Addictive Behaviors 165 (2025) 108303

Contents lists available at ScienceDirect

Addictive Behaviors

journal homepage: www.elsevier.com/locate/addictbeh

Adolescent extraversion and agreeableness predict adult alcohol use: A 22-Year prospective study

Ingmar H.A. Franken [a,*], Peter Prinzie [b]

[a] Center for Substance use and Addiction Research, Department of Psychology, Education and Child Studies, Erasmus University Rotterdam, the Netherlands
[b] Faculty of Psychology and Educational Sciences, Department of Developmental, Personality and Social Psychology, Ghent University, Belgium

ARTICLE INFO

Keywords:
Alcohol
Personality
Extraversion
Agreeableness
Childhood
Adolescence

ABSTRACT

The Five Factor Model (FFM or Big 5) traits of extraversion, agreeableness, conscientiousness, neuroticism and openness, have all been associated with alcohol use. However, the vast majority of these studies have used cross-sectional designs, limiting the ability to evaluate the temporal relationships between childhood personality traits in adult alcohol use patterns.

In the current prospective community cohort study (N = 329), we examine the predictive value of FFM traits measured in childhood and adolescence (starting at 6–9 years of age; well before the typical age at which adolescents begin drinking) for alcohol use in adulthood (27–30 years of age), spanning an average of 22 years. Personality was assessed with the Hierarchical Personality Inventory for Children (HiPIC) across 5 consecutive waves utilizing multiple informants (child, mother, father, and teachers). Alcohol use was measured by the self-report Quantity-Frequency Variability Index (QFV).

A series of regression analyses indicates that during adolescence, high levels of extraversion and low levels of agreeableness are both (independently) associated with heavier drinking. These associations are robust and consistent from the first adolescent wave (age 12–15 years) to the last adolescent wave. Notably, informant-dependent measures from early childhood waves (ages 6–9) were not significant predictors, highlighting the importance of considering developmental context and informant variability. By leveraging a longitudinal design with temporally separated measures of personality and alcohol use, this study minimizes concerns about reverse causality. The results highlight the long-term relevance of adolescent personality traits in understanding adult drinking behavior and suggest that targeted prevention strategies focusing on highly extraverted and low-agreeable adolescents may help reduce harmful drinking patterns later in life.

1. Introduction

Heavy alcohol use has a negative impact on physical health, neurological and psychiatric problems, public safety, crime prevalence, and most importantly, is a strong predictor of alcohol use disorder (Duke et al., 2018; McCambridge et al., 2011). The question of why some people drink more than others has fascinated researchers for centuries. Centuries ago, Hippocrates and Galen suggested that traits they called "humors" and "temperaments" could predict health behaviors (Dammeyer & Zettler, 2018). Hans-Jurgen Eysenck was one of the first modern psychologists to suggest that individuals with certain traits, particularly high levels of extraversion and neuroticism, may be more prone to alcohol use (Eysenck & Eysenck, 2013). Subsequent theories have taken this as a starting point and expanded on it, hypothesizing that more dysfunctional personality traits, particularly a cluster of impulsive, antisocial, sensation-seeking personality traits, may be associated with alcohol use (Pickering et al., 2013) and play a critical role in predicting who may be at risk for hazardous alcohol use (Gray, 1993). One of the most widely studied lower order personality factors in relation to alcohol use is the personality trait of impulsivity. There is robust longitudinal evidence that impulsivity is an important predictor of later substance use, including problematic alcohol use (Boog & Franken, 2024; Sher et al., 2000; Stautz & Cooper, 2013).

However, less is known about higher order personality traits in relation to alcohol use. One of the most widely studied personality trait models is the Five Factor Model (FFM; also known as the Big Five model.

* Corresponding author at: Department of Psychology, Education and Child Studies, Erasmus University Rotterdam, P.O. Box 1738, 3000 DR Rotterdam, the Netherlands.
E-mail address: franken@essb.eur.nl (I.H.A. Franken).

https://doi.org/10.1016/j.addbeh.2025.108303
Received 2 September 2024; Received in revised form 6 January 2025; Accepted 17 February 2025
Available online 18 February 2025

This model includes five higher order personality traits: Extraversion, Agreeableness, Conscientiousness, Neuroticism (versus Emotional Stability) and Openness. There are many studies showing a relation between these FFM traits and health behavior (Strickhouser et al., 2017). Specifically, many cross-sectional studies show that almost all the FFM traits are associated with alcohol use to a greater or lesser extent. These studies are analyzed in a recent *meta*-analysis by Lui et al. (2022) who conclude that Extraversion, Conscientiousness, and Agreeableness are the most robustly associated with alcohol use. Notably, the often-hypothesized relationship between the FFM trait of Neuroticism and alcohol use was found only for negative drinking-related outcomes, not for alcohol use per se. Lui and colleagues also clearly point out that only eight of the 80 studies in their systematic review were longitudinal prospective studies. To our knowledge, there are currently only two community-based prospective studies using FFM traits to predict alcohol use in children or adolescents (Chassin et al., 2004; Little et al., 2013). Chassin and colleagues (2004) show that high impulsivity (lower order personality), high neuroticism, and low agreeableness (higher order personality) in adolescence are associated with heavier drinking later in life. However, in their study personality measures were not administered until emerging adulthood (ages 18–23 years). Little and colleagues, using adolescent/early adulthood FFM personality measures (ages 17–18 years), also found that high impulsivity and low agreeableness predicted alcohol use in early adulthood. However, these two studies measured personality at age 17+, so there are no studies of childhood FFM predictors of alcohol use in adulthood. A recent meta-analysis reports that alcohol consumption during adolescence influences personality traits over time (Juchem et al., 2024). Therefore, to decrease the effects of reverse causality, it is important to measure personality before the typical age at which children begin drinking, which is about 14 years on average in Belgium (Rosiers, 2023), preferably before adolescence. In addition, the time between the FFM personality and the alcohol use measures in these two studies was a maximum of 7 years. In addition, this is the first prospective study to examine the prediction of alcohol use in adulthood using early childhood (ages 6–9) indicators of personality rated by mother, father, and teachers.

