



## Self-reported psychotic symptoms predict impulsivity among African-American patients in an urban non-psychiatric medical setting

Michael T. Compton\*, Nadine J. Kaslow

*Department of Psychiatry and Behavioral Sciences, Emory University School of Medicine, Grady Memorial Hospital, Box 26238, 80 Jesse Hill Jr. Drive, SE, Atlanta, GA 30303, USA*

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### Abstract

A variety of epidemiological studies have documented self-reported psychotic symptoms among individuals in the general population. Research has not been conducted on the associations between self-reported psychotic symptoms and enduring personality characteristics, such as impulsivity, among participants in non-psychiatric settings. We hypothesized that impulsivity scores, as measured by the Barratt Impulsiveness Scale (BIS-11), would be predicted partly by the presence of one or more of a variety of positive psychotic experiences, determined by the revised Symptom Checklist-90. The sample consisted of 100 African-American men and women seeking care in medical clinics in an urban public sector hospital. The sample was divided into those participants endorsing one or more of six psychotic symptoms and those not reporting psychotic symptoms. Multiple linear regression models examined predictors of impulsivity (as measured by the BIS-11 total score and the two derived subscales), including the effect of self-reported positive psychotic symptoms. The presence of psychotic symptoms was predictive of the total impulsivity score and the ideomotor impulsivity subscale score, even after adjustment for the effects of other correlates of impulsivity, including gender, homelessness, history of conviction for a misdemeanor or felony, and history of past treatment or hospitalization for psychiatric or substance abuse problems. The findings suggest that there is an important link between the presence of self-reported psychotic symptoms and impulsivity, especially ideomotor impulsivity, in a general sample of low-income African-American men and women seeking ambulatory medical care. Further research on self-reported psychotic symptoms in non-psychiatric populations is needed, as well as research on the personality correlates of such symptoms, including impulsivity.

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\* Corresponding author. Tel.: +1 404 778 1486; fax: +1 404 616 3241.

*E-mail address:* [mcompto@emory.edu](mailto:mcompto@emory.edu) (M.T. Compton).

## 1. Introduction

Several authors have proposed that there is a continuum of psychotic phenomena in the general population, and that only a portion of those endorsing such symptoms meet criteria for a psychiatric illness (Verdoux and van Os, 2002; Johns et al., 2002). Epidemiological studies have supported this notion, finding a much higher prevalence of reported psychotic experiences than diagnosed or diagnosable psychotic illnesses in the general population. Data from the Epidemiologic Catchment Area (ECA) study revealed that the lifetime prevalence of hallucinations was 10% for men and 15% for women (Tien, 1991). In the National Comorbidity Survey (NCS), 28.4% of respondents from the general population answered positively to one or more of the questions exploring psychotic symptoms (Kendler et al., 1996).

In a representative sample of the noninstitutionalized general population of the United Kingdom, Germany, and Italy ( $n=13,057$ ), 0.6% reported daytime auditory hallucinations (Ohayon, 2000). The Netherlands Mental Health Survey and Incidence Study ( $n=7,076$ ) found a prevalence of 8.7% and 6.2%, respectively, for delusions and hallucinations considered “not clinically relevant” (not bothered by it and not seeking help for it); and of the 1,237 individuals with any type of positive psychosis rating, only 2.1% had a diagnosis of a nonaffective psychotic disorder (van Os et al., 2000). In a survey of primary care patients ( $n=790$ ), one out of 10 participants with no psychiatric history reported paranoid delusions (a conspiracy against them), and 16% reported having experienced verbal auditory hallucinations (Verdoux and van Os, 2002). Clearly, population estimates of the prevalence of self-reported psychotic symptoms vary widely, probably related to differences in study samples and differences in the definition, operationalization, and measurement of these experiences.

Little research has been conducted on characteristics associated with self-reported psychotic symptoms among community samples in non-psychiatric settings. Such symptoms may be endorsed more commonly by women, younger people, individuals from lower socioeconomic backgrounds, and those who are single (van Os et al., 2000; Johns et al., 2002; Verdoux and van Os, 2002). Additionally, reports of psychotic symptoms may vary across ethnic groups

(Johns et al., 2002). However, we know of no research on psychotic symptoms in community samples among African Americans in particular.

