# *Personality Traits and Drug Use:*
# *A Longitudinal Study Using Data from the British Cohort Study*

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## Statements

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### Statement of Ethics

Study approval statement: A Study Approval Statement was not required for this study as it is based on publicly available data.

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### Conflict of Interest Statement

“The authors have no conflicts of interest to declare.”

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## Author Contributions

**EMG:** Conceptualization, Data curation, Software, Formal analysis, Writing –original draft. **JEMP:** Conceptualization, Supervision, Writing - Review and Editing. All authors approved the final manuscript.

## Data Availability Statement

The data that support the findings of this study are openly available in UK Data Service at http://doi.org/10.5255/UKDA-Series-200001

## Plain Language Summary

Drug use presents significant concerns for health, economics, and society globally. Research highlights the pivotal role of personality traits in understanding drug use. This study aims to contribute to the existing literature by exploring how personality traits at age 10 correlate with drug use at age 30. Utilizing data from the British Cohort Study 1970, we obtained five personality traits from both teacher-completed and self-completion questionnaires when participants were ten years old. The relationship between personality traits and drug use was examined by employing a probit model. Children exhibiting lower levels of conscientiousness/ agreeableness or higher levels of extraversion/internal locus of control at age 10 were more inclined to engage in drug use in adulthood. Moreover, significant differences based on gender and the types of drugs used were observed. These findings might be valuable to policymakers, as they could introduce interventions tailored to specific personality traits to mitigate their adverse effects. For instance, they could offer emotional regulation training for children with low levels of conscientiousness or engage children with high extraversion in stimulating activities such as sports, creative arts, or music.

## Abstract

**Introduction:** Drug use is a significant health, economic and social concern globally. Research indicates that personality traits are crucial in explaining drug use. This paper contributes to the expanding literature by exploring how personality traits at age 10 affect the likelihood of having used any drug at age 30.

**Methods:** Data were extracted from the British Cohort Study 1970. The Big Five dimensions were derived by aggregating items related to distinct traits. Furthermore, probit regression analysis was conducted to ascertain the relationship between personality traits at age 10 and drug use by age 30.

**Results:** Children with low levels of conscientiousness, or agreeableness; or high levels of extraversion, or internal locus of control at the age of 10 are more likely to use any drug in adulthood. In addition, significant differences were observed across gender and types of drugs.

**Conclusions:** These findings suggest that early personality traits play a pivotal role in predicting the likelihood of drug use in adulthood. The results interest policymakers, as they could guide the implementation of personality-targeted interventions to mitigate the adverse effects of specific personality traits. For instance, emotional regulation training could benefit children with low conscientiousness; while stimulating activities such as sports, creative arts, or music could engage children with high extraversion.

**Keywords:** Big-five locus-control childhood drug-user adulthood.

## Introduction

Drug use continues to be a significant public health, social, and economic issue globally. It is estimated that 296 million people worldwide used any drug in 2021 [1]. This challenge is particularly acute in the United Kingdom (UK), where the societal costs of drug use exceed £19 billion annually [2] with 9.4% of adults aged 16 to 59 years having used any drug[3] . Alarmingly, this prevalence rate increases to 21% among individuals aged 16 to 24 years [3]. This is particularly disturbing as the early onset of drug use is a crucial predictor of subsequent drug-related issues[4].

Drug use is intricately linked with various adverse outcomes (violence [5], traffic accidents [6], mental health disorders [7], risky sexual behaviour [8], unemployment [9], and diminished quality of life [10]). Investigating predictive factors is therefore essential to effectively tackle this public health issue. Although numerous studies have highlighted personality traits—defined as enduring patterns of feelings, thoughts, and behaviours [11], as risk factors for drug use[12–17], . there has been a paucity of research focusing on their long-term associations using longitudinal designs [18].

There are various models of personality, but the Five-Factor Taxonomy is the most widely recognized [19]. The Big Five model comprises five broad factors: openness to experience (a propensity for new aesthetic, cultural, or intellectual experiences), conscientiousness (a tendency to be organized, responsible, and diligent), extraversion (a tendency towards sociability), agreeableness (a tendency to behave in a cooperative, unselfish manner), and neuroticism (a chronic level of emotional instability and susceptibility to psychological distress). Research on personality has demonstrated that drug use is positively correlated with openness to experience, extraversion, and neuroticism [12–18,20], whereas both conscientiousness and agreeableness are negatively correlated with drug use [12,13,15–18,20].

