



Icahn
School of
Medicine at
Mount
Sinai

The Effects of Cigarette-Smoking Behavior and Psychosis History on General and Social Cognition in Bipolar Disorder

¹Ospina, L.H., ¹Russo, M., ¹Nitzburg, G., ¹Cuesta-Diaz, A., ¹Shanahan, M., ¹Perez-Rodriguez, M.M., ¹Mcgrath, M., ¹Levine, H., ^{1,2}Burdick, K. E.

¹Icahn School of Medicine at Mount Sinai; ²James J Peters VA Medical Center, Bronx, NY, USA

ABSTRACT

Background: Several studies have documented the prevalence and effects of cigarette-smoking on cognition in psychosis disorders; fewer have focused on bipolar disorder (BD). The current study assessed the influence of cigarette-smoking on general and social cognition in a BD cohort, accounting for illness features with a focus on psychosis history.

Methods: We assessed smoking status in 105 euthymic BD patients, who completed a comprehensive battery including both social and general cognitive measures. We compared smokers vs. non-smokers on cognitive performance and tested for effects of psychosis history, premorbid intellectual functioning, substance use, and current affective symptoms.

Results: Within the BD non-psychotic subgroup (n = 45), smokers generally outperformed non-smokers; in contrast, for BD subjects with a history of psychosis (n = 41), non-smokers outperformed smokers. This pattern was noted more globally using a general composite cognitive score and on social/affective measures assessing patients’ ability to identify emotions of facial stimuli and solve emotional problems.

Conclusions: Results suggest there may be at least partially divergent underlying neurobiological causes for cognitive dysfunction in BD patients with and without psychosis in relation to cigarette-smoking behavior.

BACKGROUND

•Studies in bipolar disorder (BD) suggest that patients with a history of psychosis are more likely to smoke cigarettes than are those BD patients without psychosis (1, 2), perhaps contributing to a more severe form of the illness and poorer outcome (2 – 4).

•Meta-analytic data (5) reveal that BD with psychotic features is associated with poorer general cognitive performance on certain domains such as processing speed, verbal memory, working memory, and planning and reasoning, than is the non-psychotic subtype of the illness. Studies assessing social cognition in BD patients accounting for psychosis history, however, have been mixed.

•Results assessing the effects of smoking on cognition in BD run counter to what has been generally found in schizophrenia. While smoking has been shown to temporarily improve aspects of cognition in patients with psychotic disorders, no effects (or even impairment) have been observed in BD patients (6 – 8).

•Few, if any, studies have accounted for psychosis history on the effects of cigarette-smoking behavior on measures of general and social/affective processing in BD.

METHODS

•DSM- IV diagnoses were confirmed using the SCID. BD patients were included if they were age 18-65, and met criteria for current euthymia (HAM-D < 15 and CARS-M < 8). Self-reported smoking history was recorded as lifetime smoker or non-smoker.

•The MATRICS (Measurement and Treatment Research to Improve Cognition in Schizophrenia) Consensus Cognitive Battery (MCCB) was used to assay 7 basic cognitive domains: *Processing Speed, Attention, Working Memory, Verbal Learning, Visual Learning, Reasoning, and Social Cognition*. Executive functioning was also assessed using a composite score of the MATRICS Reasoning domain, the Stroop Test, Trail-Making Test Part B (TMT-B), and the Wisconsin Card Sorting Test (WCST).

•Social cognition was measured using the social cognitive domain (MSCEIT) from the MCCB, the Reading the Mind in the Eyes Test (RMET) and a facial emotion recognition task (ERT).

•Separate MANCOVAs (with a Bonferroni correction) were conducted to explore the effect of cigarette-smoking behavior and psychosis history on general and social cognitive measures. Premorbid IQ, substance use, and depressive and manic subclinical symptoms were included as covariates.

Table 1. Demographic Characteristics

	Non-Smoker (n = 33) Mean (SD) or n (%)	Smoker (n = 72) Mean (SD) or n (%)	Statistic (p)
Age	45.94 (10.98)	47.81 (9.73)	t = -0.88 (0.38)
Sex (F)	13 (12.50)	29 (27.90)	χ ² = 0.001 (0.97)
Race (White)	13 (12.40)	23 (21.90)	χ ² = 0.56 (0.46)
Premorbid IQ	100.94 (14.53)	100.76 (14.27)	t = 0.06 (0.95)
CARS-M	2.39 (3.39)	4.04 (4.79)	t = 1.78 (0.08)
HAM-D	8.01 (5.85)	8.20 (6.25)	t = -0.15 (0.88)

RESULTS

Figure 1. Interactions between Smoking Behavior and Psychosis History on General and Social Cognition