Although reported psychotic symptoms may be a risk factor for later diagnosis of a psychotic disorder, research also has shown that such positive symptoms may be nonspecific markers of later psychiatric illness, with little diagnostic specificity (Verdoux and van Os, 2002). Self-reported hallucinations were found to predict later psychiatric disorder in a study of adolescents ( $n=914$ ) in The Netherlands in which 5% reported auditory hallucinations (Dhossche et al., 2002). Specifically, self-reported auditory hallucinations increased the risk for a diagnosis of depressive disorders and substance use disorders 8 years later. Psychotic symptoms in the general population also may be associated with lower quality of life (van Os et al., 2000).

Research has yet to be conducted on the associations between self-reported psychotic symptoms and enduring personality characteristics among non-psychiatric populations. One such dimensional personality trait is impulsivity. This characteristic is of importance because it is a risk factor for problematic behaviors, such as aggression and substance abuse. For example, impulsivity was found to be closely correlated with antisocial behavior (including rule breaking, aggression, and vandalism) in a large sample of noninstitutionalized adolescents in Spain (Luengo et al., 1994). Among cocaine-dependent individuals, impulsivity was correlated with average daily cocaine use and substance abuse treatment retention (Moeller et al., 2001). Impulsivity has also been shown to be associated with substance abuse among individuals with schizophrenia or schizoaffective disorder (Dervaux et al., 2001). Additionally, impulsivity has been shown to be a risk factor for suicidal behaviors (Apter et al., 1993; Oquendo and Mann, 2000), including among low-income African Americans (Kaslow et al., 2004). Clearly, impulsivity is a personality trait of importance not only among psychiatric patients, but in the general population as well.

The current study is an analysis of data from 100 African-American men and women seeking care in medical clinics in an urban public sector hospital. The primary goal of this analysis was to ascertain the prevalence of self-reported psychotic symptoms and

to determine if the presence of such symptoms would be predictive of impulsivity scores. Furthermore, we sought to determine whether such an association would persist when controlling for past history of treatment for a psychiatric disorder or substance abuse problem. We hypothesized that impulsivity scores, as measured by the 11th version of the Barratt Impulsiveness Scale (BIS-11), would be partly predicted by the presence of one or more of a variety of positive psychotic experiences, determined by the Symptom Checklist-Revised (SCL-90R), even when controlling for past history of psychiatric or substance abuse treatment. The models were also constructed to control for relevant sociodemographic confounders based on bivariate tests.

## 2. Methods

### 2.1. Participants

Participants included in this analysis ( $n=100$ : 50 men, 50 women) were recruited as controls for a case-control study of individual and social environment risk factors for suicide attempts among low-income African Americans (Kaslow et al., 2004). All control participants were recruited from a large, urban, university-affiliated public hospital that serves a predominantly indigent population. The sample consisted of African Americans, aged 18–64 years, who were seeking medical care in a hospital clinic. Four participants were seeking care in the hospital's family planning/obstetrics clinics, 14 in a women's urgent care clinic, 76 in a general ambulatory urgent care clinic, and six in various other outpatient ambulatory settings. Equal numbers of men and women were recruited. Of the 116 people approached to participate in the control group, 16 (14%) were excluded: eight (7%) due to refusal to participate, six (5%) because of a history of at least one prior suicide attempt, one (0.9%) due to significant cognitive impairment, and one (0.9%) for unspecified reasons.

Participants were recruited by research team members who screened eligible participants, explained the study, and answered questions. Recruitment was conducted at various times of the day on various days of the week. After written informed consent was obtained, screening measures were

administered to determine further eligibility. Once eligibility was verified, the research team member administered questionnaires verbally, due to the relatively low levels of functional literacy in this population (Williams et al., 1995). Data collection consisted of a 3-h face-to-face interview. Data from a variety of measures and rating scales were gathered, including information on depressive symptoms, hopelessness, family and marital functioning, interpersonal violence, social support, spirituality/religious involvement, ethnic identity and coping/attributional style, in addition to the instruments described in further detail below. Participants were reimbursed \$25 for their time.

