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Personality traits and illicit substances: The moderating role of poverty

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ABSTRACT

Background: Illicit substances increase risk of morbidity and mortality and have significant consequences for society. Personality traits are associated with drug use; we test whether these associations vary by socioeconomic status.
Method: Participants ($N = 412$) from the Healthy Aging in Neighborhoods of Diversity across the Life Span (HANDLS) study completed the Revised NEO Personality Inventory and self-reported use of opiates and cocaine. 50% of participants were living below 125% of the federal poverty line. Mean-level personality differences across never, former, and current opiate/cocaine users were compared. Logistic regressions compared never versus current users and interactions between personality traits and poverty status tested whether these associations varied by socioeconomic status.
Results: High Neuroticism and low Agreeableness increased risk of drug use. The association between low Conscientiousness and drug use was moderated by poverty, such that low Conscientiousness was a stronger risk factor for illicit substance use among those with relatively higher SES. For every standard deviation decrease in Conscientiousness, there was a greater than 2-fold increase in risk of illicit substance use (OR = 2.15, 95% CI = 1.45–3.17). Conscientiousness was unrelated to drug use among participants living below 125% of the federal poverty line.
Conclusions: Under favorable economic conditions, the tendency to be organized, disciplined, and deliberate is protective against drug use. These tendencies, however, matter less when financial resources are scarce. In contrast, those prone to emotional distress and antagonism are at greater risk for current drug use, regardless of their economic situation.

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1. Introduction

Drug use and addiction is complex and involves both psychological and economic factors. Among the psychological factors, several traits that define the Five Factor Model of personality (Neuroticism, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness) have been implicated in the use of illicit substances. Individuals who are prone to negative emotions (high Neuroticism), those who are antagonistic and hostile (low Agreeableness), and those who are disorganized and undisciplined (low Conscientiousness) are more likely to use drugs than those who score on the opposite pole of these traits (Anderson et al., 2007; Grekin et al., 2006; Kornør and Nordvik, 2007; Prisciandaro et al., 2011; Terracciano et al., 2008). Personality traits have also been implicated in the etiology of drug addiction. Adolescents who score high on Negative Emotionality, a trait akin to Neuroticism, or low on Constraint, a trait akin to Conscientiousness, are at greater risk of developing a substance dependence disorder by age 20 (Elkins et al., 2006). This evidence suggests that personality traits are in part an antecedent, not just consequence, of illicit drug use.

In addition to psychological factors, economic and social factors are also associated with drug use. The availability of drugs in the neighborhood, social norms, and low socio-economic status (SES) increase the likelihood of use (Degenhardt and Hall, 2012). In addition to the main effects of economic and psychological factors, the two may interact to amplify or ameliorate risk. For example, personality traits may be one coping resource to buffer against a poor economic situation. Personality traits could also be a vulnerability that exacerbates risks faced in the community.

In a diverse sample of urban dwellers, we examine the association between personality traits and use of cocaine and opiates. Our first goal is to identify a personality profile associated with drug use. Our second goal is to test whether the personality-drug use associations vary by poverty status. We also examine whether these associations vary by other demographic factors (race, sex, age).

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2. Method

2.1. Sample

Participants were drawn from the Healthy Aging in Neighborhoods of Diversity across the Life Span (HANDLS) study (Evans et al., 2010). HANDLS is a population-based longitudinal study designed to disentangle the effects of race and socio-economic status on morbidity and mortality. Participants were recruited as a fixed cohort from an area probability sample of 12 census segments in Baltimore, MD. To be included, participants had to be between 30 and 64 years old, be able to give informed consent, be able to perform at least five of the measures (medical history, physical performance, cognitive testing, dietary recall, audio questionnaire, body composition, carotid Doppler, or pulse wave velocity), and have a valid picture identification; exclusion criteria included pregnancy at time of entry and being within six months of cancer treatment.

From the total HANDLS cohort, 412 participants had valid personality and drug use assessments (see below). This subsample was selected such that participants were contacted for the personality assessment in the same order that they were recruited for the initial wave of testing. Although not every participant was available for interview, we attempted to contact all participants for which we had resources. The personality assessment was terminated because of financial constraints and was not based on pre-determined criteria. The response rate for contacted individuals was 88%. This sample was 66% female, 55% African American, and 50% were living below 125% of the federal poverty line, which is similar to the composition of the overall HANDLS cohort (Evans et al., 2010). The average age was 49.81 (SD = 8.38).

