**Supplementary Material**

**Personality Assessment**

*Eysenck Personality Questionnaire (EPQ)*[1]*:* EPQ is a questionnaire consisting of 3 scales to measure Extraversion, Neuroticism, and Psychoticism. Each item is responded to using a dichotomous (yes/no) response format. High scores on Extraversion reflect openess, assertiveness, and the tendency to experience positive emotions. High scores on Neuroticism reflect moodiness, worry, and the tendency to experience negative emotions. High scores on Psychoticism reflect impulsiveness, tough-mindedness, and emotional detachment.

*Cloninger’s Temperament and Character Inventory (TCI)*[2]*:* TCI is based on an elaborate psychobiological model of personality and distinguishes between Temperament and Character Dimensions. Each item is responded to using a dichotomous (yes/no) response format. The four Temperament Dimensions are based on the hypothesis that neurochemical transmitters (serotonin for the behavioural inhibition system, dopamine for the activation system, noradrenalin for the behavioural maintenance system) determine the stable stimulus–response patterns which can be viewed as the foundation of personality traits. According to the phylogenetic development of temperament, Cloninger identifies the following Temperament Dimensions: a behavioural inhibition subsystem underlying Harm Avoidance (pessimistic worrying in anticipation of problems), an activation subsystem underlying Novelty Seeking (the initiation of the appetitive approach in response to novelty), a behavioural maintenance subsystem underlying Reward Dependence (the maintenance of behaviour in response to cues of social reward) and an additional independent dimension, Persistence (perseverance despite frustration and fatigue). Further studies have identified three different Character Dimensions uncorrelated with these Temperament Dimensions: Self-Directedness (having will-power and determination), Cooperativeness (individual differences with regard to tolerance and empathy) and Self-Transcendence (individual differences in spirituality).

*Spielberger’s State-Trait Anxiety Inventory—Trait Scale (STAI-T)*[3]*:* Trait anxiety refers to relatively stable individual differences in proneness to anxiety. The STAI-T is a 20-item scale with high internal consistency, high stability, and adequate validity. Each item is scored on a 4-point Likert scale, ranging from 1 (“very false for me”) to 4 (“very true for me”). Some of the questions relate to the absence of anxiety, and are reverse-scored. The range of scores is 20-80, the higher the score indicating greater anxiety.

*Carver and White’s Behavioural Inhibition/Behavioural Acivation System (BIS/BAS) questionnaire*[4]*:* The behavioral inhibition scale (BIS)/behavioral activation scale (BAS) is a 20-item scale that measures dispositional sensitivities of two motivational systems: a behavioral inhibition or withdrawal system and a behavioral activation or approach system. Each item is scored on a 4-point Likert scale, ranging from 1 (“very true for me”) to 4 (“very false for me”). Higher scores on the BIS scale indicate increased behavioural inhibition, and higher scores on the BAS scale indicate increased behavioural activation. The score for the BAS scale is a composite of 3 subscales: drive, reward responsiveness, and fun seeking.

**Modified HSBC – WHO Questionnaire**

HBSC[5] focuses on understanding young people's health in their social context – where they live, at school, with family and friends. Researchers in the HBSC network are interested in understanding how these factors, individually and together, influence young people's health as they move from childhood into young adulthood.

The international network is organized around an interlinked series of focus and topic groups related to the following areas: Body image, bullying and fighting, eating behaviours, health complaints, injuries, life satisfaction, obesity, oral health, physical activity and sedentary behavior, relationships (family and peers), school environment, self-rated health, sexual behavior, socioeconomic environment, substance use (alcohol, tobacco and cannabis), weight reduction behavior.

The HBSC research network is an international alliance of researchers that collaborate on the cross-national survey of school students: Health Behaviour in School-aged Children (HBSC). The HBSC collects data every four years on 11-, 13- and 15-year-old boys' and girls' health and well-being, social environments and health behaviours.

The research venture dates back to 1982, when researchers from England, Finland and Norway agreed to develop and implement a shared research protocol to survey school children. By 1983 the HBSC study was adopted by the WHO Regional Office for Europe as a collaborative study.

**References**

[1] Eysenck H, Eysenck S. Manual for Eysenck Personality Questionnaire. San Diego: Digits, 1975.

[2] Cloninger CB, Svrakic DM, Przybeck TR. A Psychobiological Model of Temperament and Character. Arch Gen Psychiatry 1993;50:975-990.