### 2.2. Measures

A *Demographic Data Form* was used to gather information on basic sociodemographic and clinical characteristics, including age, gender, educational attainment, relationship status, living arrangement, employment status, income, history of conviction for a misdemeanor or felony, gun ownership, and psychiatric/substance abuse treatment history.

The *Symptom Checklist-Revised (SCL-90R)* is a 90-item self-report scale that assesses a wide variety of psychological symptoms (Derogatis, 1992). Instructions state that participants should rate each problem with reference to "how much that problem has distressed or bothered you during the past 7 days, including today." Each symptom is rated with a 5-point Likert scale (0=not at all, 1=a little bit, 2=moderately, 3=quite a bit, 4=extremely). Test-retest and internal consistency reliabilities have been shown to be good (Derogatis et al., 1976; Horowitz et al., 1988). The internal consistency reliability coefficient for the present sample was 0.98 for the global severity index. We were interested in six symptoms in particular, which are listed in Table 1. For statistical analyses, the sample was divided into those participants rating one or more of the six psychotic symptoms with a score of 2 or more ("moderately", "quite a bit", or "extremely"). Because we were primarily interested in narrowly defined positive symptoms that are typically viewed as core elements of psychosis (hallucinations and delusions), we used only the six items shown in Table 1 rather than the more broadly defined psychoticism or

Table 1

Prevalence of psychotic symptoms during the past 7 days, based on scores of 2 (moderately), 3 (quite a bit), or 4 (extremely)

Psychotic symptom	Prevalence in entire sample ( $n=100$ )	Prevalence in sub-sample excluding those with a history of psychiatric or substance abuse treatment ( $n=82$ )
#7: The idea that someone else can control your thoughts	8 (8%)	4 (4.9%)
#16: Hearing voices that other people do not hear	7 (7%)	4 (4.9%)
#35: Other people being aware of (knowing about) your private thoughts	12 (12%)	7 (8.5%)
#43: Feeling that you are watched or talked about by others	25 (25%)	17 (20.7%)
#62: Having thoughts that are not your own	10 (10%)	6 (7.3%)
#68: Having ideas or beliefs that others do not share	17 (17%)	13 (15.9%)
Any of the above psychotic symptoms scored $\geq 2$ (moderately)	37 (37%)	27 (32.9%)
Any of the above psychotic symptoms scored $\geq 3$ (quite a bit)	24 (24%)	18 (22.0%)
Any of the above psychotic symptoms scored 4 (extremely)	14 (14%)	11 (13.4%)

paranoid ideation dimensions that can be scored with the SCL-90R.

The *Barrett Impulsiveness Scale (BIS-11)* is a 30-item questionnaire that assesses the personality trait of impulsivity (Barratt, 1994). The scale consists of 30 statements that are rated on a 4-point Likert scale (1=rarely/never, 2=occasionally, 3=often, 4=almost always/always) without relation to any specific time period (a trait measure of impulsivity). Twelve items are reverse-scored, a design feature to avoid response sets. Higher summed scores for all items indicate higher levels of impulsivity. Table 2 presents all items along with the results of the factor analysis described below. Patton et al. (1995) have shown that the BIS-11 has good internal consistency reliability (Cronbach's alpha values of 0.82, 0.79, and 0.83 among college students, substance abuse patients, and general psychiatric patients, respectively). The internal consistency reliability coefficient for the current sample was 0.75.

We conducted factor analysis of the BIS-11 items from our sample instead of relying on the subscales derived from data from other samples. The factor analysis on the BIS-11 items yielded nine components with eigenvalues greater than one. Only two factors contained more than three items with factor loadings  $\geq 0.40$ , and examination of the scree plot supported the importance of these two factors. The two factors were studied further and were found to contain 15 and 11 items, respectively, with factor loadings  $\geq 0.40$ . Table 2 lists the factor loadings of these two factors, which are labeled the "cognitive" and the "ideo-motor" components. Two items did not load onto

either of these two factors at a cut point of  $\geq 0.35$  (item #13, "I like to think about complex problems"; and item #28, "I am more interested in the present than the future").