In the present study, we will use the most widely used childhood questionnaire for measuring FFM personality traits in children and adolescents, the Hierarchical Personality Inventory for Children (HiPIC; Mervielde & De Fruyt, 2002). with the following higher order domains: Extraversion, Benevolence (= child equivalent of Agreeableness), Conscientiousness, Emotional Stability (child equivalent of reversed Neuroticism), and Imagination (= child equivalent of Openness). For ease of comparison with most of the literature in this area and to avoid confusion, we will use the standard adult terminology for the FFM domains in the remainder of this paper, i.e., Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness. The present study fills the research gap between studies showing that childhood FFM traits are predictive of adolescent alcohol use and adult studies showing an influence of FFM traits on heavy alcohol use. The association between childhood FFM personality traits and adult alcohol use has not been examined in a long-term follow-up study using reliable and robust measures of personality and alcohol use in a large (N = 329) community cohort.

By integrating the results of Liu's meta-analysis and the only two community-based prospective studies using FFM traits to predict alcohol use in children or adolescents (Chassin et al., 2004; Little et al., 2013), we aim to provide a more comprehensive understanding of the role of personality in early alcohol use. In summary, high extraversion, high neuroticism, and low agreeableness in childhood have generally been found to predict greater alcohol use in adulthood. This study builds on previous research by examining these associations in greater depth within a large, well-characterized community cohort spanning over two decades.

2. Methods

2.1. Participants

The present study is based on data from the Flemish Study on Parenting, Personality and Development (Grossmann et al., 2024; Prinzie et al., 2003; van Eldik et al., 2021), a Belgian longitudinal study initiated in 1999. The sample was randomly selected from a proportional stratified sample of primary school children, with strata defined by geographic location, gender, and age. All participants were Flemish-speaking Belgian citizens. The initial cohort comprised a sample of 595 children (49 % female), and the study has followed these participants through ten waves of measurement (W1-W10) to date. Detailed information on response rates can be found in Van den Akker et al. (2013) and de Haan et al. (2017). The FSPPD includes unique personality data from both children and parents, using reliable Big Five measures to assess broad personality domains. The FSPPD uses a prospective, multi-informant, multi-method approach, including reports from mothers, fathers, and teachers, with children themselves serving as informants from age 7 (median). SES analysis shows that 12 % are upper class, 79 % are middle class, and 9 % are lower class (Prinzie et al., 2003).

This study is based on data from six different waves of the ongoing longitudinal study: W3 (ages 6–9, collected in 2001), W4 (ages 9–12, collected in 2004), W5 (ages 12–15, collected in 2007), W6 (ages 14–17, collected in 2009), W7 (ages 17–19), and W10 (ages 27–30, collected in 2018). The first two waves (W1 and W2) did not include personality measures. Each wave consisted of four cohorts of children who were 6, 7, 8, and 9 years old at W3. At W3 and W4, Hi*P*IC scores were provided by the children's, mothers, fathers and teachers. At W10, adults self-

Table 1
Descriptive statistics of personality variables per wave.

	Valid	Mean	SD	Minimum	Maximum
W3 Ext	329	−1.52 × 10–5	0.39	−1.15	1.12
W3 Agree	329	6.08 × 10–6	0.38	−1.52	1.36
W3 Con	329	3.04 × 10–6	0.46	−1.27	1.11
W3 Neu	329	−2.13 × 10–5	0.47	−1.49	1.31
W3 Open	329	−3.04 × 10–6	0.44	−1.18	1.05
W4 Ext	329	−2.43 × 10–5	0.39	−1.09	0.99
W4 Agree	329	−2.43 × 10–5	0.35	−1.44	1.22
W4 Con	329	6.08 × 10–6	0.49	−1.35	1.33
W4 Neu	329	6.08 × 10–6	0.47	−1.81	1.29
W4 Open	329	9.12 × 10–6	0.45	−1.21	1.08
W5 Ext	318	3.46	0.46	2.06	4.59
W5 Agree	318	3.54	0.43	1.70	4.50
W5 Con	318	3.26	0.51	1.53	4.50
W5 Neu	318	3.44	0.66	1.44	4.94
W5 Open	318	3.50	0.48	2.33	4.83
W6 Ext	303	3.47	0.51	1.81	4.69
W6 Agree	303	3.52	0.40	2.13	4.88
W6 Con	303	3.26	0.54	1.59	4.81
W6 Neu	303	3.38	0.67	1.56	4.88
W6 Open	303	3.48	0.46	2.33	4.88
W7 Ext	320	3.41	0.52	1.38	4.72
W7 Agree	320	3.64	0.40	2.27	4.67
W7 Con	320	3.43	0.56	1.78	4.78
W7 Neu	320	3.24	0.73	1.31	4.81
W7 Open	320	3.60	0.48	2.17	4.92