A lesser-studied construct to measure personality is Locus of control. This construct reflects the degree to which individuals believe they can influence events in their lives. People with an internal locus of control perceive life events as the direct result of their own actions, whereas those with an external locus of control attribute these events to factors beyond their control, such as luck or fate. [21]. Research has shown that an internal locus of control serves as a significant protective factor against various health issues, including drug use [17,22–27]

The study aims to expand the existing literature by examining the association between early personality traits and drug use in adulthood. Utilizing data from the 1970 British Cohort Study (BCS70), a longitudinal birth cohort study of over 17,000 UK births, our contribution is threefold. Firstly, while the personality psychology literature provides valuable insights, it has primarily relied on cross-sectional data, which introduces the risk of reverse causality. We address this by measuring personality traits at age 10, establishing temporal precedence and reducing concerns about reverse causality. Secondly, our research explores multiple drug categories, enabling the identification of common behavioural patterns across substances. Lastly, we perform gender-stratified analyses to explore potential gender-specific nuances in personality traits.

The main results of our analysis are as follows. First, higher levels of extraversion and internal locus of control in childhood are associated with increased drug use later in life, while lower

levels of agreeableness and conscientiousness in children are linked to a higher likelihood of using any drug in adulthood. Second, the relationship between personality and any drug use is consistent for both cannabis and cocaine use. Third, our analysis indicates gender differences in these associations. Boys who scored higher on extraversion/internal locus of control and lower on agreeableness were more prone to use any drug in adulthood, while girls with higher scores on conscientiousness were less likely to use any drug.

## Methods

*Data Sources*

Data from the "1970 British Cohort Study (BCS70)" was used for the analysis. This extensive longitudinal study follows the lives of over 17,000 individuals born in the UK between April 5th and 11th, 1970. Participants have been meticulously tracked through ten waves of surveys aimed at collecting comprehensive information on health, physical, educational and social development, and economic circumstances among other factors (for further information see [28]). This data has been extensively utilized by numerous studies investigating the relationship between early personality traits and adult outcomes in health, education, and the labour market [22,23,29–31].

Our empirical analysis uses three key waves: at birth (1970), the 10-year mark (1980), and the 30-year (1999/2000). The birth wave included an interview with the mother, antenatal care, delivery information, and details about the first seven days post-birth. The 1980 wave examined aspects such as childhood health, education, social and family circumstances. It involved interviews with parents, a parental self-completion questionnaire, medical and educational assessments, a pupil self-completion questionnaire, and two questionnaires completed by class teachers and head teachers. The 1999/2000 wave encompassed a broad range of topics, including family life, housing, employment, income, qualifications and training, physical and mental health, diet and exercise, alcohol consumption, smoking, drug use, and contact with the police.

*Outcome variable*

Participants were asked if they had used any drug (cannabis, ecstasy, amphetamines, LSD, poppers, magic mushrooms, cocaine, temazepam, sedatives, ketamine, crack cocaine, heroin, and methamphetamine) from the ages of 16 to 30 years. A binary variable was created to indicate whether any drug was used in the 12 months prior to survey (1 for use, 0 for no use). Additionally, individual binary variables were also generated for each drug to indicate its use in the year prior to the survey (1 for use, 0 for no use).

*Personality traits variable*

The Big Five dimensions were derived from a teacher-completed questionnaire when the child was ten years old. Although the BCS70 does not include a specific Big Five questionnaire, it features 51 items related to social behaviour, such as task concentration, fear of new situations, and temper outbursts. Teachers rated each behaviour's intensity from "not at all" (0 points) to "a great deal" (48 points). The Big Five dimensions were constructed by aggregating items associated with each trait, with higher scores indicating a stronger presence of that trait. Four

dimensions were retained: conscientiousness, extraversion, agreeableness, and neuroticism, all showing good internal consistency except for extraversion. Openness was not measured due to the lack of relevant items (see Table S1 and Table S2 in the Supplementary Material for details).