Two subscale scores of the BIS-11 were derived based on the factor analysis: a cognitive subscale score and an ideo-motor subscale score. Both of these latent dimensions were found to have approximately normal distributions, and were therefore suitable for further analysis as dependent variables in multiple linear regression models (cognitive subscale:  $n=99$ , mean =  $30.68 \pm 7.2$ , median = 30.0, skewness value = 1.98, kurtosis value = 0.32; ideo-motor subscale:  $n=100$ , mean =  $29.1 \pm 6.2$ , median = 28.0, skewness value = 2.38, kurtosis value = 1.60). The Cronbach's alpha internal consistency coefficients for these two subscales were 0.80 for the cognitive subscale and 0.72 for the ideo-motor subscale.

### 2.3. Data analysis

Descriptive statistics were conducted to examine sociodemographic characteristics of the sample, prevalence of psychotic symptoms reported on the SCL-90R, and scores on the BIS-11. Chi-square tests were used to compare those reporting versus those not reporting psychotic symptoms in relation to sociodemographic variables. More specifically, the sample was divided into those participants rating one or more of the six psychotic symptoms with a score of 2 or more ("moderately", "quite a bit", or "extremely"). Independent sample Student's *t*-tests were conducted to assess differences in BIS-11 scores along socio-

Table 2  
Factor analysis of BIS-11 items for 100 low-income African Americans seeking care in ambulatory/urgent care settings (factor 1: “cognitive”, factor 2: “ideo-motor”)<sup>a</sup>

Item	Factor 1	Factor 2
1. I plan tasks carefully <sup>b</sup>	0.58	
2. I do things without thinking	0.50	
3. I am happy-go-lucky <sup>c</sup>	−0.46	
4. I have racing thoughts		0.38
5. I plan trips well ahead of time <sup>b</sup>	0.58	
6. I am self-controlled <sup>b</sup>	0.63	
7. I concentrate easily <sup>b</sup>	0.76	
8. I save regularly <sup>b</sup>	0.54	
9. I find it hard to sit still for long periods of time		0.35
10. I am a careful thinker <sup>b</sup>	0.68	
11. I plan for job security <sup>b</sup>	0.57	
12. I say things without thinking		0.45
13. I like to think about complex problems <sup>b</sup>		0.45
14. I change jobs <sup>c</sup>		0.37
15. I act “on impulse”		0.56
16. I get easily bored when solving thought problems		0.44
17. I have regular medical/dental checkups <sup>b</sup>	0.40	
18. I act on the spur of the moment		0.49
19. I am a steady thinker <sup>b</sup>	0.61	
20. I change where I live <sup>c</sup>		0.39
21. I buy things on impulse		0.46
22. I finish what I start <sup>b</sup>	0.71	
23. I walk and move fast <sup>c</sup>		0.51
24. I solve problems by trial-and-error		0.47
25. I spend or charge more than I earn		0.52
26. I talk fast <sup>c</sup>		0.43
27. I have outside thoughts when thinking		0.44
28. I am more interested in the present than the future		0.44
29. I am restless at lectures or talks <sup>c</sup>	0.42	
30. I plan for the future <sup>b</sup>	0.68	

<sup>a</sup> Only the greatest factor loadings (all  $\geq$  a cut point of 0.35) in the two factors of interest are shown for each item.

<sup>b</sup> Indicates reverse-scored items.

<sup>c</sup> Indicates items loading onto factors different from the cognitive and ideo-motor factors reported by Barratt (1994) in psychiatric inpatients.

demographic dichotomies (gender, high school completion, single marital status, homelessness, employment status, income less than \$1000 per month, past conviction for a misdemeanor or felony, gun ownership, and past hospitalization or treatment for psychiatric or substance abuse problem). Multiple linear regression models examined predictors of impulsivity (as measured by the BIS-11 total score and the two

derived subscales), including the effect of self-reported positive psychotic symptoms. All analyses were conducted using the *SPSS 11.5* statistical package.

