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Original Paper

Racial Variation in the Association between Suicidal History and Positive and Negative Urgency among American Children

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Abstract

Background: *Positive and negative urgency reflect specific facets of impulsivity and correlate with several health-related risk behaviors such as aggression, substance use, and suicide. Less is known about how positive and negative urgency are associated with suicidal behaviors of diverse racial groups.*

Aim: *To investigate racial differences in the positive associations between positive and negative urgency and suicide in children in US.*

Materials and methods: *This longitudinal study used the Adolescent Brain Cognitive Development (ABCD) study. Participants were 10535 American children between ages 9 and 10 years old who were followed for up to one year. The independent variable was suicide history. The primary outcomes were the positive and negative urgency measured by the Urgency, Premeditation (lack of), Perseverance (lack of), Sensation Seeking, Positive Urgency, Impulsive Behavior Scale (UPPS-SS). Mixed-effects regression models were used for data analysis.*

Results: *In the overall sample, suicidality was associated with positive and negative urgency in children. Race showed a statistically significant interaction with suicidality on children's positive and negative urgency, indicating stronger effects of suicidality on positive and negative urgency for White, compared to Black and Other/Mixed race children respectively.*

Conclusion: *The effects of positive and negative urgency for suicidality of American children depend on race. White American children show the strongest links between positive and negative urgency and risk of suicide, while the effects of positive and negative urgency on children suicide are weaker for Black and Other/Mixed race children.*

Keywords

personality, positive urgency, negative urgency, population groups, children, parental educational attainment

1. Introduction

Positive and negative urgency reflects two specific facets of impulsive personality trait (Littlefield, Stevens, Ellingson, King, & Jackson, 2016). Both positive and negative urgency operate as overlapping risk factors for a wide range of health-related risk behaviors, including but not limited to addiction, problematic substance use, aggression, and suicide (Cyders, Zapolski, Combs, Settles, Fillmore, & Smith, 2010; Racine et al., 2013; Halcomb, Argyriou, & Cyders, 2019). Positive and negative urgency domains are commonly measured by a scale called urgency, premeditation (lack of), perseverance (lack of), sensation seeking (UPPS) (Wang, Wen, Cheng, & Li, 2017; Wang & Chassin, 2018; Albein-Urios, Martinez-Gonzalez, Lozano, Moreno-Lopez, Soriano-Mas, & Verdejo-Garcia, 2013; Aloi et al., 2020; Verdejo-García, Lozano, Moya, Alcázar, & Pérez-García, 2010).

Compared to children and adults with low positive and negative urgency scores, subjects with high scores on the field of positive and negative urgency respond undesirably to anticipation or omission of reward (Mason, Dunton, Gearhardt, & Leventhal, 2020; Racine et al., 2015; Puhalla, Ammerman, Uyeji, Berman, & McCloskey, 2016; Bardo, Weiss, & Rebec, 2018). Positive and negative urgency are well-documented in tasks that use monetary incentives (Mason, Dunton, Gearhardt, & Leventhal, 2020; Racine et al., 2015; Puhalla, Ammerman, Uyeji, Berman, & McCloskey, 2016; Bardo, Weiss, & Rebec, 2018). Following omission of an expected reward, subjects with high levels of negative urgency show very high levels of frustration and display greater impulsive behaviors than subjects who are low in negative urgency (Bardo, Weiss, & Rebec, 2018). The task-based measures of positive and negative urgency have shown similar results in animal and human studies.

The neurobiology of positive and negative urgency are partially known. A growing body of literature has proposed that neural systems involving interconnections between the prefrontal cortex and the amygdala play a key role in differentiating children with low and high positive and negative urgency (Bardo, Weiss, & Rebec, 2018). The work on the link between suicide and positive and negative urgency is also particularly crucial as it shows whether suicide may be linked to such personality traits. Such information may have some implications for designing prevention programs to tackle suicide in children. Specifically, the results of studies on racial variation in the link between suicidality and positive and negative urgency has the potential to inform scientists and practitioners who work with children who are at high risk of suicide (Bardo, Weiss, & Rebec, 2018).

