Adolescent Personality Profiles, Neighborhood Income, and Young Adult Alcohol Use: A Longitudinal Study

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Abstract

Personality traits and socioeconomic factors such as neighborhood income have been identified as risk factors for future alcohol abuse, but findings have been inconsistent possibly due to interactions between risk and protective factors. The present study examined the prediction of drinking behavior using empirically derived multi-trait patterns and tested for moderation by average neighborhood income. Using latent profile analysis (LPA) in a sample of 863 Dutch adolescents, four empirical personality profiles based on 6 traits were observed: Extraverted, Dysregulated, Neurotic, and Regulated. Dysregulated and Extraverted youth drank higher quantities of alcohol more frequently in young adulthood relative to the Regulated group, above and beyond the effects of baseline adolescent drinking, age, and sex. Profile levels of neuroticism did not appear to affect drinking behavior. Average neighborhood income did not moderate adolescent personality and young adult drinking. These findings suggest that future alcohol research should consider individual trait patterns to inform prevention and intervention efforts, and theories implicating both positive and negative emotionality traits as risk factors for drinking are preferable to those emphasizing the importance of the latter.

Keywords

Personality; Neighborhood Income; Socioeconomic Status; Alcohol; Drinking

1. Introduction

Adolescent personality traits associated with both positive and negative emotionality are thought to be robust predictors of later alcohol abuse (Kuntsche, Knibbe, Gmel, & Engels, 2006). Longitudinal studies have shown that traits associated with negative emotionality and behavioral withdrawal (e.g., neuroticism) place children and adolescents at risk for alcohol

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abuse and dependence in later adolescence and young adulthood (Littlefield, Sher, & Wood, 2010). This could be due to alcohol's dampening of the emotional and physical stress response for those with high levels of negative emotionality-related traits (Ralevski, et al., 2010).

Traits related to positive emotionality and approach behavior (e.g., sensation seeking, extraversion) have also been associated with alcohol use (MacPherson, Magidson, Reynolds, Kahler, & Lejuez, 2010). Research has shown that alcohol can enhance positive affect, and thus be particularly rewarding for individuals with sensation- and positive emotionality-seeking personalities (Fillmore, Ostling, Martin, & Kelly, 2009). Sensation- and reward-seeking individuals tend to have an increased heart rate response to alcohol (Brunelle, et al., 2004) and experience a subsequent increase in subjective energy and excitement (Conrod, Peterson, & Pihl, 2001).

Environmental factors such as low socioeconomic status (SES) have also been linked to alcohol use vulnerability (Cerda, Diez-Roux, Tchetgen, Gordon-Larsen, & Kiefe, 2010). Studies have not been consistent, however. Wiles and colleagues' (2007) systematic review of the longitudinal data on early SES and later drinking concluded that there is currently only weak evidence to support this association due to often contradictory results within the literature. The authors cited several limitations that could explain this lack of consistent findings, such as a dearth of research directly examining SES and alcohol use longitudinally, variability in measurement of alcohol use and SES, a need to adjust for age and sex effects, failure to account for psychiatric problems and family history of alcohol use, and a need to consider cultural differences in both SES and alcohol use that could affect their association (Wiles, et al., 2007).

In summary, numerous studies have documented links between adolescent alcohol use and individual and environmental variables. Unfortunately, research has traditionally focused on main effects for person- or environment-related risk factors separately, while interactions between person and environment variables still need to be tested (Wills, Ainette, Stoolmiller, Gibbons, & Shinar, 2008). Both positive emotionality/approach and negative emotionality/withdrawal traits have been related to an increased risk for adolescent and young adult drinking. Because the majority of the personality-drinking literature has utilized a variable-centered analytical approach (e.g., regression), which assumes that samples are homogeneous (i.e., that all individuals display one pattern of traits or behaviors; (Von Eye & Bogat, 2006)), it is not yet clear whether there are individuals with high levels of both types of traits (e.g., neuroticism & sensation seeking) who receive positive emotionality-enhancing *and* negative affect-dampening rewards from alcohol, or whether negative emotionality traits mitigate the risk associated with positive emotionality traits (or vice versa). Pathways to alcohol use may differ based on the combination of multiple traits rather than on the presence of a single trait.