2.2. Measures

2.2.1. Personality. Participants completed the Revised NEO Personality Inventory (NEO-PI-R), a reliable and valid measure of personality traits (Costa and McCrae, 1992). The NEO-PI-R consists of 240 items that assess the five broad domains and 30 specific facets of personality. A trained staff member administered the personality measure via telephone. Psychometric properties of the NEO-PI-R were good in this sample and have been described in detail elsewhere (Sutin et al., submitted for publication). Normative data were used to standardize raw scores into T-scores (mean = 50, SD = 10).

2.2.2. Drug use. Use of illicit substances was self-reported. Participants were asked about their current and past use of opiates (heroin/morphine/codeine) and cocaine/crack. Participants were asked if they had ever used these substances and, if so, when was the last time they used it. Participants who had used cocaine and/or opiates within the last six months were classified as current users (n = 98; opiates only = 27, cocaine only = 40, both substances = 31), those who had used in the past but not within the last six months were classified as former users (n = 24), and those who had never used either cocaine or opiates were classified as never users (n = 290).

2.3. Statistical analyses

We used Analysis of Covariance (ANCOVA) to examine personality differences across never, former, and current opiate/cocaine users controlling for age, sex, ethnicity, and poverty status. We also used logistic regression to examine whether personality differentiated between current users and never users, controlling for the demographic factors. We then tested whether poverty, race, sex, and age moderated any of the factor-level associations using Aiken and West's (Aiken and West, 1991) method for testing interactions. For the moderator analyses, we followed up any significant factor-level associations with analyses on the facets.

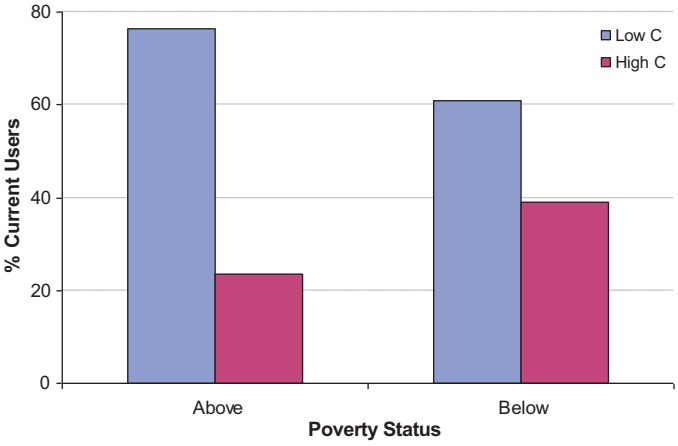

Fig. 1. Percentage of drug users scoring high and low in Conscientiousness by poverty status.

3. Results

Estimated marginal means (standard errors) for never, former, and current opiate/cocaine users are shown in Table 1. There were significant differences across the groups for Neuroticism, Agreeableness, and Conscientiousness. Post hoc analyses revealed that former and current opiate/cocaine users scored lower on both Agreeableness and Conscientiousness than never users and current users scored significantly higher on Neuroticism than never users. The logistic regressions further indicated that for every standard deviation increase in Neuroticism, there was about a 25% increased risk of current drug use, whereas for every standard deviation decrease in Openness to Experience, Agreeableness, and Conscientiousness there was a 25%, 45%, and 35% increased risk of use, respectively.

The facet-level analyses generally followed the domain-level associations. Current opiate/cocaine users scored higher on all facets of Neuroticism, except N4: Self-Conscientiousness. That is, current users were more prone to anxiety, hostility, depression, and were more impulsive and vulnerable to stress. Current users scored lower on all facets of Agreeableness, except A5: Modesty and A6: Tender-Mindedness, and lower on all facets of Conscientiousness than never users. Although there were no differences across the three groups for domain-level Extraversion, there were several differences at the facet level. Current users were more cold (low E1: Warmth), submissive (low E3: Assertiveness), and unhappy (low E6: Positive Emotions), but tended to crave excitement and stimulation (high E5: Excitement-Seeking). In general, former users scored in between never and current users and did not differ significantly from the other two groups.

Our second goal was to test whether poverty status moderated the association between personality and current drug use. And, indeed, the association between Conscientiousness and drug use varied by poverty level ($OR_{CxPoverty}$ = 1.05, 95% CI = 1.01–1.10; Fig. 1). Low Conscientiousness was a risk factor for substance use among those living above 125% of the poverty line, whereas it was unrelated to drug use among those living below this line. Specifically, among participants with relatively more means, there was a greater than 2-fold increase in risk of illicit substance use for every standard deviation decrease in Conscientiousness (OR = 2.15, 95% CI = 1.45–3.17). At the facet level, this pattern held for C1: Competence ($OR_{C1xPoverty}$ = 1.05, 95% CI = 1.01–1.10), C5: Self-Discipline ($OR_{C5xPoverty}$ = 1.05, 95% CI = 1.01–1.10), and C6:

Table 1
Mean-level personality differences between never, former, and current opiate/cocaine users.

