Adolescent specific effects of lifetime stress severity on impulsivity

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Introduction

- Impulsivity is a tendency to react to external stimuli, often quickly, without fully considering the long term consequences (Kim and Lee, 2011).
- Adolescence is characterized by increased reward sensitivity and sensation seeking, which is thought to facilitate exploration of novel environments that supports the transition to independence in adulthood[1].
- Environmental factors such as stress have been shown to increase impulsivity and sensation-seeking in adolescents[2] and predict high-risk behaviors, such as substance use, in adults[3].
- Research exploring the effect of stress on impulsivity in adolescents has primarily examined the domain of sensation seeking. Although studies have shown that sources of stress such as childhood trauma have been associated with increased affect related impulsivity in youth ages 9-15 as well as in adults, they lack the developmental lens characterizing this association when transitioning from adolescence into adulthood. Moreover, research that does address other aspects of impulsivity such as negative and positive urgency vary in the type of stress being examined.
- To bridge these gaps, we use comprehensive measures of cumulative lifetime stress and impulsivity with diverse domains of impulsivity extending beyond sensation seeking in a normative sample of adolescents and adults.
- We hypothesized that variation in lifetime stress would be associated with individual differences in impulsivity; specifically, that greater lifetime stress would correspond with exacerbated impulsivity, specifically in adolescence which is a lifespan period marked by normative enhancements in sensation seeking.

Methods

Sample

- 163 healthy participants (ages 10-33, 53 % female, 1 visit each) across two studies who were screened for psychiatric disorders and medications

Stress and Adversity Inventory (STRAIN)[4]

- Comprehensive self-report measure of lifetime stress across 15 domains

UPPS-P Impulsive Behavior Scale[5]

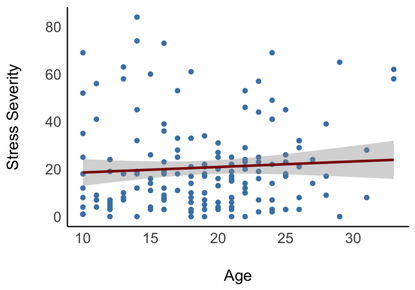
- 59 item self-report measure of impulsivity that assessed Negative Urgency, Lack of Premeditation, Lack of Perseverance, Sensation Seeking and Positive Urgency

Statistical Models

- Linear regression models were used to investigate the association between cumulative lifetime stress severity and impulsivity, controlling for age
- Associations between stress and subscales of impulsivity were further explored
- Additional models tested for age interactions that could indicate differential impacts of stress depending on developmental stage
- Finally, exploratory analyses assessed associations between particular stress domains and subscales of impulsivity

Table 1. Demographic information

	N	%
Sex Assigned At Birth		
Female	87	53%
Male	76	47%
Race		
Asian	19	12%
Black	11	7%
Chose not to answer	1	0.6%
More than 1	11	7%
White	121	74%
Ethnicity		
Hispanic	12	7%
Non-Hispanic	150	92%
Chose not to answer	1	0.6%



Age and stress-related variability in impulsivity

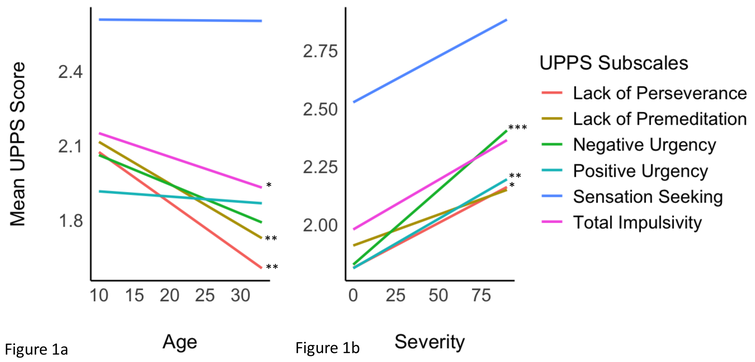


Figure 1a

Figure 1b

Figure 1a. Total impulsivity ($p<0.04$), lack of perseverance($p<0.01$) and lack of premeditation($p<0.01$) decrease with age

Figure 1b. Across individual subscales, associations with stress were most prominent for negative urgency ($p<0.001$) , lack of perseverance ($p<0.04$) and positive urgency ($p<0.01$) when controlling for age.