This study tested whether personality profiles and their interaction with low neighborhood income predict later alcohol use. We hypothesized that an adolescent personality profile of low to moderate levels across all traits would be associated with low levels of young adult alcohol consumption relative to other profiles, and such adolescents would be more resilient than their peers to any detrimental effects of low neighborhood income on later drinking behavior.

2. Method

2.1. Participants and Procedures

Participants were twins aged 13.00 to 15.99 years when completing Time 1 questionnaires as part of a longitudinal survey study on health, lifestyle and personality conducted by the Netherlands Twin Register (Boomsma, et al., 2006; Boomsma, et al., 2002). Data were available for 863 twins (54% female), with a mean age of 14.88 years in 1991 (SD = 0.72; range = 13.08 – 15.99), and 18.80 years in 1995 (SD = 0.77; range = 17.12 – 20.27). In 1995 (Time 3), outcome data included 511 participants with Time 1 personality data and Time 3 drinking frequency data, and 507 individuals with Time 1 personality data and Time 3 drinking quantity data. Subjects with missing Time 3 drinking data were not significantly different from those with complete data on age, sex, average neighborhood income, or zygosity.

2.2. Measures

Time 1 *Neuroticism and Extraversion* were measured using the Amsterdamse Biografische Vragenlijst (Amsterdam Biographical Questionnaire; ABV) (Wilde, 1970). *Sensation Seeking* was assessed with the four subscales of the Dutch version of the Zuckerman Sensation Seeking Scale (SSS) (Feij & van Zuilen, 1984): Thrill and Adventure Seeking (TAS), Experience Seeking (ES), Disinhibition (DIS), and Boredom Susceptibility (BS). Items with substance use-related content were removed from these scales for the current study. Postal codes from participants' addresses were used to index *average neighborhood incomes* (ANI; after taxes) of all residents for a particular region, using data from Statistics Netherlands (Statistiek, 2001). To assess *alcohol use at Time 1,* adolescents were asked *whether they had ever used alcohol.* Time 1 drinking status was coded such that 1 = Yes, I have used alcohol and 0 = No, seldom, or never used alcohol.

To assess *frequency of alcohol use at Time 3*, participants rated an 8-point scale in response to the question, "how often do you drink alcohol?" Responses ranged from "I don't drink alcohol" to "daily." To determine *quantity of alcohol consumption at Time 3*, subjects reported the mean number of glasses of alcohol they drink in a typical week, with responses ranging from "less than 1 glass" to "more than 40 glasses a week."

2.3. Data Analysis

Empirically based personality profiles were estimated with latent profile analysis (LPA) using the program Latent Gold (Vermunt & Magidson, 2000) and an EM algorithm (Dempster, Laird, & Rubin, 1977). To control for twin-dependence, a multilevel model was used with family number as a grouping variable and standard errors adjusted using the robust (Sandwich) standard error estimator. To choose the best-fitting model, the Bayesian Information Criterion (BIC) (Raftery, 1993) was used.

To examine the main and interactive effects of Time 1 personality profiles and ANI on Time 3 drinking outcomes and account for the non-independence of these data (twins within families), Linear Mixed Models (LMM) analyses using the variance components covariance structure were conducted in SPSS.

3. Results

A four-profile model was the best-fitting (Figure 1). Profile 1 was the most common (36%), followed by profile 2 (29%), profile 3 (26%), and profile 4 (9%). Profile 1 was characterized by low neuroticism, moderate BS, DIS, and ES, and high extraversion and TAS, and was therefore named "Extraverted." Profile 2 was named "Neurotic" to reflect high neuroticism,

low extraversion and low-moderate sensation seeking. Profile 3 was named "Regulated," as these youth displayed low to moderate levels of all traits. Finally, profile 4 was labeled "Dysregulated" to reflect high levels of all traits. This group was most distinguished by its highly elevated BS and DIS scores.

