spatial working memory	0.57 (0.94)	0.03 (0.67)	−0.28 (0.96)	2.55	0.092
Learning	0.47 (0.47)	−0.42 (0.71)	−0.46 (0.88)	4.12	0.024
Executive functioning	0.06 (0.24)	−0.09 (0.30)	−0.06 (0.25)	0.78	0.465
Prospective memory	0.62 (0.58)	−0.15 (0.94)	−0.26 (0.85)	2.78	0.075
Global composite score	0.40 (0.35)	−0.12 (0.35)	−0.19 (0.44)	6.07	0.005

[a] Standardized raw scores.

CPZE indicates chlorpromazine equivalence; PANSS, Positive and Negative Syndrome Scale; HDRS, Hamilton Depression Rating Scale.

Taking into account that even small changes in cognition may affect functioning when the right cognitive domain is improved (Wykes and Spaulding, 2011), the results suggested that strategies focused in learning to reduce distractions and maintain attention are important skills to teach during CCT. The results also showed that younger and older participants seemed to benefit more from the SE + CCT intervention compared with the middle-aged participants. Previous literature has shown greater improvements in cognition among young patients than in older patients receiving cognitive training alone (Bowie et al., 2014; Kontis et al., 2013) or in combination with SE (McGurk and Mueser, 2008). In addition, work skills assessed by an observer-rated scale seem to improve more in patients who are within their first years of the illness (Bowie et al., 2014). Our results added that the positive effect of being young was also found in work outcomes when CCT is provided with SE. People in their 20s and early 30s are in a critical developmental period in terms of completion of education and starting work and the onset of SMI during this period often interrupts the work trajectory. Thus, it is worthwhile to focus on improving work outcomes in this population. The results also showed that older participants did better than middle-aged participants in work attainment after the treatment. This is important because older people with SMI have the highest rates of unemployment (Luciano and Meara, 2014) and may face specific age-related barriers when searching a job. Previous studies have shown that, although to a lesser extent, older people benefit from cognitive training (Bell et al., 2005a; Kontis et al., 2013; Twamley et al., 2011; Wykes et al., 2009) and can return to work when provided evidence-based SE (Twamley et al., 2012a). Bowie et al. (2014) found that real-world work skills did not improve in patients with more than 15 years of psychosis after CT. However, it has to be noted that the mean age in this study for the "long-term course" group was 45 years, which would correspond to "middle-aged" adults in our study. It may be that compared with those in the middle-aged group, younger individuals have an advantage in being hired, while older individuals may represent a "survivor" cohort of individuals with SMI who are highly motivated to work.

Our study has several limitations; most notably, the small sample size limited the size of the separate age groups. This limitation is relevant given that it is possible that some effects, such as the interactions between age and cognitive domains, were not detectable because of an insufficient statistical power. In addition, our results may not generalize those individuals who receive SE without CCT. Because of the lack of control group, the specific treatment effects of SE and CCT remain unknown and future work should examine this relationship in the context of a control condition. Although most of the selected cognitive measures have low ceiling/floor and practice effects as shown by the MATRICS Consensus Cognitive Battery studies (Nuechterlein et al., 2008), we cannot rule out the possibility that psychometric characteristics influenced the results, especially for measures not included in the MATRICS (*e.g.*, prospective memory). It should also be noted that the results provide information about whether someone obtained work, but did not examine the duration of employment, number of hours worked, or the wages earned. Despite these limitations, our results suggest that improving attention may improve job attainment rates in the context of SE for individuals with SMI and that middle-aged individuals with SMI may need additional support to obtain employment.

CONCLUSIONS

Improved attention and age group (young and old) were associated with better work outcomes after SE + CCT. Improving attention may be an important target for improving work outcome in SMI. Middle-aged individuals may need additional support to return to work.

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DISCLOSURE

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The authors declare no conflict of interest.

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