Associations between stress and impulsivity are strongest in adolescents and young adults

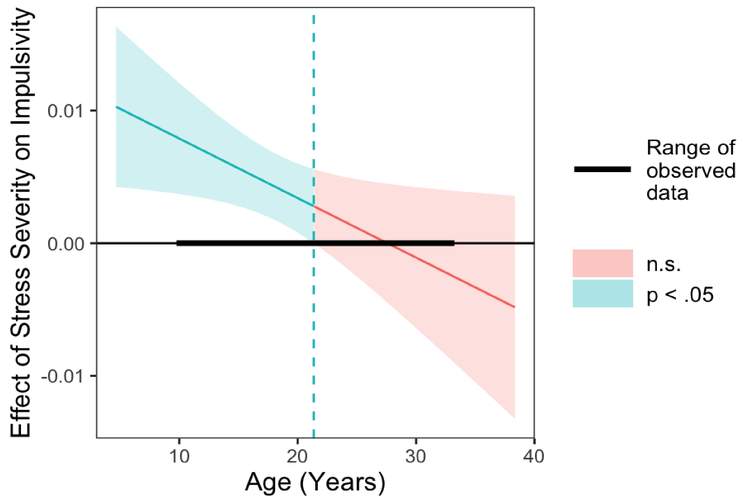


Figure 2. The effect of stress severity on total impulsivity was particularly prominent in adolescents and young adults from ages 10-21.

Increased stress severity specific to safety and threat was associated with increased affect related impulsivity

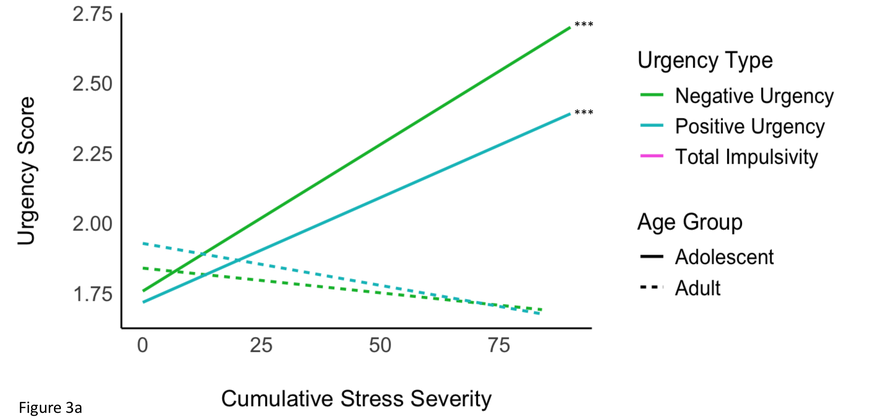


Figure 3a

Figure 3a. Increased stress severity in adolescents is specifically associated with increases in affect related impulsivity including negative ($p<0.001$) and positive urgency ($p<0.001$).

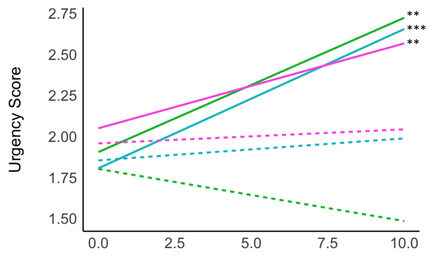


Figure 3b

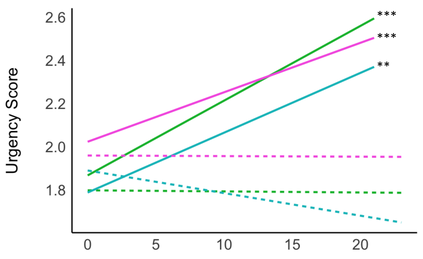


Figure 3c

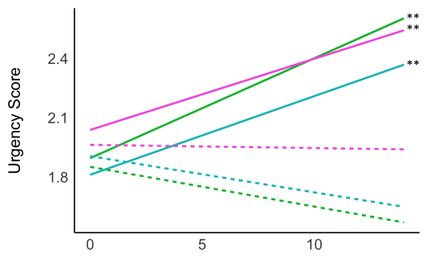


Figure 3d

Exploratory analyses investigated whether specific domains of stress (STRAIN) were related to specific subscales of the UPPS, and whether these associations differed in adolescents (ages 10-21) and adults (ages 22-33). These analyses revealed that stress severity in adolescents (not adults) was particularly associated with affect-related subscales of impulsivity including negative (all $p < .01$) and positive urgency (all $p < .01$) relative to other subscales, and these associations were most prominent within three particular stress domains, including legal related stress (Figure 3b), physical danger related stress (Figure 3c), and life-threatening related stress (Figure 3d).

Conclusions

- Cumulative lifetime stress severity was positively associated with impulsivity, with significant age interactions indicating that the association was strongest in adolescents in comparison to adults.
- Furthermore, associations between stress and impulsivity, particularly in adolescents, were specific to affective subscales of impulsivity, including negative and positive urgency, but were not associated with sensation seeking as found in previous research.
- These results could suggest that adolescent increases in impulsivity, particularly related to affect, may be exacerbated by higher levels of cumulative life stress severity and stress related to safety and threat, during a period when brain functions related to inhibitory control and emotion regulation are still maturing.
- Future work should interrogate this relationship longitudinally to characterize within subject variation of these associations across development.

References

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