Locus of control was assessed at age 10 using the CARALOC questionnaire, a self-administered survey consisting of 20[1] questions, examples include "Do you feel that most of the time it is not worth trying hard because things never turn out right anyway?" and "When bad things happen to you, is it usually someone else's fault?" [32] Children could choose "Yes" (-1), "Don't know" (0), or "No" (1). A continuous locus of control index was calculated by summing the responses from each item, ranging from -15 (strong external locus of control) to +15 (strong internal locus of control). The locus of control measures demonstrated relatively low internal consistency (see Table S3 in the Supplementary Material for details).

*Control variables*

The present study aimed to explore the relationships between personality traits and drug use, controlling for potential confounding factors. Cognitive ability was included in the model to determine if personality traits have effects independent of cognitive ability. Cognitive ability was assessed at age 10 using a battery of six standardized tests: the four British Ability Scales (word definitions, recall of digits, similarities, and matrices), the abbreviated Edinburgh Reading Test, and the Friendly Maths Test. The first principal component was retained, demonstrating robust internal consistency (Cronbach's alpha = 0.81) and explained 57.44% of the total variance, indicating that a significant portion of the variance in cognitive ability was captured by this factor.

The home environment significantly influences child development [33]. Thus, our model includes control variables related to the home environment. These variables encompass whether the mother gave birth to her first child before the age of 20, the educational attainment of both parents, and the parental social class at the child's birth (classified as unskilled or partly skilled versus managerial, technical, or professional). Furthermore, we introduced a gender dummy variable (1 for male, 0 for female).

Dummy-coded socio-economic factors influencing drug use were also integrated into the model: marital status (1 for married or cohabiting, 0 for single), four dummy variables for labour market status (employed, unemployed, student, and inactive), and several dummy variables for region of residence.

*Analysis Strategy and Statistics*

The relationship between personality traits and drug use can be analysed using the following probit regression model:

$$Y_{it} = G\,(\beta_0+\beta_1*X_{1it-s}+\beta_2*X_{2it}*\beta_3*Z_{it}+\varepsilon_{it}) \qquad (1)$$

where Yit equals one if the respondent i has used any drug at the moment "t", and zero otherwise, $X_{1\mathrm{it}-\mathrm{s}}$ is a vector composed of predetermined control variables obtained before moment "t", $X_{2\mathrm{it}}$

[1] Five of them were excluded as they are distractors

is a vector composed of control variables obtained at the moment "t", and $Z_{\mathrm{it}}$ include the measures of personality traits recorded at the moment "t". G (.) is the cumulative normal distribution function and the error term ($\varepsilon_{it}$) is normally distributed.

However, equation 1 may present risk of reverse causality when estimated since dependent variable may influence the independent variable of interest. For example, it has been demonstrated that people who use cannabis are more likely to show subsequent manic symptoms [34]. Mathematically, it can be expressed as follows:

$$Z_{it}=G(\gamma_0+\gamma_1*V_{it}+\gamma_2*Y_{it}+\varepsilon_{it}) \quad (2)$$

Where $V_{it}$ is a vector of exogenous variables and $Y_{it}$ is a variable that reflects if individuals have used any drug at the moment "t". If the assumptions in the equation 2 is met, then the estimated coefficients in equation 1 will be biased. A methodological approach commonly employed in the existing literature to handle the risk of reverse causality is the utilization of lagged independent variables in the regression analysis [35]. So, the equation to be estimated will be the next:

$$Y_{it}=G(\beta_0+\beta_1*X_{1it-s}+\beta_2*X_{2it}+\beta_3*Z_{it-u}+\varepsilon_{it}) \quad (3)$$

Where variables are defined as equation 1 except $Z_{\mathrm{it-u}}$. This variable includes the measures of personality traits recorded at the moment "t-u" (in our case, at 10 years old)[2].

Each personality trait and cognitive-skill measure has been standardized (mean = 0, standard deviation = 1) to make their coefficients comparable. Consequently, the coefficients are interpreted as a change in the dependent variable for a one standard deviation increase in the independent variable of interest.

## Results

*Prevalence of drug use*

The prevalence of drug use is shown in Table 1. 18.10% of respondents reported having used any drug in the year prior to survey. Cannabis was the most commonly used drug (15.72%),. which is significantly higher than the second most prevalent drug, cocaine (5.61%). The prevalence of other drugs was less than 5%[3].