### 3. Results

Table 3 presents the sociodemographic characteristics of the sample. The mean age of participants was  $34.8 \pm 11.2$  years, and 42% had never been married. The sample represents a socially disadvantaged population in terms of educational attainment, employment status, and income. Specifically, nearly half (42%) of the participants did not complete high school, just over half (54%) were unemployed, and 74% reported a monthly individual income of less than \$1000. Furthermore, 40% reported having been convicted of a misdemeanor or felony in the past, and 11% were homeless.

Based on the SCL-90R, the sample reported a relatively high prevalence of positive psychotic symptoms, as shown in Table 1. Seven percent

Table 3  
Sociodemographic characteristics of 100 African Americans attending a medical clinic at a large, urban public hospital

Age	34.8 $\pm$ 11.2
Male gender	50 (50%)
Highest grade completed in school	
• <9th grade	12 (12%)
• 9–11th grade	30 (30%)
• 12th grade	25 (25%)
• >12th grade	33 (33%)
Current relationship status	
• Single, never married	42 (42%)
• Boyfriend/girlfriend, not living together	16 (16%)
• Married	8 (8%)
• Cohabiting but not married	8 (8%)
• Divorced/separated/widowed	26 (26%)
Currently homeless	11 (11%)
Currently unemployed	54 (54%)
Approximate monthly individual income	
• \$0–249	22 (22%)
• \$250–499	15 (15%)
• \$500–999	37 (37%)
• \$1000–1999	21 (21%)
• $\geq$ \$2000	5 (5%)
Ever convicted of misdemeanor or felony	40 (40%)
Gun ownership	10 (10%)
Past hospitalization or treatment for psychiatric problem or substance abuse	17 (17%)

reported being moderately or more bothered by auditory hallucinations (item #16), and 17% reported being moderately or more bothered by “having ideas or beliefs that others do not share” (item #68). The proportions reporting being moderately or more bothered by thought control (item #7), thought broadcasting (item #35), or thought insertion (item #62) were 8%, 12%, and 10%, respectively. Thirty-seven percent reported any of the six psychotic symptoms of interest at the level of “moderately” or above, 24% reported one or more at or above the “quite a bit” level, and 14% reported one or more psychotic symptoms at the level of “extremely.” When excluding those patients with a history of psychiatric or substance abuse treatment, these percentages are attenuated. Nonetheless, 32.9% reported any of the six psychotic symptoms at the level of “moderately” or above, 22% reported one or more at or above the “quite a bit” level, and 13.4% reported one or more psychotic symptoms at the level of “extremely.”

Bivariate statistical tests were performed to compare those with ( $n=37$ ) and without ( $n=63$ ) psychotic symptoms (defined as those reporting being “moderately”, “quite a bit”, or “extremely” bothered by one or more of the six psychotic symptoms of interest) in relation to sociodemographic characteristics. Among the variables shown in Table 3, only two sociodemographic characteristics significantly distinguished those reporting versus those not reporting psychotic symptoms on the SCL-90R: homelessness and ever having been hospitalized or in a treatment program for psychiatric or substance abuse problems. Nine of 36 participants reporting psychotic symptoms (25%) were homeless, compared with only two of 62 (3%) without psychotic symptoms ( $n=98$ ,  $\chi^2=10.84$ ,  $df=1$ ,  $P<0.01$ ; Fisher’s exact test). Ten of 37 participants reporting psychotic symptoms (27%) had ever been in psychiatric or substance abuse

treatment, compared with seven of 62 (11%) without psychotic symptoms ( $n=99$ ,  $\chi^2=4.04$ ,  $df=1$ ,  $P<0.05$ ). No other sociodemographic characteristics distinguished those reporting from those not reporting psychotic symptoms. Independent samples Student’s *t*-tests were used to compare the mean BIS-11 scores according to sociodemographic dichotomizations. Four sociodemographic characteristics were associated with mean total BIS-11 score: gender, homelessness, past misdemeanor or felony conviction, and past psychiatric/substance abuse treatment. Table 4 presents these data.