Ext = Extraversion, Agree = Agreeableness, Con= Conscientiousness, Neu= Neuroticism (note that we used the HiPIC Emotional Stability scores for this table, for all other analyses this score is reversed and represents Neuroticism). Open= Openness;
SD= Standard deviation. W3-W7 is Wave 3 to Wave 7. Keep in mind that the W3 and W4 variables are latent factors of the multi-informants.

reported their alcohol consumption. For sample sizes of the analyses, see Table 2.

2.2. Predictors: Personality

Personality was assessed using the Hierarchical Personality Inventory for Children (HiPIC; Mervielde & De Fruyt, 2002), a Dutch lexically based instrument designed to measure individual differences in children. The HiPIC consists of 144 items organized into five higher-order factors: Extraversion, Agreeableness (HiPIC: Benevolence), Conscientiousness, Neuroticism (HiPIC: Reversed Emotional Stability) and Openness (HiPIC: Imagination). Mothers, fathers and the children's teachers rated the children's behavior on a 5-point Likert scale (ranging from 1, *almost not characteristic*, to 5, *very characteristic*). In the first two waves (W3 and W4) children were too young to provide self-reports, therefore, we rely on mothers, fathers and teachers reports of the children's personalities. In W5, W6 and W7 we rely on the child's self-reported personality (and did not report mothers, fathers and teachers reports). Interrater agreement was high, with intraclass correlation coefficients ranging from 0.76 to 0.89 across traits and waves. To reduce the number of analyses, we computed in Mplus for every wave and for each personality factor a latent variable that combined mothers', fathers', and teachers' reports into a single variable. Shiner and Caspi (2003) recognized the HiPIC as a reliable measure for assessing personality in children. In addition, the factor structure of the HiPIC is highly replicable and its domains show high internal consistency (Mervielde & De Fruyt, 2002; see Prinzie et al., 2003; Van den Akker et al., 2013 for the HiPIC's internal consistency in the FSPPD sample).

2.3. Alcohol use patterns

Alcohol consumption was assessed using the Quantity-Frequency-Variability (QFV) index (Cahalan et al., 1969; Lemmens et al., 1992). The QFV assesses alcohol use by asking three questions: "On average, how many days a month do you drink?" (9-point scale ranging from 2 or less to 28 or more); "When you drink alcohol, how many glasses do you usually consume?" (7-point scale ranging from *1 glass* to *11 or more glasses*); "In the past six months, have you ever consumed six or more glasses in one day?" (8-point scale ranging from *never* to *every day*). To avoid multiple testing we used a single measure of alcohol consumption, i.e., we created a QFV total score by adding the three QFV items. This is very similar to the AUDIT-C questions and AUDIT-C total scale (Bush et al., 1998). Thus, we used a combined measure of alcohol quantity, frequency, and binge drinking frequency, with higher scores indicating heavier and more hazardous drinking.

2.4. Analysis

To test temporal associations among the Big Five personality factors and alcohol use we ran linear regression models for each wave, with within-wave variance in age (max. 4 years) and gender in the first model (H0) and personality variables added in the second model (H1). In each analysis, the total QFV score at W10 (ages 27–30 years) was added as the dependent variable. The assumptions of the regression models were evaluated by inspecting residual plots, tolerance levels, and the variance inflation factor. Because within wave age was not significant in any of the models, and gender was significant in all models, we omitted the within-wave age variance in all analyses, and discuss the effects of gender separately, as they are more or less the same for all analyses. Standardized β values were presented to enable comparison between models, while R^2 was used as a measure of effect size for the whole model. We performed Little's missing completely at random (MCAR) test, and based on the nonsignificant result, we conclude that our personality data are missing completely at random (Little's MCAR test: Chi-Square = 1344.939, df = 1288, Sig. = 0.132). Analyses were performed with pairwise deletion of missing cases, so the number of subjects slightly varied between analyses (see Table 1). We applied an FDR (Benji Hochberger adjustment) was applied to correct for multiple testing on the R^2 change in the overall model when adding the personal variables in the second regression step. This did not change the results, so we report the uncorrected values.

3. Results

3.1. Childhood (W3, W4) latent variables based on mother, father, and teachers reports

For wave 3 (ages 6–9) and 4 (ages 9–12) alcohol use in wave 10 was not predicted by any of the latent personality factors. The personality variables in W3 (F_{change} (5, 322) = 1.12, p = 0.45) and W4 (F_{change} (5,322) = 1.61, p = 0.16) did not add significantly to the effects of gender, see below. In wave 3 (9–12 years) Agreeableness (β = -0.11, p = 0.08) and in wave 4 both Extraversion (β = 0.25, p < 0.09) and Agreeableness (β = -0.16, p = 0.06) reached p-values < 0.10, but they failed to reach the 0.05 level of significance.