*Results for using drugs*

Table 2 presents our findings. A one standard deviation increase in extraversion and locus of control at age 10 is associated with an increase in the likelihood of having used any drug in the 12 months prior to the survey by 1.78 and 1.22 percentage points, respectively. Conversely, a one standard deviation increase in agreeableness and conscientiousness at age 10 is associated with a decrease in the probability of having used any drug in the 12 months prior to survey by 1.46

[2] The inclusion of lagged personality measures is only appropriate if personality traits do not change over the lifecycle [57]. This assumption is checked in the sumplentary material.

[3] Due to the low use of these drugs, these substances were not considered for further analyses.

and 2.39 percentage points, respectively. Furthermore, an increment of one standard deviation in the cognitive skill score corresponds to a 3.4 percentage point elevation in the probability of having used any drug within the twelve months preceding the survey administration.

These results are consistent when examining cannabis and cocaine use. Children who have a one standard deviation above average extraversion, locus of control, and cognitive ability at age 10 are more likely to use cannabis or cocaine by age 30. Conversely, those with one standard deviation above the average in agreeableness and conscientiousness are less likely to engage in such behaviours..

Regarding gender differences, our analysis reveals that agreeableness, extraversion, conscientiousness, and locus of control are associated differently across gender. Extroverted, non-agreeable, and internally oriented boys are more inclined to use any drug, while conscientiousness is negatively associated with drug use among women.

*Robustness checks*

We redefined the dependent variable by creating a dummy variable that takes the value of 1 if participants have ever used any drug and 0 if they have never used any drug. The results are presented in column II of Table 3. The findings are qualitatively similar; however, locus of control is no longer statistically significant. The other personality traits remain statistically significant, with more pronounced effects.

In column III of Table 3, a variable indicating potential alcohol dependence or abuse was added to the model. The magnitude and statistical significance of the coefficients were unaffected by this variable. Lastly, column IV of Table 3 introduced a variable reflecting legal issues. Only conscientiousness appeared to be sensitive in this case, as the point estimates decreased, and it became no longer statistically significant. The point estimates for extraversion and agreeableness also decreased, but they remained statistically significant.

## Discussion

The aim of the current study was to investigate how childhood personality traits predict drug use in the United Kingdom. Results for Extraversion, Agreeableness, and Conscientiousness are consistent with previous literature showing a higher prevalence of drug use among people with high Extraversion and low Agreeableness and Conscientiousness [12,13,15–18,20]. People with high Extraversion are characterized by being sociable and tend to attend social events where drugs are commonly used [36], which could explain the associations found in this study. Additionally, Extraversion is significantly related to sensation-seeking [37], which in turn is associated with drug use [38]. Individuals with high Agreeableness typically maintain good relationships and receive substantial social support, which may deter them from engaging in socially proscribed activities such as drug use. Finally, individuals with high Conscientiousness are characterized by adherence to social norms, greater self-control, and less impulsivity [39], which explains why those with low Conscientiousness are more likely to use drugs, as they may struggle to inhibit their impulses.

The current study failed to find a relationship between neuroticism and drug use. Previous studies have yielded mixed results. People with high levels of neuroticism tend to be constantly

stressed and worried about their health; therefore, they may be less likely to use drugs due to anticipated health harms [40] and more likely to use drugs as a coping mechanism to alleviate stressful emotions [41]. These differing findings warrant further examination in future research.

Contrary to expected results, an internal locus of control was not a protective factor, which is inconsistent with most previous studies [17,22–27], but it aligns with some previous studies [42–44]. These authors hypothesized that individuals with a high internal locus of control believe they can control their drug use and limit future negative consequences. Discrepancies in the current study compared to previous ones may be explained by two reasons. First, the measure of locus of control used in the current study consisted of a standard psychological scale [21], and perhaps a drug-related locus of control scale would be more appropriate to reflect drug-specific contexts. Second, locus of control is often measured as a unidimensional continuous scale, although researchers have suggested it is a multidimensional trait, recommending that internal and external locus of control should be measured separately [45]. Further analysis using a multidimensional approach to locus of control and employing context-specific measures may contribute to a better understanding of the relationship between locus of control and drug use.