Only covariates significantly related to the outcome variables in exploratory analyses were included in the LMMs. Adolescent personality (Time 1) was significantly associated with the amount and frequency of drinking in early adulthood (Time 3) (see Table 1). Specifically, Extraverted and Dysregulated youth reported drinking higher quantities of alcohol more often than Regulated individuals. Neurotic youth did not differ from others in drinking behavior. Post hoc analyses confirmed that the Regulated group significantly differed from the Dysregulated and Extraverted groups on drinking quantity (vs. Dysregulated $p<.01$; vs. Extraverted $p<.001$) and frequency (vs. Dysregulated $p<.05$, vs. Extraverted $p<.01$), but revealed no other significant group differences in later drinking behavior. Neurotic and Regulated youth did not differ in drinking behavior.

ANI at Time 1 did not predict Time 3 drinking quantity ($\beta=.04$, ns) or frequency ($\beta=.06$, ns), and the interactions between Time 1 personality profiles and Time 1 ANI did not significantly predict Time 3 drinking quantity (βs from $-.09$ to $.01$, ns) or frequency (βs from $-.08$ to $-.01$, ns).

4. Discussion

Adolescent personality profiles predicted young adult drinking quantity and frequency above and beyond the contributions of adolescent drinking, age, and sex. This finding was due to the high drinking quantity of the Extraverted and Dysregulated groups relative to Regulated youth; the Neurotic profile was unrelated to drinking outcomes. High neuroticism was a component of the Dysregulated group; however, it co-occurred with high extraversion and sensation seeking, highlighting the value of a person-centered analytical approach. The Extraverted group, with low neuroticism, also reported increased alcohol consumption in young adulthood compared to Regulated individuals. These findings suggest adolescent neuroticism by itself should be considered neither a risk nor a protective factor for young adult drinking. Theoretical models emphasizing an overall "emotion management" or learning process related to drinking (Cooper, et al., 1995; Smith & Anderson, 2001), rather than medication of negative affect, might best capture pathways to drinking.

Extraverted individuals may drink more than their peers due to low inhibition (e.g., low neuroticism, high extraversion and TAS), resulting in difficulty controlling consumption once it has begun. This most prevalent profile (36%) could also represent a normative adolescent personality, with increased alcohol consumption in young adulthood, but not necessarily clinically significant problems with addiction later in life. Longer-term prospective studies measuring drinking-related functional impairment will help determine how many adolescents with this profile demonstrate "normal" adolescent tendencies versus long-lasting, clinically significant problems with alcohol.

The low prevalence of the Dysregulated profile (9%) suggests that it represents levels of personality traits outside the typical range for this age group. With high neuroticism, extraversion, and sensation seeking, Dysregulated youth may find alcohol rewarding as a means to cope with negative affect, facilitate social interaction, and enhance positive emotion. Regulated youth, however, may not experience the same intensity of approach tendencies and negative affect and therefore not desire alcohol for these purposes.

Average neighborhood income (ANI) in adolescence was not related to young adult drinking. This is not an unusual finding in the SES-alcohol literature; other studies have

demonstrated a variety of associations (Wiles et al., 2007). Contrary to our hypotheses, no significant interaction effects emerged between ANI and personality predicting later drinking. It is possible that ANI does not sufficiently measure economic stress in this sample. Furthermore, socioeconomic risk variables, including ANI, may have an additive effect such that a particular combination and severity of these factors lead to later drinking problems. Alternatively, socioeconomic factors may not be good predictors of alcohol use, indicating that proximal risk factors such as psychopathology, alcohol outcome expectancies, and personality are more strongly associated with drinking behavior.

Some limitations to this study must be acknowledged. Drinking was assessed without specifying how to measure one drink and via self-report, which could be influenced by personality. The personality variables consisted of a disproportionate number of positive emotionality/approach traits relative to negative emotionality/withdrawal traits. Inclusion of additional negative emotionality/withdrawal traits might help capture differences that were missed here. Alternative explanations for our findings should be tested in future investigations. For instance, alcohol outcome expectancies, psychopathology, or parenting could mediate the effect of personality on alcohol use identified in this study.