3.2. Early adolescence (W5): Child reports

At early adolescence wave 5 (ages 12–15 years) the personality variables (F_{change} (5,311) = 5.8, p < 0.001) had added value to the explained variance of gender. Both Extraversion, β = 0.25, p < 0.001, and Agreeableness, β = -0.16, p = 0.01, significantly predicted alcohol use 15 years later. This regression model, including gender, explained 16 % of the variance.

3.3. Middle adolescence (W6): Child reports

At middle adolescence wave 6 (ages 14–17 years) the personality variables (F_{change} (5, 296) = 4.41, p < 0.001) significantly added explained variance to the effects of gender. Extraversion, β = 0.17, p < 0.009, and predicted alcohol use. In this wave, Agreebleness failed to reach significance (β = -0.11, p = 0.06). This regression model, including gender, explained 16 % of the variance.

Table 2
Regression analyses per wave of personality traits with alcohol consumption at age 27–30 years as dependent variable[a].

	W3 (*N* = *329*) **(6–9 years)**		**W4** (*N* = *329*) **(9–12 years)**		**W5** (*N* = 318) **(12–15 years)**		**W6** (*N* = 303) **(14–17 years)**		**W7** (N = 320) **(17–19 years)**	
	β (*SE*)	***p***	**β (*SE*)**	***p***	**β (*SE*)**	***p***	**β (*SE*)**	***P***	**β (*SE*)**	***p***
Extraversion	0.076 (0.290)	0.231	0.105 (0.568)	0.092	**0.250 (0.458)**	**0<.001**	**0.165 (0.442)**	**0.09**	**0.219 (0.416)**	**< 0.001**
Agreeableness	−0.111 (0.582)	0.076	−0.122 (0.644)	0.055	**−0.155 (0.519)**	**0.013**	−0.112 (0.534)	0.060	**−0.195 (0.479)**	**< 0.001**
Conscientiousness	0.098 (0.591)	0.194	0.093 (0.565)	0.231	−0.002 (0.437)	0.974	−0.111 (0.411)	0.074	−0.093 (0.359)	0.102
Neuroticism	−0.018 (0.528)	0.800	−0.059 (0.542)	0.403	−0.043 (0.326)	0.477	−0.067 (0.348)	0.302	−0.037 (0.291)	0.537
Openness	−0.044 (0.662)	0.590	−0.057 (0.656)	0.484	−0.065 (0.452)	0.288	0.001 (0.500)	0.982	−0.068 (0.427)	0.244

Note: β is a standardized coefficient. Values in bold indicate a significant relationships. The W5, W6, and W7 measures are child self-report measures. The W3 and W4 measures are based on a latent variable constructed from reports from the child's mother, father, and teacher.

[a] Per wave, the FFM traits were assessed in separate multiple regression models adjusted for sex. The latter was significant in all the models.

3.4. Late adolescence (W7): Child report

At middle adolescence wave 7 (ages 17–19 years), the personality variables (F_{change} (5, 313) = 8.16, $p < 0.001$) significantly added explained variance to the effects of gender. Again both Extraversion, $\beta = 0.22$, $p < 0.001$, and Agreeableness, $\beta = -0.20$, $p < 0.001$, predicted alcohol use. This regression model, including gender explained 20 % of the variance.

3.5. Gender

Gender was a significant predictor of alcohol use (all p's < 0.001) in all the regression models. Not surprisingly, men drank overall more alcohol than women, (see Fig. 1) at W10 (ages 27–30).

4. Discussion

The most striking finding of this study is that adult alcohol use can be predicted using adolescent personality measures measured 15 years before. Adolescents' self-reported Agreeableness scores at an age of 12–15 years old predicted alcohol use in adulthood (age 27–30 years). Specifically, low Agreeableness was associated with higher levels of alcohol use. In other words, high Agreeableness was protective against heavy alcohol use 15 years later. Similarly, the adolescents' self-reported Extraversion at ages 12–15 years old also predicted the child's alcohol use 15 years later. Both self-reported Agreeableness and Extraversion remained significant predictors of adult alcohol use throughout adolescence, with the exception of agreeableness at wave 6. This measure fell just above the 0.05 level of significance, likely due to a slightly reduced number of respondents and thus power at that wave.

The finding that extraversion is an important and stable predictor of alcohol use is consistent with several theories of personality. Since Carl Jung first introduced the term Extraversion, it has been an important trait in nearly every prominent model of personality (Wilt & Revelle, 2017). Eysenck & Eysenck (2013) proposed the arousal model of Extraversion, in which stimulating activities such as substance use and social interactions are viewed as means of stimulating low baseline arousal. In addition, several later elaborations of Eysenck's theory have developed lower-order trait constructs that are very similar to the higher-order trait of Extraversion (Depue & Collins, 1999) and share the idea that extraversion is a motivation for stimulating and rewarding stimuli, such as impulsivity (Revelle, 1997), sensation-seeking, (Lydon-Staley et al., 2020; Zuckerman, 1997) and Behavioral Activation System (BAS; Gray, 1972). All of these lower-order traits have been associated with substance use (see, e.g., Boog & Franken, 2024; Franken & Muris, 2006). One study supports the notion that extraversion and BAS sensitivity both appear to represent an approach-related trait (Quilty et al., 2014). In addition, the finding that extraversion is a predictor of alcohol use is in line with several other longitudinal studies that measured extraversion or similar constructs such as sociability and impulsivity (Strickhouser et al., 2020; Ivanov et al., 2021; Hakulinen et al., 2015).