1.1 Aims

This study had two aims. First, to test the association between suicidal ideation and positive and negative urgency in American children. Second, to compare racial groups of American children for the effects of suicidal ideation on positive and negative urgency. While suicidality is expected to be associated with

more positive and negative urgency (Hypothesis 1), these effects are expected to be more salient for White than non-White children (Hypothesis 2). Stronger association between personality and suicide in White than non-White children is in line with previous work on differential association between risk factors, affect, mood, and suicide in White than Black children and adults (Assari & Lankarani, 2016; Assari, Caldwell, & Mincy, 2018; Assari, 2020).

2. Materials and Methods

2.1 Design, Setting, and Sampling

This cross-sectional study was a secondary analysis of existing data. We borrowed data from the Adolescent Brain Cognitive Development (ABCD) study (Alcohol Research: Current Reviews Editorial Staff, 2018; Casey et al., 2018; Karcher, O'Brien, Kandala, & Barch, 2019; Lisdahl et al., 2018; Luciana et al., 2018). The ABCD is a national children's brain development study with broad diversity based on race, ethnicity, sex, and socioeconomic position (SEP) (Alcohol Research: Current Reviews Editorial Staff, 2018; Auchter et al., 2018).

Participants were recruited from multiple cities across various states in the US. This sample was enrolled through the US school system. The recruitment catchment area of the ABCD, which was composed of 21 participating sites, encompasses over 20% of the entire United States population of 9-10-year-old children. The ABCD applied a carefully designed sampling and recruitment process across various sites, described elsewhere (Alcohol Research: Current Reviews Editorial Staff, 2018; Casey et al., 2018; Lisdahl et al., 2018; Auchter et al., 2018; Asaad & Bjarkam, 2019; ABCD; Feldstein Ewing, Chang, Cottler, Tapert, Dowling, & Brown, 2018; Werneck et al., 2018; Fine et al., 2019; Dick et al., 2019; Dick et al., 2019; Michelini, Barch, Tian, Watson, Klein, & Kotov, 2019; Gray, Schvey, & Tanofsky-Kraff, 2019; Beauchaine, 2020; Buscemi et al., 2018; Exuperio et al., 2019; Lynch et al., 2019; Dick et al., 2019; Hoffman, Howlett, Breslin, & Dowling, 2018), to ensure that the sample is random and representative. Such local randomization efforts yielded a final overall ABCD sample that is a close approximation of national sociodemographic factors. These sociodemographic factors include race and ethnicity, age, sex, SEP, and urbanicity. The SEP target in the ABCD has two sources: 1) the American Community Survey (ACS) and 2) annual 3rd and 4th-grade school enrollment. The first is a large-scale survey of approximately 3.5 million households conducted annually by the US Census Bureau. The second dataset is maintained by the National Center for Education Statistics (NCES), which is affiliated with the US Department of Education. A full description of the ABCD sample and sampling is published here (Garavan et al., 2018).

2.2 Analytical Sample

This study included 10535 9-10 years old children who had data on our study variables, including negative urgency. Children from any race or ethnicity were included. No additional eligibility criteria were considered.

2.3 Measures

Positive and negative urgency. Positive and negative urgency were measured using the Urgency, Premeditation (lack of), Perseverance (lack of), Sensation Seeking, Positive Urgency, Impulsive Behavior Scale (UPPS-SS) (Lynam, Smith, Whiteside, & Cyders, 2006). Positive and negative urgency are inter—related constructs that reflect various aspects of impulsivity. Positive and negative urgency in this study were both treated as continuous measures, with a higher score indicating higher positive and negative urgency traits (higher impulsivity). The UPPS-SS is a valid and reliable measure (Verdejo-García, Lozano, Moya, Alcázar, & Pérez-García, 2010). Figure 1 shows the distribution of the outcomes.