Unfortunately, it is not possible to capture the trait of openness with the available items in the British Cohort Study. However, this limitation is offset by including cognitive test scores as a proxy. Although personality traits differ from intelligence, previous studies have associated cognitive skills with openness [46]. Individuals with high levels of openness are characterized by imagination, creativity, curiosity, and progressive attitudes, making them more open to novel experiences, such as drug use [47].

Gender differences were also found. These findings are in line with previous literature [48]. Disparities in drug use by gender may be fundamentally rooted in divergent personality traits. Statistical t-test analyses reveal that females exhibit significantly elevated levels of agreeableness and conscientiousness, coupled with lower degrees of internal locus of control, neuroticism, and cognitive abilities[4].

Despite the strength of the current study including its longitudinal design, its relatively large sample size (n=5,629) and the inclusion of a diverse range of variables as potential confounding factors, there are some limitations. First, self-report measures introduce potential biases. Participants might have demonstrated reluctance to disclose drug use (social desirability bias), or may have encountered difficulties in accurately recounting past instances of drug use (recall bias), or positive impressions of people in one area have led participants to have positive feelings in another area (halo effect) [49]. However, confidentiality and anonymity were both guaranteed, and it is expected these effects to be minimal [50]. Future research should use more objective measures to check if similar results are found. Secondly, the validity of the study's findings may be compromised by issues of attrition and item non-response. A 32.73% of the initial participant provided full information for all examined variables. If these losses are not systematically random, the result could be biased. However, a considerable fraction of this sample attrition is attributable to an exogenous factor—a teachers' strike in the United Kingdom schools in 1986 [51]. Third, these results should be interpreted with caution since unobserved or unmeasured

[4] Refer to the Table S4 in Supplementary Material for further details of t-test estimation results split by gender.

variables, such as neighbourhood characteristics [52], parental knowledge/monitoring [53], the influence of peers [54], or socioeconomic status [55], could potentially act as confounding variables, thereby obfuscating the observed associations.

## Conclusions

This study aimed to contribute to the growing literature on early personality traits and drug use in adulthood. Results indicate that certain early personality traits appear to be predictors of drug use later in life. These findings could interest policymakers, as they suggest the potential for personality-targeted interventions to mitigate the negative effects of certain traits, which have been shown to be effective in preventing drug use [56]. Such interventions could be developed and targeted towards children displaying personality risk profiles. For example, individuals with low conscientiousness often exhibit reduced self-control, a known risk factor for drug use. Targeted interventions could focus on enhancing self-control, utilizing emotional regulation, or goal management training to foster greater discipline and impulse control. Similarly, individuals with high extraversion, characterized by a higher threshold for arousal, may use drugs to satisfy their need for stimulation. Alternative interventions could involve providing safer, yet equally stimulating activities such as competitive sports, creative arts, or music, which meet their arousal needs without the associated risks of drug use. These interventions should be implemented as early as possible, since personality traits are much more malleable during childhood [57].

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**Table 1 Prevalence drug use in the last year (%)**

| | Drug use |
|---|---|
| Any drugs | 18.10 |
| Cannabis | 15.72 |
| Cocaine | 5.61 |
| Other drugs | <5 |

**Table 2 Results for the relationship between early personality traits and drug use in adulthood in the last 12 months**

| | Use any drug | Use Cannabis | Use Cocaine | Use any drug (Male) | Use any drug (Female) |
|---|---|---|---|---|---|
| Neuroticism | -0.0033 | -0.0069 | -0.0020 | -0.0044 | -0.0002 |
| | (0.0081) | (0.0077) | (0.0049) | (0.0132) | (0.0098) |
| Conscientiousness | -0.0146* | -0.0186** | -0.0101** | -0.0085 | -0.0200** |
| | (0.0078) | (0.0074) | (0.0047) | (0.0122) | (0.0099) |
| Extraversion | 0.0178** | 0.0149** | 0.0152*** | 0.0275** | 0.0108 |
| | (0.0070) | (0.0063) | (0.0044) | (0.0111) | (0.0086) |
| Agreeableness | -0.0239*** | -0.0231*** | -0.0102** | -0.0333*** | -0.0112 |
| | (0.0067) | (0.0063) | (0.0040) | (0.0103) | (0.0089) |
| Locus of control | 0.0122** | 0.0122** | 0.0152*** | 0.0184** | 0.0055 |
| | (0.0059) | (0.0056) | (0.0037) | (0.0096) | (0.0071) |
| Cognitive ability | 0.0340*** | 0.0331*** | 0.0120*** | 0.0284*** | 0.0400*** |
| | (0.0067) | (0.0064) | (0.0039) | (0.0104) | (0.0084) |