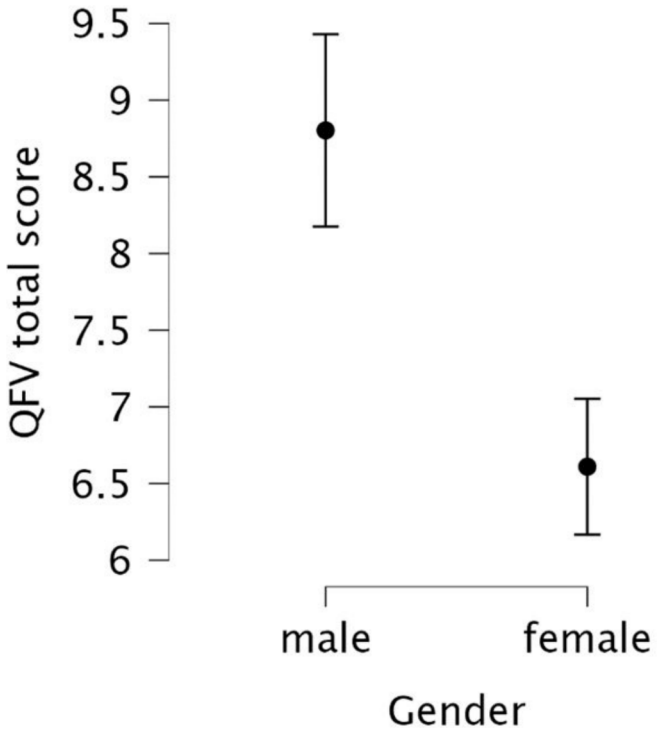

Fig. 1. Average scores of the QFV index by gender of at age 28–30.

In addition, high Agreeableness during adolescence was found to be a protective factor for adult alcohol use. Although we are not aware of any theoretical account that directly links Agreeableness to substance use, a number of cross-sectional and longitudinal studies have found that high Agreeableness is protective against (problematic) alcohol use (see e.g., Malouff et al., 2005, Malouff et al., 2007). In line with our findings, a recent 10-year longitudinal study among veterans found that high Agreeableness was protective against persistent high alcohol consumption (Na et al., 2023). Within the FFM, Agreeableness is a prosocial trait and reflects an endorsement of social rules and social harmony. This could be incompatible with problematic and frequent alcohol use. In addition, agreeable persons show more prosocial behavior (Buchinger et al., 2024; Graziano & Eisenberg, 1997) and it might be that agreeable individuals are more likely to imitate behaviors and form relationships with peers who engage in prosocial behaviors rather than substance use. Further, it has been suggested that high Agreeableness is associated with acquiring mature roles and responsibilities such as marriage or parenthood (Na et al., 2023).

The association between Agreeableness, Extraversion, and alcohol use seems quite robust over time for a long period. We found significant effects with R^2 values between 0.14 and 0.20 (including gender; 0.06 to 0.10 without gender). Not surprisingly, the explained variance of the models generally increased over time as we moved closer to the time of alcohol measurement at age 28–30 years. According to Cohen (1988), R^2 between 0.14 and 0.20 are small to moderate effect sizes. Funder and Ozer (2019) even argue that R^2 values of 0.01, 0.04, and 0.09 in longitudinal personality studies correspond to small, medium, and large effects, respectively.

Although no significant personality predictors of drinking were found at Waves 3 (ages 6–9) and 4 (ages 9–12), the trends that both Agreeableness (Waves 3 and 4) and Extraversion (Wave 4) had the largest effect sizes are consistent with the findings in the later waves. Clearly, the effect sizes of such early measures of personality are small to very small over a 22-year period, and even larger sample sizes are needed to find significant predictive value of these very early measures. It is promising, however, that even at these early stages of life, Agreeableness and Extraversion are the most promising candidate traits.

The fact that other FFM traits have not been found to be associated with alcohol use is also important for understanding the determinants of alcohol use. For example, it is important to note that, in contrast to many cross-sectional studies, neuroticism did not prospectively predict alcohol use in the present study. This is not consistent with Eysenck's idea that people high in neuroticism are prone to alcohol consumption. Rather, this suggests that neuroticism, the tendency to experience anxiety, depression, and other negative feelings, might be a consequence of frequent drinking.

As expected, gender was found to be an important predictor of alcohol consumption. This is not surprising, as this is consistent with almost all epidemiological studies of the general population (Wilsnack et al., 2000). Not only do men drink more often and more heavily, but they also have more problematic drinking, including being diagnosed with and having an alcohol use disorder (AUD; White, 2020).

One of the strengths of the present study is that the children's personality is measured comprehensively using a well-validated 144-item personality scale with high reliable FFM scales, measured over 5 waves, spanning a 22-year time window of childhood and adolescence, with first measurements well before first alcohol use, and using multiple informants (self, mother, father, different teachers). In addition, alcohol use is measured comprehensively using a well-established and widely used index of alcohol use, including quantity, frequency, and variability of alcohol use (binge drinking frequency). Many other studies use only a binary measure (ever vs. never used alcohol) or starting age. Another strength is that there is a large (15 years) time span between the first personality measure and alcohol use. This allows us to show that both agreeableness and extraversion remain robust predictors of alcohol use over time.

