Supplementary Materials

To accompany

Examining the association between punishment and reward sensitivity and response inhibition to previously incentivized cues across development

Contents:

Additional follow up analyses

Relationship between BIS, age, and reaction time

A GAM was computed with reaction time as the dependent variable and the interaction between age and BIS, as well as the main effects BIS and age, as predictors. Age (*edf* = 6.731, *ref.df* = 7.851, $F = 18.131$, $p < .001$) was a significant predictor of reaction time, with participants responding faster across age. The overall effect of BIS (*edf* = 1.001, *ref.df* = 1.002, $F = 0.141$, $p = .708$) and the interaction between BIS and age did not significantly predict reaction time (*edf* = 2.383, *ref.df* = 2.930, $F = 1.675$, $p = .218$).

Relationship between BIS, age, and impulsivity

Measure of Impulsivity

Self-reported impulsivity was measured using 23 items from the UPPS-P Impulsive Behavior Scale (Watts et al., 2020; Zapolski et al., 2010). Participants under the age of 18 also had a parental-report version of this scale, which was not used in the current study given that older participants did not have this version. Four items were used to measure negative urgency (e.g., "when I am upset, I often act without thinking, $\alpha = 0.70$), four items were used to measure sensation seeking (e.g., "I like new, thrilling things, even if they are a little scary, $\alpha = 0.72$) and four items were used to measure positive urgency (e.g., "I tend to act without thinking when I am very, very happy; $\alpha = 0.85$). Negative urgency, positive urgency, and sensation seeking were measured on a scale from from 1 (*not at all like me*) to 4 (*very much like me*). Four items were used to measure *lack* of planning (e.g., "I tend to stop and think before doing things; $\alpha = 0.82$) and seven items were used to measure *lack* of perseverance (e.g., "I almost always finish a project I start"; $\alpha = 0.73$). Lack of planning and lack of perseverance were measured on a scale from from 1 (*very much like me*) to 4 *(not at all like me)*. All participants in the current sample

completed the same version and for each of these scales and higher scores reflect greater dimensions of impulsivity. Possible scores ranged between 1 and 14 for negative urgency, positive urgency, and sensation seeking, *lack* of planning, and between 1 and 28 for *lack* of perseverance.

We computed five GAMs, with each dimension of impulsivity (lack of perseverance, lack of planning, sensation seeking, negative urgency and positive urgency) modeled as the dependent variable. The interaction between age and BIS, as well as the main effects BIS and age, were entered as predictors. Multiple comparisons were corrected using the Holm method.

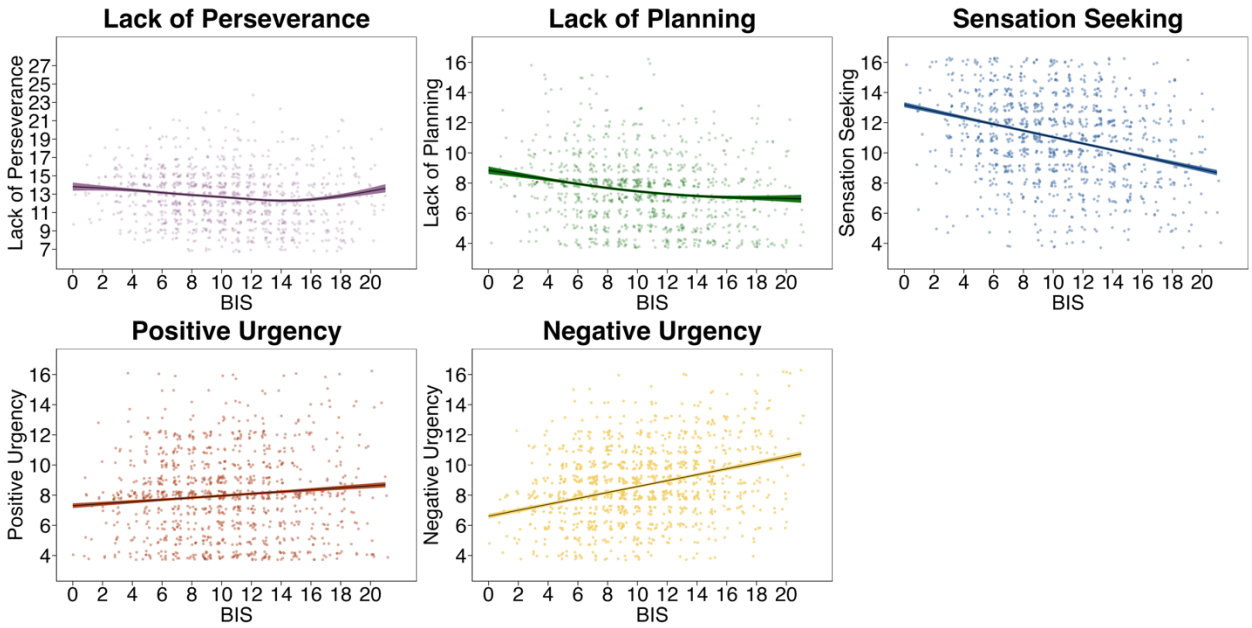
Lack of Perseverance. BIS (*edf* =3.314, *ref.df* =4.165, *F* =3.895, *p* = 0.034) was a significant predictor of perseverance. Age (*edf* =3.755, *ref.df* =4.684, *F* = 3.038, *p* = .070) and the interaction between age and BIS was not significant (*edf* =1.519, *ref.df* =1.849, *F* =1.728, *p* = .753).