[3] Spielberger CD, Gorsuch RL, Lushene R, Vagg PR, Jacobs GA. Manual for the State-Trait Anxiety Inventory. California: Consulting Psychologists Press; 1983.

[4] Carver CS, White TL. Behavioral inhibition, behavioral activation, and affective responses to impending reward and punishment: The BIS/BAS Scales. Journal of Personality and Social Psychology 1994;67:319-333.

[5] Child and Adolescent Health Research UK. Health Behavior in School-aged Children (HBSC) study, http://www.uib.no/sites/w3.uib.no/files/attachments/hbsc\_external\_study\_protocol\_2009-10.pdf; 2017 [accessed 20.02.17].

**Supplementary Table 1. Item loadings from Principal Component Analysis on life-style factors.**

|  |  |
| --- | --- |
|  | **Non-linear Principal Components\*** |
|  | **Drug Use** | **School Cohesion** | **Satisfaction from Family Relations & Life** | **Academic Performance** |
| Times of ever using cannabis | 0.991 |  |  |  |
| Age of onset cannabis | 0.991 |  |  |  |
| Schoolmates cohesion |  | 0.806 |  |  |
| Schoolmates solidarity |  | 0.798 |  |  |
| Schoolmates acceptance |  | 0.729 |  |  |
| Satisfaction from family relations  |  |  | 0.781 |  |
| Quality of Life scale |  |  | 0.748 |  |
| First degree relatives with history of mental illness |  |  | -0.713 |  |
| Teacher’s opinion of academic performance |  |  |  | 0.857 |
| Last year’s academic performance |  |  |  | 0.868 |

*\* Extraction Method: Principal Component Analysis. Rotation Method: Varimax. As rotation options are not available within CATPCA in SPSS 19, VARIMAX*

*rotation was performed by saving the transformed variables and applying linear PCA with VARIMAX rotation.*

**Supplementary Table 2. Item loadings from Principal Component Analysis on personality traits.**

|  |  |
| --- | --- |
|  | **Principal Components\*** |
|  | **Anxiety/Neuroticism** | **Sensitivity to Reward** | **Openness to Experience** | **Agreeableness** |
| STAI-Trait Anxiety | 0.896 |  |  |  |
| EPQ-Neuroticism | 0.825 |  |  |  |
| TCI-Self-Directedness | -0.777 |  |  |  |
| BAS-Drive |  | 0.865 |  |  |
| BAS-Reward Responsiveness |  | 0.829 |  |  |
| TCI-Novelty Seeking |  |  | 0.823 |  |
| EPQ-Extraversion |  |  | 0.628 |  |
| BAS-Fun Seeking |  |  | 0.603 |  |
| TCI-Reward Dependence |  |  |  | 0.819 |
| TCI-Cooperativeness |  |  |  | 0.791 |

*\* Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.*

**Supplementary Table 3. Associations of individual characteristics, personal factors, and personality traits with STQ total for male pupils.**