Personality	User status			OR (95% CI)
	Never (N = 290)	Former (N = 24)	Current (N = 98)	
Neuroticism	$52.26\ (.84)_a$	$55.02\ (2.92)_{ab}$	$56.40\ (1.46)_b$	1.24 (1.05–1.46)*
Extraversion	51.24 (.83)	53.18 (2.88)	48.74 (1.44)	.83 (.66–1.04)
Openness	51.39 (.59)	51.45 (2.05)	49.12 (1.02)[d]	.74 (.56–.97)*
Agreeableness	$51.17\ (.53)_a$	$46.63\ (1.83)_b$	$46.77\ (.92)_b$	.54 (.40–.74)**
Conscientiousness	$50.38\ (.64)_a$	$45.25\ (2.25)_b$	$45.30\ (1.12)_b$	.66 (.53–.83)**
Facets				
N1: Anxiety	$51.92\ (.56)_a$	$50.91\ (1.94)_{ab}$	$54.46\ (.97)_b$	1.34 (1.03–1.76)*
N2: Angry Hostility	$52.39\ (.61)_a$	$54.55\ (2.11)_{ab}$	$55.92\ (1.06)_b$	1.44 (1.12–1.86)**
N3: Depression	$53.34\ (.60)_a$	$57.51\ (2.11)_{ab}$	$55.82\ (1.06)_b$	1.29 (1.01–1.66)*
N4: Self-Consciousness	46.85 (.64)	48.76 (2.23)	49.38 (1.12)	1.25 (.99–1.58)
N5: Impulsivity	$48.80\ (.56)_a$	$53.37\ (1.94)_b$	$51.54\ (.97)_b$	1.33 (1.03–1.73)*
N6: Vulnerability	$50.59\ (.66)_a$	$52.29\ (2.29)_{ab}$	$54.57\ (1.15)_b$	1.43 (1.14–1.78)**
E1: Warmth	$50.48\ (.63)_a$	$49.34\ (2.19)_{ab}$	$46.97\ (1.10)_b$	.73 (.58–.93)**
E2: Gregariousness	48.11 (.60)	49.45 (2.09)	46.28 (1.04)	.84 (.65–1.08)
E3: Assertiveness	$53.61\ (.62)_a$	$53.90\ (2.15)_{ab}$	$50.40\ (1.07)_b$	.73 (.58–.93)*
E4: Activity	47.39 (.55)	50.05 (1.90)	47.41 (.95)	1.00 (.76–1.31)
E5: Excitement-seeking	$48.70\ (.55)_a$	$46.37\ (1.93)_b$	$51.78\ (.96)_c$	1.45 (1.10–1.90)**
E6: Positive emotions	$51.92\ (.67)_a$	$49.47\ (2.34)_{ab}$	$47.00\ (1.17)_b$	.66 (.52–.83)**
O1: Fantasy	50.70 (.51)	51.60 (1.78)	49.62 (.89)	.83 (.61–1.12)
O2: Aesthetics	53.83 (.54)	54.38 (1.88)	52.43 (.94)	.81 (.62–1.07)
O3: Feelings	50.31 (.54)	52.50 (1.89)	49.99 (.95)	.93 (.70–1.24)
O4: Actions	49.24 (.64)	49.82 (2.24)	47.56 (1.12)	.83 (.65–1.06)
O5: Ideas	$51.06\ (.56)_a$	$49.33\ (1.96)_{ab}$	$47.99\ (.98)_b$	.68 (.52–.89)**
O6: Values	48.68 (.52)	47.06 (1.83)	48.49 (.91)	.95 (.71–1.28)
A1: Trust	$44.46\ (.59)_a$	$43.52\ (2.06)_{ab}$	$39.60\ (1.03)_b$	.62 (.48–.79)**
A2: Straightforwardness	$51.78\ (.56)_a$	$46.54\ (1.95)_b$	$48.56\ (.98)_b$	.70 (.53–.91)*
A3: Altruism	$54.11\ (.62)_a$	$49.10\ (2.17)_b$	$49.38\ (1.09)_b$	.63 (.49–.81)**
A4: Compliance	$46.90\ (.63)_a$	$41.34\ (2.19)_b$	$42.71\ (1.10)_b$	.68 (.54–.87)**
A5: Modesty	50.09 (.58)	49.69 (2.01)	50.24 (1.00)	1.01 (.77–1.30)
A6: Tender-mindedness	58.57 (.61)	57.75 (2.13)	58.09 (1.06)	.94 (.74–1.20)
C1: Competence	$49.72\ (.67)_a$	$47.08\ (2.35)_{ab}$	$44.80\ (1.18)_b$	.67 (.54–.84)**
C2: Order	$51.00\ (.69)_a$	$46.73\ (2.39)_{ab}$	$47.57\ (1.20)_b$	.77 (.62–.96)*
C3: Dutifulness	$48.34\ (.55)_a$	$43.84\ (1.91)_b$	$44.15\ (.95)_b$	.61 (.46–.80)**
C4: Achievement striving	$53.76\ (.69)_a$	$49.46\ (2.41)_{ab}$	$48.69\ (1.21)_b$	.68 (.55–.85)**
C5: Self-discipline	$47.78\ (.63)_a$	$43.04\ (2.20)_b$	$44.49\ (1.10)_b$	.75 (.59–.94)*
C6: Deliberation	$51.21\ (.58)_a$	$48.88\ (2.02)_{ab}$	$48.72\ (1.01)_b$	.76 (.59–.99)*