Lack of Planning. BIS (*edf* = 2.097, *ref.df* = 2.662, *F* = 9.885, *p* < .001) was a significant predictor of planning. Age (*edf* = 1.001, *ref.df* = 1.002, *F* = 2.129, *p* = .635) and the interaction between age and BIS were not significant (*edf* = 1.790, *ref.df* = 2.210, *F* = 2.688, *p* = .320).

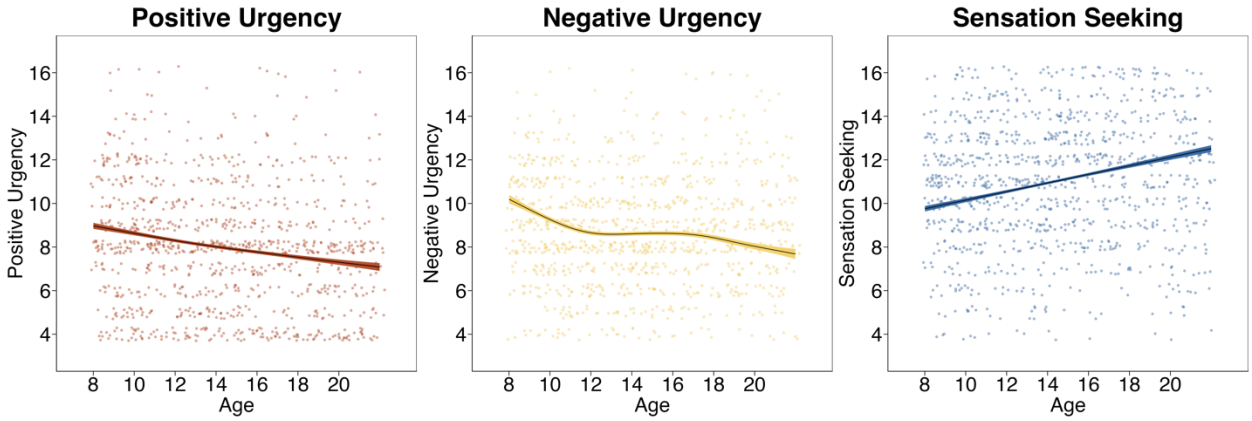
Positive Urgency. Age (*edf* = 1.545, *ref.df* = 1.918, *F* = 16.987, *p* < .001) and BIS (*edf* = 1.001, *ref.df* = 1.003, *F* = 8.324, *p* = .034) were significant predictors of positive urgency. The interaction between age and BIS was not significant (*edf* = 1.330, *ref.df* = 1.592, *F* = 1.837, *p* = .753).

Negative Urgency. Age (*edf* = 3.827, *ref.df* = 4.745, *F* = 8.84, *p* < .001) and BIS (*edf* = 1.001, *ref.df* = 1.002, *F* = 84.86, *p* < .001) were significant predictors of negative urgency. The interaction between age and BIS was not significant (*edf* = 2.313, *ref.df* = 2.854, *F* = 1.57, *p* = .753).

Sensation Seeking. Age (*edf* = 1.000, *ref.df* = 1.000, *F* = 53.111, *p* < .001) and BIS (*edf* = 1.001, *ref.df* = 1.002, *F* = 79.227, *p* < .001) were significant predictors of sensation seeking. The interaction between age and BIS was not significant (*edf* = 1.874, *ref.df* = 2.345, *F* = 2.171, *p* = .635).



Supplementary Fig 1. Effects plots showing the significant relationship between BIS and dimensions of impulsivity. The solid black lines represent the non-linear model fit. The shaded color regions depict the 95% confidence interval (CI). Impulsivity dimensions are presented along the y-axis and BIS is plotted along the x-axis. Raw scores, slightly jittered to show overlapping points, are depicted in the background. The top three panels reveal that higher BIS is associated with *lower* impulsivity. The bottom two panels show that higher BIS is associated with *higher* impulsivity.



Supplementary Fig 2. Effects plots showing the significant relationships between age and dimensions of impulsivity. The solid black lines represent the non-linear model fit. The shaded color regions depict the 95% confidence interval (CI). Impulsivity dimensions are presented along the y-axis and age is plotted along the x-axis. Raw scores, slightly jittered to show overlapping points, are depicted in the background.