The present study is not without its limitations. Although the sample is in many ways representative of Western and developed countries, some factors may be specific to the national or Western context and may not be easily generalized to a different international context, such as developing countries. In addition, the findings cannot be generalized without hesitation to the prediction of AUDs. Although it must be noted that hazardous alcohol use measured with screeners such as the AUDIT-C (similar to the current QFT) are excellent predictors of AUD (Raninen et al., 2024). In addition, we could not establish significant effects of personality measures in childhood (W3 and W4) on adult alcohol use, although in these waves also Extraversion and Agreeableness were the personality variables with the highest effect size. This suggests that future studies will need larger samples to detect these very small effect sizes over a long period of time (>20 years).

The present findings that the adolescent traits of Agreeableness and Extraversion have been found to be important predictors of later adult alcohol use are important for advancing our understanding of the importance of personality traits in alcohol use. These findings enhance our understanding of how early life traits influence later adult health behaviors. This longitudinal approach leads to a more comprehensive understanding of human development and the factors that influence health behaviors across the lifespan. In addition, the identification of relevant childhood and adolescent characteristics associated with later alcohol use may help in the development of early intervention programs or tailored educational programs. Although personality traits are more or less stable across the lifespan (Bleidorn et al., 2022), there are effective interventions targeting personality traits that could be used as early alcohol interventions to prevent heavy drinking (Newton et al., 2022). Our study suggests that Extraversion and Agreeableness may be useful targets for such interventions. For example, Piedmont (2001) found increases in Agreeableness over time in a personality change treatment program for substance abusers. Therefore, targeting these FFM traits early in life may reduce the likelihood of heavy alcohol use in adulthood.

CRediT authorship contribution statement

Ingmar H.A. Franken: Writing – review & editing, Writing – original draft, Visualization, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Peter Prinzie:** Writing – review & editing, Resources, Project administration, Methodology, Investigation, Funding acquisition, Conceptualization.

Funding

This study was supported by an FWO Odysseus grant (G0DCB23N) awarded to PP.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.addbeh.2025.108303.

Data availability

Data will be made available on request.

References

Bleidorn, W., Schwaba, T., Zheng, A., Hopwood, C. J., Sosa, S. S., Roberts, B. W., & Briley, D. A. (2022). Personality stability and change: A meta-analysis of longitudinal studies. *Psychological Bulletin, 148*(7–8), 588–619. https://doi.org/10.1037/bul0000365

Boog, M., & Franken, I. H. A. (2024). The role of impulsivity in addictive behavior. In I. H. A. Franken, R. W. Wiers, & K. Witkiewitz (Eds.), *Handbook of Addiction Psychology*. Sage Publication.

Buchinger, L., Entringer, T. M., Richter, D., Wagner, G. G., Gerstorf, D., & Bleidorn, W. (2024). Codevelopment of life goals and the Big Five personality traits across adulthood and old age. *Journal of Personality and Social Psychology, 126*(2), 346–368. https://doi.org/10.1037/pspp0000477

Bush, K., Kivlahan, D. R., McDonell, M. B., Fihn, S. D., Bradley, K. A., & for the Ambulatory Care Quality Improvement Project. (1998). The AUDIT Alcohol Consumption Questions (AUDIT-C): An Effective Brief Screening Test for Problem Drinking. *JAMA Internal Medicine, 158*(16), 16. https://doi.org/10.1001/archinte.158.16.1789

Cahalan, D., Cisin, I., & Crossley, H. (1969). American drinking practices: A national study of drinking behavior and attitudes. New Brunswick, NJ: Rutgers Center of Alcohol Studies. Emotionality, and coping reasons for drinking: Is there evidence for a self medication model of alcohol use. *Psychology of Addictive Behaviors, 15*, 237–245.

Chassin, L., Fora, D. B., & King, K. M. (2004). Trajectories of alcohol and drug use and dependence from adolescence to adulthood: The effects of familial alcoholism and personality. *Journal of Abnormal Psychology, 113*(4), Article 4. https://doi.org/10.1037/0021-843X.113.4.483

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed). Lawrence Erlbaum Associates.

Dammeyer, J., & Zettler, I. (2018). A Brief Historical Overview on Links Between Personality and Health. In C. Johansen (Ed.), *Personality and Disease* (pp. 1–16). Academic Press. https://doi.org/10.1016/B978-0-12-805300-3.00001-3.

de Haan, A., De Pauw, S., van den Akker, A., Deković, M., & Prinzie, P. (2017). Long-term developmental changes in children's lower-order big five personality facets. *Journal of Personality, 85*(5), 616–631. https://doi.org/10.1111/jopy.12265

Depue, R. A., & Collins, P. F. (1999). Neurobiology of the structure of personality: Dopamine, facilitation of incentive motivation, and extraversion. *Behavioral and Brain Sciences, 22*(3), Article 3.

Duke, A. A., Smith, K. M., Oberleitner, L., Westphal, A., & McKee, S. A. (2018). Alcohol, drugs, and violence: A meta-meta-analysis. *Psychology of Violence, 8*(2), 238–249.

Eysenck, H. J., & Eysenck, S. B. (2013). The biological basis of personality. In *Personality Structure and Measurement (Psychology Revivals)* (pp. 49–62). Routledge.