A multiple linear regression was conducted to determine the extent to which the BIS-11 score could be predicted by the presence of self-reported psychotic symptoms. Gender, homelessness, history of conviction for a misdemeanor or felony, and past history of psychiatric or substance abuse treatment also were entered into the regression as independent variables because these characteristics were significantly associated with BIS-11 scores in the bivariate analyses described above. Scores on the BIS-11 were distributed normally ( $n=99$ ; mean =  $66.7 \pm 9.2$ ; median = 66.0; skewness value = 0.23; kurtosis value = 1.93). The linear regression model was significant ( $F=5.82$ ;  $df=5,91$ ;  $P<0.01$ ), with a coefficient of determination ( $R^2$ ) of 0.24, indicating that 24% of the variation in BIS-11 scores can be explained by differences in the five independent variables of interest. As shown in Table 5, of the five independent variables, only self-reported psychotic symptoms and history of conviction were significant unique predictors in the model. In a simple linear regression containing only self-reported psychotic symptoms, the  $R^2$  was 0.13; and in a multiple linear regression containing the four covariates (gender, homelessness, history of conviction for a misdemeanor or felony, and past history of psychiatric or

Table 4  
Significant differences in BIS-11 scores according to sociodemographic dichotomizations, independent samples Student’s *t*-test

Variable	Sample sizes, mean scores $\pm$ SD		<i>t</i>	<i>df</i>	<i>P</i>
Gender	Men ( $n=49$ ): 67.2 $\pm$ 11.5	Women ( $n=50$ ): 63.0 $\pm$ 8.3	2.10	87.5*	0.038
Homelessness	Yes ( $n=11$ ): 72.9 $\pm$ 12.6	No ( $n=86$ ): 64.1 $\pm$ 9.5	2.79	95	0.006
Past conviction	Yes ( $n=40$ ): 68.7 $\pm$ 9.6	No ( $n=58$ ): 62.5 $\pm$ 9.9	3.09	96	0.003
Past psychiatric or substance abuse treatment	Yes ( $n=16$ ): 70.2 $\pm$ 10.8	No ( $n=82$ ): 64.0 $\pm$ 9.8	2.27	96	0.025

\* Equal variances not assumed for this comparison.

Table 5  
Multiple linear regression model with BIS-11 score as the dependent variable

	Unstandardized coefficients		Standardized coefficients	<i>t</i>	<i>P</i>
	<i>B</i>	<i>SE</i>	$\beta$		
(Constant)	60.23	2.11		28.53	0.001
Psychotic symptoms	6.62	2.11	0.32	3.14	0.002
Gender	−0.60	2.12	−0.03	−0.28	0.778
Homelessness	2.90	3.25	0.09	0.89	0.375
History of conviction	4.62	2.25	0.22	2.05	0.043
History of psychiatric/substance abuse treatment	2.94	2.59	0.11	1.14	0.259

substance abuse treatment) without the predictor of interest (psychotic symptoms), the  $R^2$  was 0.16.

A multiple linear regression was conducted with the BIS-11 cognitive subscale score as the dependent variable and the following independent variables: presence of psychotic symptoms, gender, homelessness, history of conviction for a misdemeanor or felony, and past history of psychiatric or substance abuse treatment. This linear regression model was significant ( $F=4.71$ ;  $df=5,91$ ;  $P<0.01$ ). The only significant unique predictor was a history of conviction for a misdemeanor or felony ( $P<0.01$ ). The linear regression model of the BIS-11 ideomotor subscale score also was significant ( $F=3.51$ ;  $df=5,92$ ;  $P<0.01$ ), with a coefficient of determination ( $R^2$ ) of 0.16, indicating that 16% of the variation in BIS-11 ideomotor subscale scores can be explained by differences in the five independent variables of interest. Among these variables, only the presence of psychotic symptoms was a significant predictor in the model ( $\beta=0.35$ ,  $t=3.34$ ,  $P<0.01$ ).

#### 4. Discussion

We found that the presence of self-reported positive psychotic symptoms was predictive of impulsivity scores in a sample of low-income African Americans receiving care in ambulatory medical settings of a large, urban, public hospital. This association remained significant even when controlling for other correlates of impulsivity, including gender, homelessness, history of conviction for a misdemeanor or felony, and history of past treatment or hospitalization for psychiatric or substance abuse problems. We know of no other research that docu-

ments an association between self-reported positive psychotic symptoms and impulsivity among non-psychiatric participants. Impulsivity is a personality trait of particular importance in relation to certain maladaptive behaviors. Impulsivity has been associated with antisocial behavior (Luengo et al., 1994), irritability and reactive aggression (Seroczynski et al., 1999), severity of substance abuse (Moeller et al., 2001), and suicidal behavior (Apter et al., 1993; Kaslow et al., 2004).