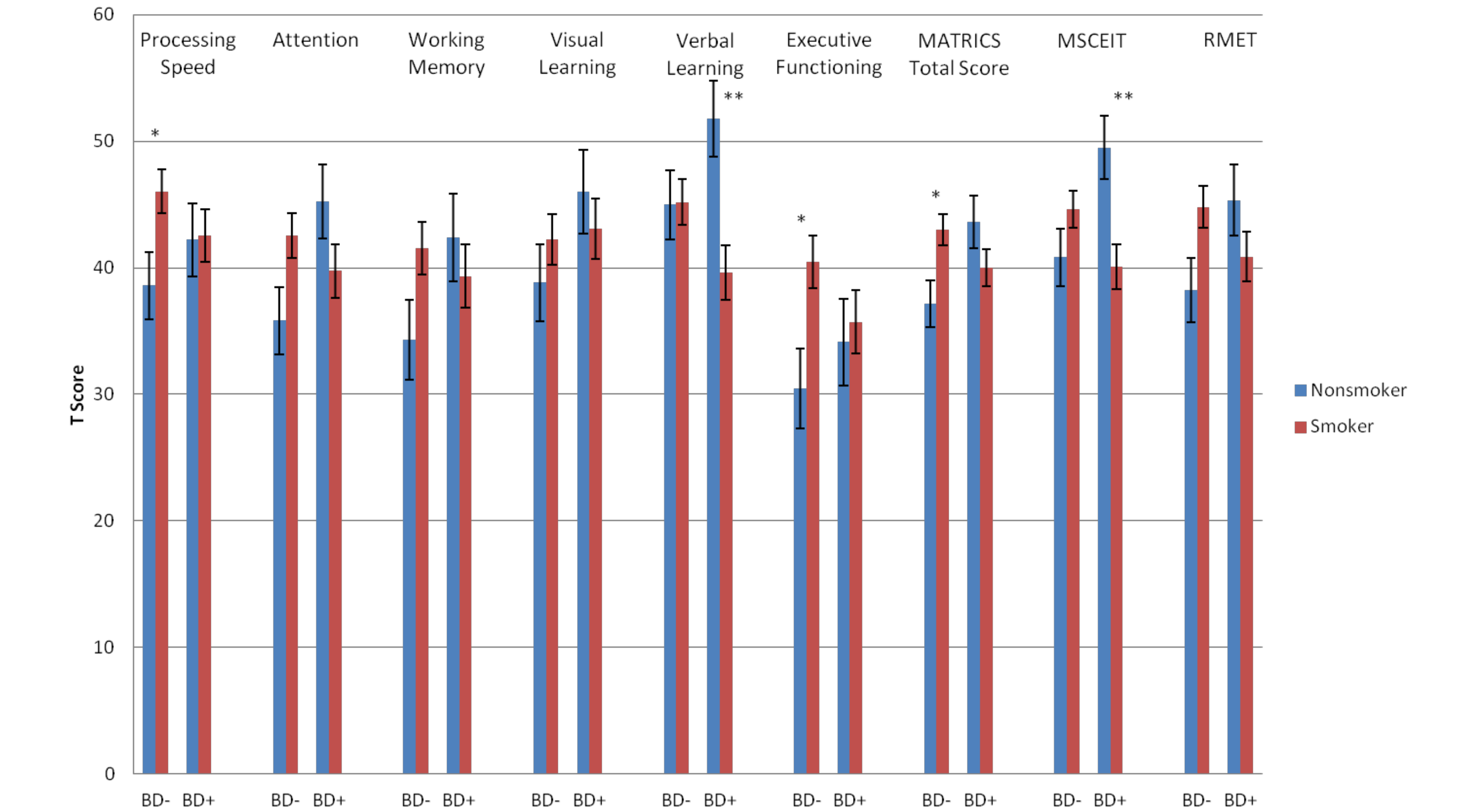
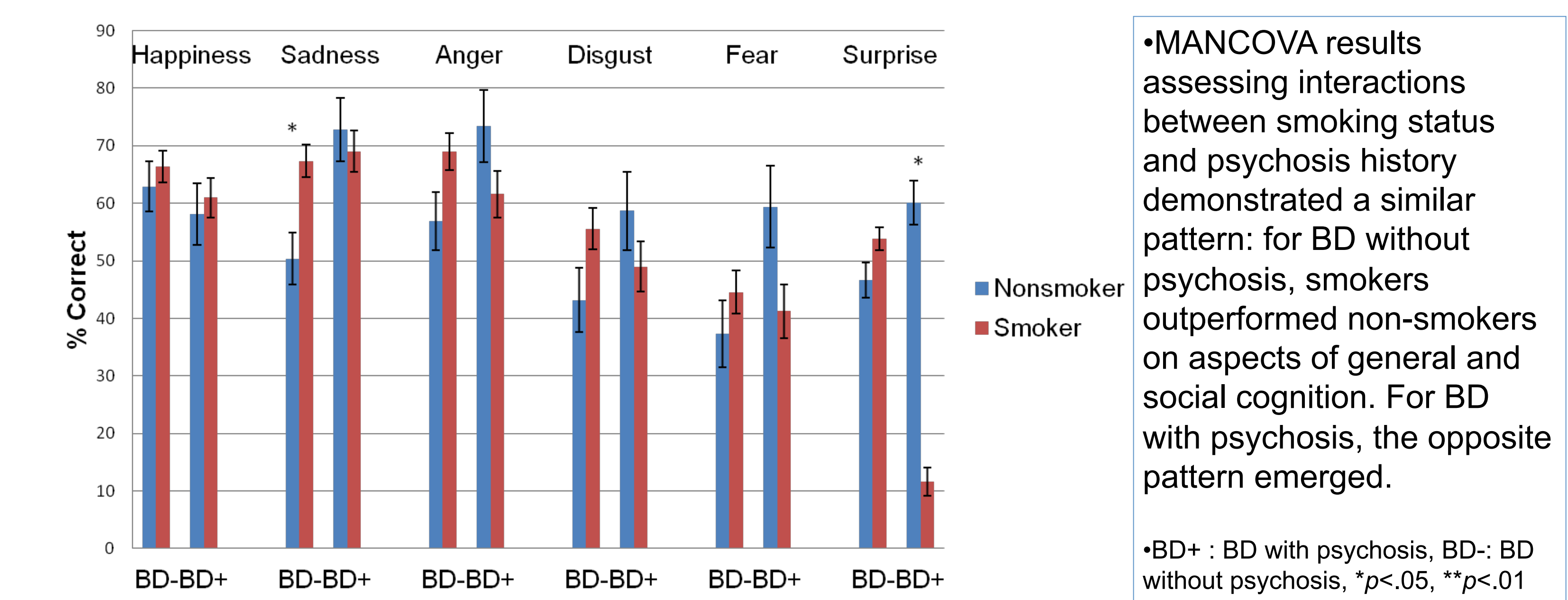