Coefficients are probit average marginal effects. Delta-method standard error in parentheses. Each column includes the following controls: gender, young first-time mother dummy, years of schooling of mother and father at birth, social class of parents at birth dummy, region of residence at 30 years dummies, marital status at 30 years dummies, and labour market status at 30 years dummies.

* Significant at 10%.

** Significant at 5%.

*** Significant at 1%.

**Table 3 Robustness check**

| | Use any drug (last 12 months) | Use any drug (Any time) | Use any drug (last 12 months) | Use any drug (last 12 months) |
|---|---|---|---|---|
| Neuroticism | -0.0033 | -0.0100 | -0.0038 | -0.0016 |
| | (0.0081) | (0.0104) | (0.0080) | (0.0079) |
| Conscientiousness | -0.0146* | -0.0439*** | -0.0138* | -0.0107 |
| | (0.0078) | (0.0100) | (0.0077) | (0.0076) |
| Extraversion | 0.0178** | 0.0411*** | 0.0163** | 0.0144** |
| | (0.0070) | (0.0088) | (0.0069) | (0.0068) |
| Agreeableness | -0.0239*** | -0.0387*** | -0.0224*** | -0.0179*** |
| | (0.0067) | (0.0092) | (0.0066) | (0.0064) |
| Locus of control | 0.0122** | 0.0022 | 0.0130** | 0.0130** |
| | (0.0059) | (0.0077) | (0.0059) | (0.0058) |
| Cognitive ability | 0.0340*** | 0.0896*** | 0.0269*** | 0.0267*** |
| | (0.0067) | (0.0084) | (0.0066) | (0.0066) |
| Controls | | | | |
| Alcohol problems | | | X | X |
| Justice problems | | | | X |

Coefficients are probit average marginal effects. Delta-method standard error in parentheses. Each column includes the following controls: gender, young first-time mother dummy, years of schooling of mother and father at birth, social class of parents at birth dummy, region of residence at 30 years dummies, marital status at 30 years dummies, and labour market status at 30 years dummies.

* Significant at 10%.

** Significant at 5%.

*** Significant at 1%.

**SUPPLEMENTARY MATERIAL**

This Supplementary Material furnishes supplementary material pertinent to the study **"Personality Traits and Drug Use: A Longitudinal Study Using Data from the British Cohort Study".**

Table S1 elucidates our employment of the Big-Five dimensions. Specifically, Column II in Table S1 delineates the specific items utilized to construct our Big-Five dimensions: conscientiousness, extraversion, agreeableness, and neuroticism. Our Big Five measures exhibited robust internal consistency for conscientiousness (Cronbach's alpha = .93), agreeableness (Cronbach's alpha = .88), and neuroticism (Cronbach's alpha = .85). However, extraversion demonstrated comparatively lower internal consistency (Cronbach's alpha = .64). Column III evaluates whether each item positively or negatively contributes to the respective Big-Five dimension. Column IV ascertains whether the item was previously included in the 1986 wave and describes the measurement methodology. Two Likert scales were employed: a 1-3 scale comprising categories of 'Does Not Apply' (1 point), 'Applies Somewhat' (2 points), and 'Certainly Applies' (3 points); and a 1-4 scale with 'Not At All' (1 point), 'Just A Little' (2 points), 'Somewhat' (3 points), and 'Very Much' (4 points).

**Table S1.** Characterization of Big-Five Dimensions

Table S2 enumerates items excluded from our Big-Five measures due to their lack of pertinence to any Big-Five dimension.