Franken, I. H. A., & Muris, P. (2006). BIS/BAS personality characteristics and college students' substance use. *Personality and Individual Differences, 40*(7), Article 7.

Funder, D. C., & Ozer, D. J. (2019). Evaluating Effect Size in Psychological Research: Sense and Nonsense. *Advances in Methods and Practices in Psychological Science, 2*(2), 156–168. https://doi.org/10.1177/2515245919847202

Gray, J. A. (1972). The structure of the emotions and the limbic system. *Ciba Foundation Symposium, 8*, 87–120.

Gray, J. A. (1993). Framework for a taxonomy of psychiatric disorder. In S. van Goozen, N. van de Poll, & J. A. Sergeant (Eds.), *Emotions: Essays on emotion theory* (pp. 29–59). Lawrence Erlbaum Associates Inc.

Graziano, W. G., & Eisenberg, N. (1997). Agreeableness: A dimension of personality. In *Handbook of Personality Psychology* (pp. 795–824). Academic Press.

Grossmann, L., Van der Hallen, R., Smeets, G., & Prinzie, P. (2024). The interplay between identity and personality pathology in emerging adults: A 7-year cross-lagged study. *Development and Psychopathology*, 1–15. https://doi.org/10.1017/S095457942400169X. Cambridge Core.

Hakulinen, C., Elovainio, M., Batty, G. D., Virtanen, M., Kivimäki, M., & Jokela, M. (2015). Personality and alcohol consumption: Pooled analysis of 72,949 adults from eight cohort studies. *Drug and Alcohol Dependence, 151*, 110–114. https://doi.org/10.1016/j.drugalcdep.2015.03.008

Ivanov, I., Parvaz, M. A., Velthorst, E., Shaik, R. B., Sandin, S., Gan, G., Spechler, P., Albaugh, M. D., Chaarani, B., Mackey, S., Banaschewski, T., Bokde, A. L. W., Bromberg, U., Büchel, C., Quinlan, E. B., Desrivières, S., Flor, H., Grigis, A., Gowland, P., & Stedman, A. (2021). Substance use initiation, particularly alcohol, in drug-naive adolescents: Possible predictors and consequences from a large cohort naturalistic study. *Journal of the American Academy of Child & Adolescent Psychiatry, 60*(5), 623–636. https://doi.org/10.1016/j.jaac.2020.08.443

Juchem, C. M., Bendau, A., Bandurski, L. C., Reich, N. J., Baumgardt, S., & Asselmann, E. (2024). Personality changes related to presence and treatment of substance use

(disorders): A systematic review. *Psychological Medicine, 54*(9), 1905–1929. https://doi.org/10.1017/S003329172400093X

Lemmens, P., Tan, E. S., & Knibbe, R. A. (1992). Measuring quantity and frequency of drinking in a general population survey: A comparison of five indices. *Journal of Studies on Alcohol, 53*(5), Article 5.

Little, K., Hawkins, M. T., Sanson, A., O'connor, M., Toumbourou, J. W., Smart, D., & Vassallo, S. (2013). Longitudinal predictors of alcohol-related harms during the transition to adulthood. *Australian Psychologist, 48*(4), 270–280. https://doi.org/10.1111/j.1742-9544.2012.00095.x

Lui, P. P., Chmielewski, M., Trujillo, M., Morris, J., & Pigott, T. D. (2022). Linking big five personality domains and facets to alcohol (Mis)use: A systematic review and meta-analysis. *Alcohol and Alcoholism (Oxford, Oxfordshire), 57*(1), 58–73. https://doi.org/10.1093/alcalc/agab030

Lydon-Staley, D. M., Falk, E. B., & Bassett, D. S. (2020). Within-person variability in sensation-seeking during daily life: Positive associations with alcohol use and self-defined risky behaviors. *Psychology of Addictive Behaviors, 34*(2), 257–268. https://doi.org/10.1037/adb0000535

Malouff, J. M., Thorsteinsson, E. B., Rooke, S. E., & Schutte, N. S. (2007). Alcohol involvement and the five-factor model of personality: A meta-analysis. *Journal of Drug Education, 37*(3), 277–294. https://doi.org/10.2190/DE.37.3.d. Scopus.

Malouff, J. M., Thorsteinsson, E. B., & Schutte, N. S. (2005). The relationship between the five-factor model of personality and symptoms of clinical disorders: A meta-analysis. *Journal of Psychopathology and Behavioral Assessment, 27*(2), 101–114. https://doi.org/10.1007/s10862-005-5384-y

McCambridge, J., McAlaney, J., & Rowe, R. (2011). Adult consequences of late adolescent alcohol consumption: A systematic review of cohort studies. *PLoS Medicine, 8*(2), Article 2. https://doi.org/10.1371/journal.pmed.1000413

Mervielde, I., & De Fruyt, F. (2002). Assessing children's traits with the Hierarchical Personality Inventory for Children. In B. de Raad, & M. Perugini (Eds.), *Big Five Assessment* (pp. 127–146). Hogrefe & Huber Publishers.