The prevalence of psychotic symptoms reported in our convenience sample of patients attending medical clinics was not drastically dissimilar from rates documented in previous studies conducted with participants from the general population. For example, a study from The Netherlands (van Os et al., 2000) found a prevalence of 6.2% for hallucinations considered “not clinically relevant” (not bothered by it and not seeking help for it), which is comparable to the 7% reported prevalence of verbal auditory hallucinations in our sample. After exclusion of those with a history of psychiatric or substance abuse treatment, the prevalence of auditory hallucinations in our sample was 4.9%. Unfortunately, few studies have examined the issue of self-reported psychotic symptoms in non-psychiatric populations, especially psychotic symptoms other than hallucinations and paranoid delusions, such as thought insertion and other passivity phenomena.

Reports of psychotic symptoms may vary across ethnic groups. The prevalence of reported hallucinations was examined in a population-based survey in England and Wales comparing members of ethnic minority groups ( $n=5196$ ) to a sample of Caucasian respondents ( $n=2867$ ). In response to the question, “Over the past year, have there been times when you

heard or saw things that other people couldn't?", 9.8% of Caribbean participants endorsed hallucinatory experiences, compared with 4.0% of Caucasian respondents and 2.3% of those from South Asian ethnic groups. We are not aware of any published data on the prevalence of self-reported psychotic experiences among low-income African Americans.

The BIS-11 scores in our sample were similar to previous studies. Patton and colleagues reported a mean score of  $63.8 \pm 10.17$  among college undergraduate students ( $n=412$ ), which is similar to the mean score found in our sample ( $65.1 \pm 10.19$ ). Unfortunately, we know of no prior documentation of BIS-11 scores among individuals from a socio-demographically similar population (socially disadvantaged African Americans in an urban setting). However, our mean score among those reporting a past history of treatment or hospitalization for a psychiatric or substance abuse problem was  $70.2 \pm 10.8$ , which is comparable to the  $71.4 \pm 12.6$  reported in 248 general psychiatric patients (Patton et al., 1995).

In our sample, we discovered two components of the BIS-11 that were remarkably similar to two of the three components evident among BIS-11 scores from a group of psychiatric inpatients ( $n=92$ ) reported by Barratt (1994). Specifically, he found a factor containing cognitive items combined with planning ahead/stability of life items, an *ideo-motor* factor, and a third factor containing only three items. Twelve of the items predominantly loading onto our "cognitive" factor are the same as those loading onto the cognitive factor described by Barratt (the exceptions being item #3, "I am happy-go-lucky", which did not load onto any of his factors, loaded onto our "cognitive" factor; item #29, "I am restless at lectures and talks", which loaded onto his *ideo-motor* factor, loaded onto our "cognitive" factor; and item #14, "I change jobs", which loaded onto his cognitive factor, loaded onto our "ideo-motor" factor). Ten of the items predominantly loading onto our "ideo-motor" factor are the same as those loading onto Barratt's *ideo-motor* factor (the exceptions being item #20, "I change where I live", which loaded onto our "ideo-motor" factor, did not load onto any of Barratt's three factors; item #23 "I walk and move fast", which loaded onto our "ideo-motor" factor, loaded onto Barratt's third factor; and item #26, "I talk fast", which

loaded onto our "ideo-motor" factor, loaded onto Barratt's third factor).

There may be several potential interpretations of the finding of an association between self-reported psychotic symptoms and impulsivity in general, and an *ideo-motor* component of impulsivity in particular. First, there may be neurobiological explanations for the association. Impulsivity may be related to frontal lobe executive functions and parietal lobe sensory integration functions (Barratt, 1994), which may also be involved in the pathophysiology of positive psychotic symptoms. A recent diffusion tensor imaging study documented that inferior frontal white matter microstructure was associated with impulsivity, particularly motor impulsiveness measured by the BIS-11, in 14 men with schizophrenia (Hoptman et al., 2002). Furthermore, impulsivity appears to be an independent neurocognitive dimension among the impairments known to exist in patients with schizophrenia. Friis et al. (2002) found that among 219 stabilized first-episode psychosis patients, impulsivity (measured by false alarms and reaction time on the continuous performance task) was one of five distinct dimensions derived from a variety of neuropsychological tests.