Figure 2. Interactions between Smoking Behavior and Psychosis History on the Emotion Recognition Task



CONCLUSIONS

- The current study demonstrated enhancing effects of smoking on verbal learning, a domain that has not been reported in previous studies.
- Among BD patients without psychosis history, smokers outperformed non-smokers on several aspects of general cognition (i.e., attention, verbal learning, and MATRICS total score) and social processing (MSCEIT, RMET, and recognition of specific facial affective stimuli); the opposite pattern was noted in BD patients with psychosis history, with non-smokers outperforming smokers in these same domains.
- These results point toward a differential cognitive response to regular exposure to nicotine that is at least in part dependent upon psychosis history in BD patients, which suggests underlying neurobiological differences between these subtypes of the disorder.

REFERENCES

1. Waxmonsky JA, Thomas MR, Miklowitz DJ, Allen MH, Wisniewski SR, Zhang H, et al. Prevalence and correlates of tobacco use in bipolar disorder: data from the first 2000 participants in the Systematic Treatment Enhancement Program. *General Hospital Psychiatry*. 2005 Sep; 27(5):321–8.
2. Corvin A, O'Mahony E, O'Regan M, Comerford C, O'Connell R, Craddock N, et al. Cigarette smoking and psychotic symptoms in bipolar affective disorder. *British Journal of Psychiatry*. 2001; 178(JULY):35–8.
3. Oquendo MA, Galfalvy H, Russo S, Ellis SP, Grunebaum MF, Burke A, et al. Prospective study of clinical predictors of suicidal acts after a major depressive episode in patients with major depressive disorder or bipolar disorder. *American Journal of Psychiatry*. 2004; 161(8):1433–41.
4. Goldstein BJ, Birmaher B, Axelson DA, Goldstein TR, Esposito-Smythers C, Strober MA, et al. Significance of cigarette smoking among youths with bipolar disorder. *American Journal on Addictions*. 2008; 17(5):364–71.
5. Bora E, Yücel M, Pantelis C. Neurocognitive markers of psychosis in bipolar disorder: A meta-analytic study. *Journal of Affective Disorders*. 2010 Dec; 127(1–3):1–9.
6. Law CW, Soczynska JK, Woldeyohannes HO, Miranda A, Brooks JO, McIntyre RS. Relation between cigarette smoking and cognitive function in euthymic individuals with bipolar disorder. *Pharmacology Biochemistry and Behavior*. 2009 Mar 31; 92(1):12–6.
7. Morisano D, Wing VC, Sacco KA, Arenovich T, George TP. Effects of Tobacco Smoking on Neuropsychological Function in Schizophrenia in Comparison to Other Psychiatric Disorders and Non-psychiatric Controls. *Am J Addict*. 2013 Jan 1; 22(1):46–53.
8. Depp CA, Bowie CR, Mausbach BT, Wolyniec P, Thornquist MH, Luke JR, et al. Current smoking is associated with worse cognitive and adaptive functioning in serious mental illness. *Acta Psychiatrica Scandinavica*. 2015; 131(5):333–41.

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