**Table S2.** Items not related to Big Five Dimension

Table S3 delineates the specifics of the CARALOC questionnaire, administered at ages 10 and 16, that was used to construct our locus of control measures. With the exception of Item 10, responses of 'Yes,' 'Don't Know,' and 'No' were coded as -1, 0, and 1, respectively. Of the original 20 items in the CARALOC questionnaire, five were omitted for serving as distractors (Items 4, 7, 11, 15, and 19). Raw scores ranged from -15 to 15, with higher scores signifying greater internalization. Our measures of locus of control demonstrated relatively low internal consistency (Cronbach's alpha = 0.63)

**Table S3.** CARALOC at age 10 and 16 years 20 items

Table S4 elucidates the t-test estimation results, disaggregated by gender. The statistical t-test analyses disclose that females demonstrate significantly elevated levels of agreeableness and conscientiousness, whereas males exhibit higher scores in internal locus of control,

neuroticism, and cognitive abilities. No significant gender differences were observed in extraversion.

**Table S4.** t-test estimation results split by gender

Finally, the stability of personality traits throughout the life course remains a contested issue within psychological research. When employing childhood personality variables as predictors of adult outcomes, it is essential to rigorously examine the assumptions concerning their temporal stability. Our approach distinguishes between two forms of stability: mean-level stability and individual-level stability. The former evaluates whether the average trait levels within a population rise or fall over time. Although mean-level stability might indicate minor average changes, suggesting a general stability, it does not account for significant intra-individual variations. The latter examines changes within individuals as they age. For our analysis, we specifically compared personality measures recorded at age 10 with personality measures assessed at age 16[5]. Specifically,

$$\Delta_j = P_j^{1986} - P_j^{1980} \qquad (4)$$

Where $P_j^{1980}$ and $P_j^{1986}$ are our personality traits at age 10 and age 16, respectively. The change in conscientiousness ranges from -12 to 12, agreeableness and extraversion ranges from -9 to 9, and neuroticism ranges from -18 to 18. Finally, the change in locus of control ranges from -30 to 30. Positive values reflect that the trait is more salient at age 16 than at age 10, while negative values reflect that the trait has become less salient over time.

Figure S1 shows the stability of personality traits over the lifecycle. Except for locus of control, the median shift across each dimension is negligible, registering a zero value; furthermore, approximately half of the sample experiences fluctuations in their Big Five attributes confined to a three-point range in either direction. Notably, the data reveal that roughly 60 percent of participants manifest no variation in their agreeableness index, compared to 25 percent in both conscientiousness and extraversion, and 20 percent in neuroticism, measured between the ages of 10 and 16.

**Figure S1.** Change in personality traits between 10 years and 16 years old

[5] Variables pertaining to the Big Five personality dimensions at age 16 were ascertained utilizing a Likert scale format, featuring either three or four ordinal response categories. To ensure methodological consistency, the personality measures obtained at age 10 were converted to a Likert scale format by normalizing the continuous scores relative to the respective number of Likert scale categories (see Table S1 in the Supplementary Material for more details).

**Table S1 Characterization of Big-Five Dimensions**

| Big five dimension | Item (1980 Wave) | Sign | 1986 Wave |
|---|---|---|---|
| Conscientiousness | Shows Perseverance | + | No |
| | Pays Attention in Class | + | No |
| | Completes Tasks | + | No |
| | Child is daydreaming | - | No |
| | Cannot concentrate on particular task | - | Yes (1–4 Likert scales) |
| | Becomes bored during class | - | No |
| | Confused or Hesitant | - | No |
| | Easily Distracted | - | Yes (1–4 Likert scales) |
| | Forgetful on Complex Task | - | No |
| | Shows lethargic/listless behaviour | | No |
| | Is Easily Frustrated | - | Yes (1–4 Likert scales) |
| | Fails to Finish Tasks | - | Yes (1–4 Likert scales) |
| Extraversion | Afraid of new things/situations | - | Yes (1–3 Likert scales) |
| | Rather Solitary | - | Yes (1–3 Likert scales) |
| | Relations with others unhappy/tearful | - | Yes (1–3 Likert scales) |
| | Sullen or sulky | - | Yes (1–4 Likert scales) |
| Agreeableness | Teases Other Children | - | No |
| | Interferes With Others | - | Yes (1–4 Likert scales) |
| | Quarrels With Other Kids | - | Yes (1–3 Likert scales) |
| | Destroys Belongings | - | Yes (1–3 Likert scales) |
| | Bullies Other Children | - | Yes (1–3 Likert scales) |
| Neuroticism | Complains about things | + | No |
| | Displays Outbursts of Temper | + | Yes (1–4 Likert scales) |
| | Cries For Little Cause | + | Yes (1–4 Likert scales) |
| | Behaves 'nervously' | + | No |
| | Fussy or Over-particular | + | Yes (1–3 Likert scales) |
| | Changes Mood Quickly | + | Yes (1–4 Likert scales) |
| | Excitable Impulsive | + | Yes (1–4 Likert scales) |
| | Worried And Anxious | + | Yes (1–3 Likert scales) |
| | Shows restless or over-active behaviour | + | Yes (1–3 Likert scales) |