Note: N = 412; estimated marginal means (standard errors) controlling for age, sex, ethnicity, and poverty status. Means with different subscripts (a–c) differ significantly at $p < .05$. Odds ratios (95% confidence interval) from logistic regressions contrasting current users to never users, controlling for the demographic factors, and scaled as increased risk per 1 SD change in personality.

[d] The difference between current and never users is significant ($p < .05$) when former users are not included in the model.

* $p < .05$.

** $p < .01$.

Deliberation ($OR_{C6xPoverty}$ = 1.06, 95% CI = 1.01–1.12). That is, among those living above 125% of the poverty line, those who were less capable and lacked discipline and those with the tendency to act before thinking were more prone to drug use; these traits were unrelated to drug use among those living in poverty. Poverty did not moderate the association between drug use and any of the other traits.

Sex moderated the association been Openness to Experience and current drug use. Women who scored high on Openness (OR_{OxSex} = .93, 95% CI = .89–.98), particularly O1: Fantasy (OR_{O1xSex} = .94, 95% CI = .91–.98), were less likely to be current users of cocaine or opiates. There was no relation between these traits and drug use among men. In addition, although O4: Actions was protective for both men and women, this association was slightly stronger among men (OR_{O4xSex} = .95, 95% CI = .92–.99). Of note, neither race nor age moderated the association between personality and drug use. Thus, Neuroticism, Openness, Agreeableness, and Conscientiousness were associated with drug use for both African American and white participants and across different ages.

4. Discussion

From this and other studies, evidence is converging on a personality profile of drug users. Users of illicit substances are more prone to negative emotions, tend to be distrustful and manipulative, and are unreliable and undisciplined (Elkins et al., 2006; Kornør and Nordvik, 2007; Ruiz et al., 2008; Terracciano et al., 2008). In our diverse sample of urban dwellers, we found the same pattern of elevated Neuroticism, decreased Agreeableness, and decreased Conscientiousness among current users of cocaine/heroin. Interestingly, poverty status moderated the association between personality and drug use, indicating that low Conscientiousness was a risk factor for drug use only among those with relatively more financial resources. In contrast to Conscientiousness, Neuroticism and Agreeableness had pervasive associations with drug use; both of these traits increased risk regardless of poverty status, race, sex, and age.

Individuals high in Neuroticism, low in Agreeableness, or low in Conscientiousness tend to act out on impulse or antagonistically, especially when combined with high levels of emotional distress. Constellations of these traits have been implicated in a number of problematic externalizing behaviors, including smoking (Terracciano and Costa, 2004), alcohol dependence (Grekin et al., 2006; Hopwood et al., 2007), gambling (MacLaren et al., 2011), and risky sexual behavior (Hoyle et al., 2000). Neuroticism reflects a general tendency to experience negative emotions and emotional distress. This trait is strongly related to psychiatric disorders and shares sizable genetic overlap with internalizing disorders, such as

depression (Hettema et al., 2006), as well as externalizing disorders, such as substance abuse (Khan et al., 2005). Thus, the association between Neuroticism and drugs use may be due, in part, to a shared genetic vulnerability. Substance use may also be a form of self-medication that individuals high in Neuroticism use as one coping strategy to alleviate emotional distress (Loukas et al., 2000).