|  |  |
| --- | --- |
|  | **Males** |
|  | **Model 1** | **Model 2** | **Model 3** |
|  | **beta** | **95% CI** | **p-value** | **beta** | **95% CI** | **p-value** | **beta** | **95% CI** | **p-value** |
| Population Density |  |  |  |  |  |  |  |  |  |  |  |  |
| <5000 | Ref. |  |  |  | Ref. |  |  |  | Ref. |  |  |  |
| 5000-10000 | 1.84 | (-1.88, | 5.56) | 0.142 | 2.26 | (-1.47, | 6.00) | 0.233 | 1.96 | (-1.07, | 5.00) | 0.203 |
| 10001-50000 | 3.29 | (-2.75, | 9.34) | 0.147 | 4.09 | (-2.01, | 10.18) | 0.187 | 3.32 | (-1.61, | 8.25) | 0.185 |
| >50000 | 9.60 | (-22.89, | 42.10) | 0.335 | 13.82 | (-18.91, | 46.56) | 0.405 | 12.57 | (-13.93, | 39.07) | 0.350 |
| Family Financial Status |  |  |  |  |   |   |   |   |   |   |   |   |
| Low | Ref. |  |  |  | Ref. |   |   |   | Ref. |   |   |   |
| Average | 0.83 | (-1.65, | 3.30) | 0.510 | 1.98 | (-0.61, | 4.57) | 0.132 | 0.54 | (-1.60, | 2.68) | 0.618 |
| Good | -1.00 | (-3.88, | 1.89) | 0.497 | 0.40 | (-2.64, | 3.44) | 0.794 | -0.80 | (-3.28, | 1.68) | 0.527 |
| Family History of Mental Illness |  |  |  |  |   |   |   |   |   |   |   |   |
| No | Ref. |  |  |  | Ref. |   |   |   | Ref. |   |   |   |
| Yes | 2.82 | (-0.86, | 6.51) | 0.132 | 1.31 | (-2.59, | 5.21) | 0.507 | *2.97* | *(-0.23,* | *6.16)* | *0.068* |
| Season of Birth |  |  |  |  |   |   |   |   |   |   |   |   |
| May to Nov | Ref. |  |  |  | Ref. |   |   |   | Ref. |   |   |   |
| Dec to Apr | **2.87** | **(0.61,** | **5.12)** | **0.013** | **2.77** | **(0.53,** | **5.02)** | **0.016** | **2.69** | **(0.89,** | **4.48)** | **0.004** |
| Ethnicity |  |  |  |  |   |   |   |   |   |   |   |   |
| Greek | Ref. |  |  |  | Ref. |   |   |   | Ref. |   |   |   |
| Immigrants | **2.79** | **(0.43,** | **5.15)** | **0.021** | **2.68** | **(0.31,** | **5.05)** | **0.027** | 1.30 | (-0.61, | 3.20) | 0.181 |
| Migration Index |  |  |  |  |   |   |   |   |   |   |   |   |
| Ratio | -0.48 | (-1.78, | 0.83) | 0.472 | -0.67 | (-1.98, | 0.65) | 0.317 | -0.57 | (-1.64, | 0.49) | 0.287 |
| Personal Factors |  |  |  |  |   |   |   |   |   |   |   |   |
| Drug use |  |  |  |  | 0.62 | (-0.47, | 1.72) | 0.261 | 0.47 | (-0.41, | 1.35) | 0.293 |
| School Cohesion |  |  |  |  | 0.95 | (-0.11, | 2.01) | 0.078 | -0.35 | (-1.28, | 0.57) | 0.451 |
| Satisfaction from Family & Life |  |  |  |  | -1.37 | (-2.66, | -0.07) | 0.039 | 0.49 | (-0.65, | 1.63) | 0.399 |
| Academic performance |  |  |  |  | -0.47 | (-1.54, | 0.60) | 0.388 | -0.07 | (-0.94, | 0.79) | 0.868 |
| Personality Traits |  |  |  |  |  |  |  |  |   |   |   |   |
| Neuroticism |  |  |  |  |  |  |  |  | **4.61** | **(3.55,** | **5.68)** | **<0.001** |
| Sensitivity to Reward |  |  |  |  |  |  |  |  | 0.17 | (-0.73, | 1.08) | 0.703 |
| Openness to Experience |  |  |  |  |  |  |  |  | 0.14 | (-0.74, | 1.02) | 0.753 |
| Agreeableness |  |  |  |  |  |  |  |  | **-1.31** | **(-2.22,** | **-0.41)** | **0.005** |
| *R2 change* |  |  |  | *0.108* |  |  |  | *0.044* |  |  |  | *0.332* |
| *p-value* |  |  |  | *0.039* |  |  |  | *0.110* |  |  |  | *<0.001* |

Bold fonts indicate statistical significance and underlined fonts indicate statistical significance after the application of the Benjamini-Hochberg correction for multiple testing. Bold fonts indicate statistical significance at 0.05.

**Supplementary Table 4. Associations of individual characteristics, personal factors, and personality traits with STQ total for female pupils.**