**Table S2 Items not related to Big Five Dimension**

| | Item |
|---|---|
| No Big Five Dimension | Wetting pants during class |
| | Trips Falls Bumps |
| | Works Deftly With Hands |
| | Clumsy at Games |
| | Difficulty Kicking Ball |
| | Dresses/undresses competently |
| | Difficulty picking up small objects |
| | Squirmy and Fidgety |
| | Manipulates small objects with hands |
| | Drops Things Being Carried |
| | Obsessional about unimportant tasks |
| | Can use Manipulative Equipment |
| | Hums or Makes Odd Vocals |
| | Rhythmic Tapping in Class |
| | Inadequate control of pencil/paint brush |
| | Soils pants during class |
| | Accident Prone |
| | Has twitches, mannerisms/tics |
| | Truants from school |
| | Fearful in Movements |
| | Holds instruments appropriately |

**Table S3 CARALOC at age 10 and 16 years 20 items**

| ITEM | ANSWER | | |
|---|---|---|---|
| | YES | DONT KNOW | NO |
| 1. Do you feel that most of the time it"s not worth trying hard because things never turn out right anyway? | -1 | 0 | 1 |
| 2. Do you feel that wishing can make good things happen? | -1 | 0 | 1 |
| 3. Are people good to you no matter how you act towards them? | -1 | 0 | 1 |
| 4. Do you like taking part in plays or concerts? | | Distractor item | |
| 5. Do you usually feel that it"s almost useless to try in school because most children are cleverer than you? | -1 | 0 | 1 |
| 6. Is a high mark just a matter of „luck" for you? | -1 | 0 | 1 |
| 7. Are you good at spelling? | | Distractor item | |
| 8. Are tests just a lot of guess work for you? | -1 | 0 | 1 |
| 9. Are you often blamed for things which just aren"t your fault? | -1 | 0 | 1 |
| 10. Are you the kind of person who believes that planning ahead makes things turn out better? | 1 | 0 | -1 |
| 11. Do you find it easy to get up in the morning? | | Distractor item | |
| 12. When bad things happen to you, is it usually someone else"s fault? | -1 | 0 | 1 |
| 13. When someone is very angry with you, is it impossible to make him your friend again? | -1 | 0 | 1 |
| 14. When nice things happen to you is it only good luck? | -1 | 0 | 1 |
| 15. Do you feel sad when it"s time to leave school each day? | | Distractor item | |
| 16. When you get into an argument is it usually the other person"s fault? | -1 | 0 | 1 |
| 17. Are you surprised when your teacher says you"ve done well? | -1 | 0 | 1 |
| 18. Do you usually get low marks, even when you study hard? | -1 | 0 | 1 |
| 19. Do you like to read books? | | Distractor item | |
| 20. Do you think studying for tests is a waste of time | -1 | 0 | 1 |

Note: Item 10 was recorded in the other way round

**Table S4 t-test estimation results split by gender**

| Variable | Girls | Boys | Mean Difference |
|---|---|---|---|
| Conscientiousness | 0.185 | -0.203 | 0.388*** |
| Extraversion | -0.010 | 0.011 | -0.021 |
| Agreeableness | 0.130 | -0.142 | 0.272*** |
| Neuroticism | -0.058 | 0.064 | -0.122*** |
| Locus of control | -0.028 | 0.030 | -0.058** |
| Cognitive ability | -0.027 | 0.029 | -0.056** |

* Significant at 10%. ** Significant at 5%. *** Significant at 1%.

**Figure S2. Change in personality traits between 10 years and 16 years old**