The strongest effects emerged for Agreeableness and Conscientiousness: Current and former illicit drug users scored about a one-half standard deviation lower on both Agreeableness and Conscientiousness than never users. Disagreeable individuals tend to be antagonistic, aggressive, and skeptical of others (Costa and McCrae, 1992). They worry less about social approval and are more likely to engage in antisocial behaviors (Shiner et al., 2003). Their lack of trust may also lead them to disregard public health messages about the dangers of illicit drug use. Those who are high in Agreeableness, in contrast, tend to be rule followers and are more likely to conform to social norms than their more antagonistic peers (Van Schoor et al., 2008).

Conscientiousness is a trait characterized by self-control, organization, and planning and, as such, it is strongly related to health behaviors (Bogg and Roberts, 2004). In the present research, poverty moderated the association between Conscientiousness and drug use in a somewhat surprising way. Low Conscientiousness emerged as a risk factor for those with relatively more means, but was unrelated to drug use among those living in poverty. Interactionist perspectives view both the environment, especially SES, and individual factors, such as personality traits, as interacting to amplify risk above each individual effect (Boardman, 2004). For example, studies of adolescent antisocial behavior have found that impulsivity is more strongly related to delinquent behaviors in low SES neighborhoods than in wealthier neighborhoods (Lynam et al., 2000). More financial resources may provide more opportunities to channel potentially maladaptive traits into more constructive outlets.

Our findings suggest, however, that rather than poverty amplifying the risk associated with low Conscientiousness, low SES overwhelmed the ability to self-control. For those with more economic resources, an individual tendency toward being disciplined and deliberative was protective against drug use. The effect of poverty is strong and can overwhelm other social (Williams and Latkin, 2007) and psychological factors (Boardman et al., 2001) that tend to be protective. Interestingly, the protective value of C3: Dutifulness was not diminished by poverty; individuals who scored high on this facet of Conscientiousness were less likely to engage in drug use regardless of their poverty status. Thus, those who tend to stick to their principles and obligations may be better able to regulate their behavior despite the temptations and stresses of poverty. Of note, poverty did not moderate the association between either Neuroticism or Agreeableness and illicit drug use. Regardless of their economic situation, those who are prone to emotional distress and those who are antagonistic are at greater risk for current drug use than those who are more emotionally stable and agreeable.

Previous studies on drug use have found mixed results for Openness to Experience. Some studies report no evidence of mean-level differences in this trait across current and never users (Terracciano et al., 2008), whereas others report that current users score slightly lower on Openness than never users (Kornør and Nordvik, 2007). Although we found support for the latter position, our findings also point to a complex relation between Openness to Experience and drug use. In particular, Openness to Experience was protective primarily for women: Open women, especially those with an active imagination, were less likely to be current users. Although intriguing, this moderating effect of sex was small and needs to be replicated.

There are limitations of the present study that could be addressed in future research. For example, the cross-sectional nature of our data did not allow us to disentangle whether personality increased risk of drug use or whether the personality differences between users and non-users were a consequence of use. Previous research has found, however, that adolescents who score higher on Negative Affectivity and lower on Constraint (Elkins et al., 2006), as well as those who score high on impulsivity (Cyders et al., 2009) are at greater risk of substance abuse by their early 20s. Although this evidence suggests that personality is a vulnerability that exists before drug use starts, illicit drugs are powerful substances that alter brain chemistry. As such, drug use may change personality over time. In addition to longitudinal data, it would be interesting to examine the effect of lifelong poverty. In the present research, we only assessed current economic status, but the effects of poverty may be compounded over time (Gianaros and Manuck, 2011). Future research could address whether life course socioeconomic status moderates the association between personality and drug use. Finally, our sample with personality data was only a subsample of the larger HANDLS cohort, which may limit the power to detect modest effects. Larger samples are thus needed to guarantee sufficient power. Although we were unable to test all HANDLS participants, the demographic composition of the subsample roughly matched that of the entire HANDLS cohort, and the findings from this study were broadly consistent with other studies of personality and drug use.

Despite these limitations, the present research had a number of strengths, including a comprehensive measure of personality traits on a relatively diverse sample that varied in race and socioeconomic status. Our findings suggest that poverty overwhelms the ability to effectively regulate behavior, whereas emotional instability and antagonism increase risk of illicit drug use regardless of financial status.

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Contributors

MKE and ABZ designed the study and wrote the protocol. ARS reviewed the literature, did the statistical analyses and wrote the first draft of the manuscript. All authors contributed to and have approved the final manuscript.

Conflict of interest

No conflict declared.

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