|  |  |
| --- | --- |
|  | **Females** |
|  | **Model 1** | **Model 2** | **Model 3** |
|  | **beta** | **95% CI** | **p-value** | **beta** | **95% CI** | **p-value** | **beta** | **95% CI** | **p-value** |
| Population Density |  |  |  |  |  |  |  |  |  |  |  |  |
| <5000 | Ref. |  |  |  | Ref |  |  |  | Ref |  |  |  |
| 5000-10000 | *1.87* | *(-0.17,* | *3.91)* | *0.072* | *1.91* | *(-0.11,* | *3.93)* | *0.064* | **2.07** | **(0.30,** | **3.83)** | **0.022** |
| 10001-50000 | 3.66 | (-0.73, | 8.04) | 0.102 | 3.23 | (-1.14, | 7.61) | 0.147 | 2.89 | (-0.93, | 6.72) | 0.138 |
| >50000 | 20.23 | (-2.82, | 43.28) | 0.085 | 18.82 | (-4.38, | 42.02) | 0.111 | 15.77 | (-4.59, | 36.14) | 0.128 |
| Family Financial Status |  |  |  |  |  |  |  |  |   |   |   |   |
| Low | Ref. |  |  |  | Ref. |  |  |  | Ref. |   |   |   |
| Average | -0.36 | (-2.23, | 1.52) | 0.709 | 0.50 | (-1.45, | 2.45) | 0.615 | -0.14 | (-1.85, | 1.58) | 0.875 |
| Good | -1.81 | (-4.06, | 0.44) | 0.114 | -0.45 | (-2.85, | 1.96) | 0.714 | 0.92 | (-1.23, | 3.08) | 0.400 |
| Family History of Mental Illness |  |  |  |  |  |  |  |  |   |   |   |   |
| No | Ref. |  |  |  | Ref. |  |  |  | Ref. |   |   |   |
| Yes | *1.91* | *(-0.07,* | *3.89)* | *0.058* | 1.31 | (-0.94, | 3.55) | 0.252 | **2.28** | **(0.27,** | **4.29)** | **0.026** |
| Season of Birth |  |  |  |  |  |  |  |  |   |   |   |   |
| May to Nov | Ref. |  |  |  | Ref. |  |  |  | Ref. |   |   |   |
| Dec to Apr | -0.74 | (-2.41, | 0.92) | 0.380 | -0.76 | (-2.40, | 0.88) | 0.361 | -0.37 | (-1.80, | 1.07) | 0.614 |
| Ethnicity |  |  |  |  |  |  |  |  |   |   |   |   |
| Greek | Ref. |  |  |  | Ref. |  |  |  | Ref. |   |   |   |
| Immigrants | -0.30 | (-2.16, | 1.56) | 0.752 | -0.51 | (-2.35, | 1.33) | 0.587 | -0.05 | (-1.67, | 1.56) | 0.947 |
| Migration Index |  |  |  |  |  |  |  |  |   |   |   |   |
| Ratio | -0.69 | (-1.61, | 0.24) | 0.144 | -0.65 | (-1.58, | 0.28) | 0.172 | -0.55 | (-1.37, | 0.27) | 0.185 |
| Personal Factors |  |  |  |  |  |  |  |  |   |   |   |   |
| Drug use |  |  |  |  | 0.34 | (-0.48, | 1.16) | 0.416 | -0.10 | (-0.83, | 0.62) | 0.778 |
| School Cohesion |  |  |  |  | **-1.05** | **(-0.20,** | **-1.89)** | **0.015** | 0.48 | (-0.28, | 1.23) | 0.213 |
| Satisfaction from Family& Life |  |  |  |  | -0.71 | (-1.68, | 0.25) | 0.146 | 0.82 | (-0.11, | 1.75) | 0.083 |
| Academic performance |  |  |  |  | -0.62 | (-1.55, | 0.30) | 0.186 | -0.07 | (-0.90, | 0.75) | 0.859 |
| Personality Traits |  |  |  |  |  |  |  |  |   |   |   |   |
| Neuroticism |  |  |  |  |  |  |  |  | **3.32** | **(2.48,** | **4.17)** | **<0.001** |
| Sensitivity to Reward |  |  |  |  |  |  |  |  | **0.83** | **(0.12,** | **1.54)** | **0.022** |
| Openness to Experience |  |  |  |  |  |  |  |  | *0.69* | *(-0.02,* | *1.41)* | *0.056* |
| Agreeableness |  |  |  |  |  |  |  |  | -0.56 | (-1.35, | 0.22) | 0.159 |
| *R2 change* |  |  |  | *0.075* |  |  |  | *0.045* |  |  |  | *0.228* |
| *p-value* |  |  |  | *0.046* |  |  |  | *0.030* |  |  |  | *<0.001* |

Bold fonts indicate statistical significance and underlined fonts indicate statistical significance after the application of the Benjamini-Hochberg correction for multiple testing. Bold fonts indicate statistical significance at 0.0