Race. Race, a self-identified variable, was a categorical variable with the following levels: Black, Asian, Other/Mixed Race, and White (reference group). Racial variation in negative urgency is well described (Holochwost et al., 2016).

History of serious suicidal ideation. History of serious (active) suicidal ideation was measured in this study, using the K-SADS. Parents were interviewed for their child's history of suicidal ideation and reported their symptoms. Any serious suicidal ideation in the past, regardless of their timing, were the outcome. This variable was treated as a categorical/dichotomous outcome with 0 for absence and 1 for presence of any suicidal ideation.

Parental educational attainment. Parental educational attainment was a five-level categorical variable. Responses included 1= less than high school diploma; 2 = high school diploma or GED; 3 = some college; 4 = college degree; and 5 = some graduate education.

Ethnicity. Ethnicity was also a self-identified variable and a categorical variable: Hispanics vs. non-Hispanics (reference category). Age was a dichotomous measure with a response of either 9 or 10 (years old). Ethnicity is shown to have an impact on negative urgency (Holochwost et al., 2016).

Sex. Sex, 1 for males and 0 for females, was a dichotomous variable. This variable was the effect modifier.

Age. Parents reported the age of their children. Age is a predictor of negative urgency (Hongwanishkul, Happaney, Lee, & Zelazo, 2005).

Parental marital status. The household's marital status was a dichotomous variable: married = 1 and non- married = 0. Family structure and marital status of the parents are shown to predict children's negative urgency (Rhoades, Greenberg, Lanza, & Blair, 2011).

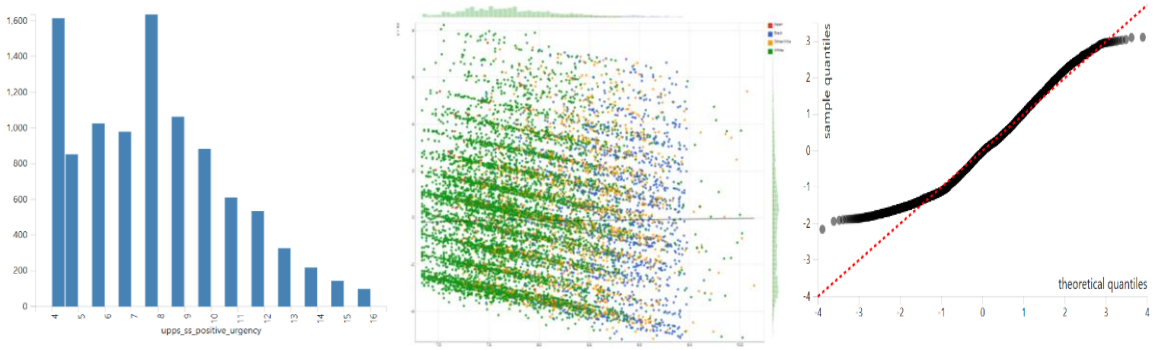
Family Income. Family income was a three-level categorical variable. The item used to measure parental educational attainment was "What is your total combined parental educational attainment for the past 12 months? This should include income (before taxes and deductions) from all sources, wages, rent from properties, social security, disability and veteran's benefits, unemployment benefits, workman". Levels were 1= less than $50,000; 2 = $50,000 to $99,000; 3 = $100,000 or more.

2.4 Data Analysis

To describe our sample, we reported mean (SD) for continuous variables and frequencies and percentages for categorical variables in the pooled sample and by sex. We also used Chi-square or independent sample t test for bivariate analysis. Our main analysis applied mixed (random) effect models that allowed adjusting for the data's nested nature. This analysis was performed in the Data Analysis and Exploration Portal (DEAP), National Data Archive (NDA), National Institutes of Health (NIH). Participants were nested within families who were nested within 21 sites. As such, our models corrected for non-independence of our observations. Two mixed-effects multivariable models were performed. In both of these models, positive or negative urgency was the outcome, race was the moderator, suicide history was the predictor, and covariates (sex, ethnicity, age, parental income, parental educational attainment, and parental marital status), as well as site and family ID were controlled. *Model 1 (no interaction)* was estimated in the absence of any interaction terms. *Model 2 (the interaction model)* added interaction terms between race and suicide history. Table 1 shows the formula used for *Model 1* and *Model 2* in the DEAP system. Regression coefficient (b), SE, and p-values were reported for each model. Figure 1 also shows the results of testing assumptions.