A second interpretation of the association may be that important variables not assessed in this study account for the association. For example, those with higher levels of impulsivity are more likely to engage in substance abuse, and one could speculate that such behavior may contribute to the psychotic symptoms reported among the more impulsive participants. Finally, we cannot exclude the possibility that the association between self-reported psychotic symptoms and impulsivity scores may be a measurement artifact related to the reporting style of those with greater impulsivity. Cognitive functions may be disturbed in those with higher levels of impulsivity, such as rapid subjective experiences of thought processing (Barratt, 1994), which may be associated with perceptual misjudgments that may lead to reports of hallucinations or delusions.

Though very interesting, these findings should be interpreted carefully in light of several methodological limitations. First, our assessments of psychotic symptoms and impulsivity were operationalized by means of researcher-administered self-report questionnaires. The self-report nature of the data, which

was not followed by detailed diagnostic assessment, may overestimate or underestimate the prevalence of true hallucinations and delusions. Self-report data also can be biased by the effects of social desirability and by social stigmatization associated with psychiatric symptoms and illnesses. Regarding the measurement of impulsivity, however, the BIS-11 is widely accepted as a valid and reliable measure of trait impulsivity, regardless of its self-report nature. A second study limitation relates to the cross-sectional study design. Assessment of the direction of causality is greatly limited in cross-sectional studies. Third, our sample represents ambulatory medical patients, and we cannot exclude the possibility that some patients had psychiatric diagnoses and were also followed in psychiatric care settings. We could not assess the extent to which reported psychotic experiences could be due to illicit drug use, organic etiologies, or diagnosed or diagnosable psychiatric illnesses. We attempted to control this by including the single variable on past history of hospitalization or treatment for psychiatric or substance abuse problems in the regression models. Nonetheless, our results may not be generalizable to purely non-psychiatric community samples as we were unable to conduct formal diagnostic assessments to rule out diagnoses including primary psychotic disorders, schizotypal personality disorder, or psychotic disorder not otherwise specified. Fourth, this study was a secondary analysis of a larger dataset that was designed to study the individual and social risk factors for suicide attempts among the population of interest. To limit error arising from multiple statistical tests, only a few of the behavioral and personality measurements obtained in the parent project were used in this analysis. We were particularly interested in the association between impulsivity and self-reported psychotic symptoms, and for this analysis we did not include other assessments aside from sociodemographic information and the data collected on the SCL-90R and BIS-11. Fifth, because of the relative demographic homogeneity of our sample, the generalizability of these findings to dissimilar populations may be limited. We focused on socially disadvantaged African Americans seeking care in a large, urban, public hospital setting. Prior research has shown that the prevalence of reported psychotic symptoms may

be higher among those in late adolescence (Johns et al., 2002), but this study focused specifically on the 18- to 64-year age range. Sixth, we were not able to use random sampling techniques, and we cannot exclude the possibility of selection bias influencing our findings. However, given the relatively low frequency of non-participation, it is unlikely that this would have had a significant effect on the findings from our sample. We cannot exclude the possibility that individuals with impulsive characteristics may be less likely to seek psychiatric care and may have been seen in the ambulatory primary care settings from which our sample was drawn.

In summary, we report that the presence of self-reported positive psychotic symptoms was predictive of impulsivity scores in our sample. Though preliminary and in need of replication, these findings may be consistent with recent evidence that certain aspects of impulsivity are related to inferior frontal white matter dysfunction in patients with schizophrenia (Hoptman et al., 2002). Our findings also support the notion of a dimensional nature of psychotic experiences, which is very different from the categorical nature of current psychiatric diagnosis. Further research on self-reported psychotic symptoms in non-psychiatric populations is needed, as well as research on the personality correlates of such symptoms, including impulsivity and its various dimensions.

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