The current investigation also has several strengths. Its generalizability is good because participants came from a large community sample. The longitudinal design allowed us to determine whether personality is *predictive* of later drinking, and these predictive associations were tested from adolescence to young adulthood, a developmental period that has been identified as critical in the etiology of alcohol abuse and dependence (Hawkins, et al., 1992). Finally, this study is the first to our knowledge to implement a person-centered analytical approach to examine personality and drinking.

These findings can inform theories of alcohol abuse and dependence, as well as intervention and prevention programs aiming to mitigate drinking risk in adolescents and young adults. Assessment of multi-trait personality profiles could be used to identify adolescents at risk for drinking problems, and behavioral interventions then tailored based on individual profile. Identification of the mechanisms by which particular personality profiles lead to drinking through further research will help to refine such interventions.

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Research Highlights

- Four adolescent personality profiles were empirically derived using latent profile analysis

- Extraverted and Dysregulated profiles predicted increased drinking quantity and frequency four years later relative to the Regulated profile

- Profile levels of neuroticism did not appear to affect drinking behavior

- Average neighborhood income did not moderate the relation between personality and drinking four years later

- We conclude that future alcohol research should consider personality trait patterns to inform prevention and intervention efforts, and theories implicating both adolescent positive and negative emotionality traits as risk factors for drinking may be more accurate than those emphasizing the importance of the latter.
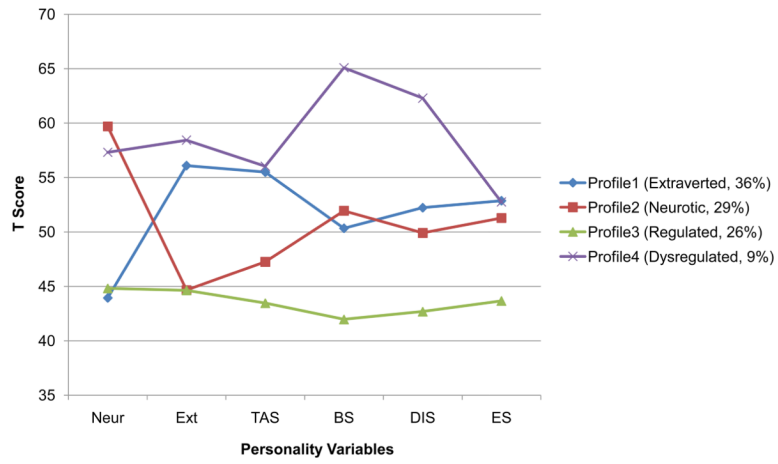
Figure 1. Best-fitting 4-Profile Model of Adolescent Personality
Note. Neur: Neuroticism; Ext: Extraversion; TAS: Thrill and Adventure Seeking; BS: Boredom Susceptibility; DIS: Disinhibition; ES: Experience Seeking.

Table 1

Linear Mixed Modeling Results for Main Effects of Time 1 Personality on Time 3 Drinking

	F(df)	B	SE	β	p
DV: Time 3 Drinking Quantity					
Personality Profile	5.30(3)				p=.001
Extraverted		.59	.16	.14	p<.001
Neurotic		.27	.18	.06	ns
Dysregulated		.71	.26	.08	p<.01
Regulated		0[a]	0		
Time 1 Drinking Status	14.79(1)				p<.001
Never Used		−.77	.20	−.16	p<.001
Have Used		0[a]	0		
Sex	72.81(1)				p<.001
Male		1.15	.13	.35	p<.001
Female		0[a]	0		
DV: Time 3 Drinking Frequency					
Personality Profile	3.33(3)				p<.05
Extraverted		.50	.17	.12	p<.01
Neurotic		.26	.19	.06	ns
Dysregulated		.61	.28	.07	p<.05
Regulated		0[a]	0		
Time 1 Drinking Status	2.53(1)				ns
Never Used		−.35	.22	−.07	ns
Have Used		0[a]	0		
Sex	38.66(1)				p<.001
Male		.88	.14	.26	p<.001
Female		0[a]	0		
Time 1 Age	1.57(1)	.14	.11	.06	ns

[a] This parameter is set to zero because it is the reference category.

Note. DV: Dependent variable; df: degrees of freedom; B: Unstandardized regression coefficient; SE: Standard error; β: standardized beta.