Na, P., Zhou, H., Montalvo-Ortiz, J. L., Cabrera-Mendoza, B., Petrakis, I. L., Krystal, J. H., Polimanti, R., Gelernter, J., & Pietrzak, R. H. (2023). Positive personality traits moderate persistent high alcohol consumption, determined by polygenic risk in U.S. military veterans: Results from a 10-year, population-based, observational cohort study. *Psychological Medicine, 53*(16), 7893–7901. https://doi.org/10.1017/S003329172300199X

Newton, N. C., Debenham, J., Slade, T., Smout, A., Grummitt, L., Sunderland, M., Barrett, E. L., Champion, K. E., Chapman, C., Kelly, E., Lawler, S., Castellanos-Ryan, N., Teesson, M., Conrod, P. J., & Stapinski, L. (2022). Effect of selective personality-targeted alcohol use prevention on 7-year alcohol-related outcomes among high-risk adolescents: A secondary analysis of a cluster randomized clinical trial. *JAMA Network Open, 5*(11), Article e2242544. https://doi.org/10.1001/jamanetworkopen.2022.42544

Pickering, A., Smillie, L., & Corr, P. (2013). On the shoulders of giants. *Psychologist, 26*, 22–25.

Piedmont, R. L. (2001). Cracking the plaster cast: big five personality change during intensive outpatient counseling. *Journal of Research in Personality, 35*(4), 500–520. https://doi.org/10.1006/jrpe.2001.2326

Prinzie, P., Onghena, P., Hellinckx, W., Grietens, H., Ghesquière, P., & Colpin, H. (2003). The Additive and interactive effects of parenting and children's personality on externalizing behaviour. *European Journal of Personality, 17*(2), 95–117. https://doi.org/10.1002/per.467. Scopus.

Quilty, L. C., DeYoung, C. G., Oakman, J. M., & Bagby, R. M. (2014). Extraversion and behavioral activation: Integrating the components of approach. *Journal of Personality Assessment, 96*(1), 87–94. https://doi.org/10.1080/00223891.2013.834440

Raninen, J., Karlsson, P., Callinan, S., & Norström, T. (2024). Different measures of alcohol use as predictors of DSM-5 alcohol use disorder among adolescents – A cohort study from Sweden. *Drug and Alcohol Dependence, 257*, Article 111265. https://doi.org/10.1016/j.drugalcdep.2024.111265

Revelle, W. (1997). Extraversion and impulsivity: The lost dimension? In H. Nyborg (Ed.), *The scientific study of human nature: Tribute to Hans J. Eysenck at eighty* (pp. 189–212). Pergamon/Elsevier Science Inc.

Rosiers, J. (2023). Syntheserapport leerlingenbevraging 2021-2022.

Sher, K. J., Bartholow, B. D., & Wood, M. D. (2000). Personality and substance use disorders: A prospective study. *Journal of Consulting and Clinical Psychology, 68*(5), Article 5.

Shiner, R., & Caspi, A. (2003). Personality differences in childhood and adolescence: Measurement, development, and consequences. *Journal of Child Psychology and Psychiatry, and Allied Disciplines, 44*(1), 2–32. https://doi.org/10.1111/1469-7610.00101

Stautz, K., & Cooper, A. (2013). Impulsivity-related personality traits and adolescent alcohol use: A meta-analytic review. *Clinical Psychology Review, 33*(4), 574–592. https://doi.org/10.1016/j.cpr.2013.03.003. Scopus.

Strickhouser, J. E., Terracciano, A., & Sutin, A. R. (2020). Parent-reported childhood temperament and adolescent self-reported substance use initiation. *Addictive Behaviors, 110*, Article Scopus. https://doi.org/10.1016/j.addbeh.2020.106503

Strickhouser, J. E., Zell, E., & Krizan, Z. (2017). Does personality predict health and well-being? *A metasynthesis. Health Psychology, 36*(8), 797–810. https://doi.org/10.1037/hea0000475

Van den Akker, A. L., Deković, M., Asscher, J. J., Shiner, R. L., & Prinzie, P. (2013). Personality types in childhood: Relations to latent trajectory classes of problem behavior and overreactive parenting across the transition into adolescence. *Journal of Personality and Social Psychology, 104*(4), 750–764. https://doi.org/10.1037/a0031184

van Eldik, W. M., de Haan, A. D., Arends, L. R., & Prinzie, P. (2021). Moderation of associations between interparental stress and (mal)adaptation by adolescents' personality: Contrasting differential susceptibility and diathesis–stress models. *Journal of Personality, 89*(4), 617–633. https://doi.org/10.1111/jopy.12603

White, A. (2020). Gender differences in the epidemiology of alcohol use and related harms in the united states. *Alcohol Research: Current Reviews, 40*(2), 01. https://doi.org/10.35946/arcr.v40.2.01

Wilsnack, R. W., Vogeltanz, N. D., Wilsnack, S. C., & Harris, T. R. (2000). Gender differences in alcohol consumption and adverse drinking consequences: Cross-cultural patterns. *Addiction, 95*(2), 251–265. https://doi.org/10.1046/j.1360-0443.2000.95225112.x

Wilt, J., & Revelle, W. (2017). Extraversion. In T. A. Widiger (Ed.), *The oxford handbook of the five factor model*. Oxford University Press. https://doi.org/10.1093/oxfordhb/9780199352487.013.15.

Zuckerman, M. (1997). The psychobiological basis of personality. In H. Nyborg (Ed.), *The scientific study of human nature* (pp. 3–16). Elsevier Science Ltd.