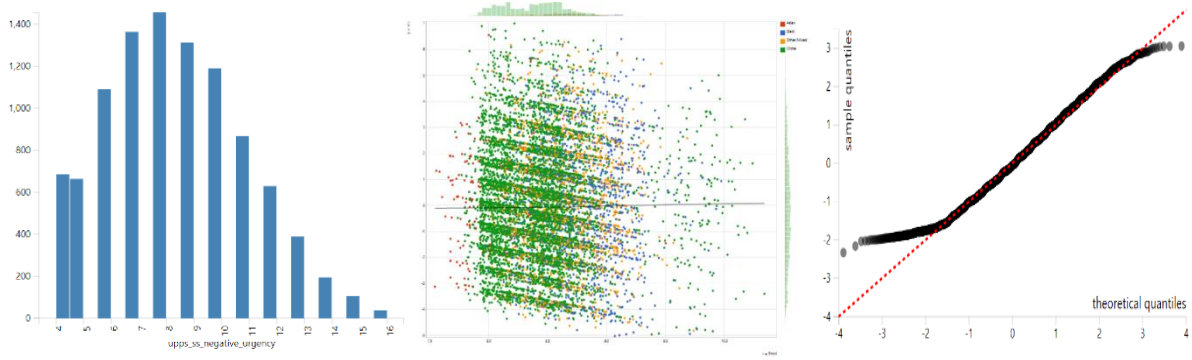
Table 1. Model Formula

Positive Urgency	**Negative Urgency**
Model 1	**Model 1**
upps_ss_positive_urgency ~ ksads_23_958_p + race.4level + sex + high.educ.bl + married.bl + age + household.income.bl + hisp	upps_ss_negative_urgency ~ ksads_23_958_p + race.4level + sex + high.educ.bl + married.bl + age + household.income.bl + hisp
Random: ~(1|abcd_site/rel_family_id)	Random: ~(1|abcd_site/rel_family_id)
Model 2	**Model 2**
upps_ss_positive_urgency ~ ksads_23_958_p + race.4level + sex + high.educ.bl + married.bl + age + household.income.bl + hisp + ksads_23_958_p * race.4level	upps_ss_negative_urgency ~ ksads_23_958_p + race.4level + sex + high.educ.bl + married.bl + age + household.income.bl + hisp + ksads_23_958_p * race.4level
Random: ~(1|abcd_site/rel_family_id)	Random: ~(1|abcd_site/rel_family_id)



(a) (b) (c)

Positive urgency



(a) (b) (c)

Negative urgency

Figure 1. Distribution of the Predictor (a), Residuals (b), and Quantiles (c)

2.5 Ethical Aspect

For this study, we used a fully de-identified data set. As such, the study was non-human subject research. This study was exempted from a full review Institutional Review Board (IRB). However, the main study protocol, the ABCD, was approved by the IRB at the University of California, San Diego (UCSD), and several other institutions. Participants signed consent or assent depending on their age (Auchter et al., 2018).

3. Results

Table 1 depicts the summary statistics of the pooled sample and by race. The current analysis was performed on 10393, 9-10 years old children from which 51% were male, and 49% were female.

Table 2 summarizes our mixed-method regression model that adjusted for the nested nature of the data. These models were in the overall (pooled) sample. *Model 1* (Main Effect Model) did show a positive effect of suicidal ideation history on positive and negative urgency in the pooled sample. Figure 2 shows a positive effect of suicidal ideation history on positive and negative urgency in the pooled sample.

Table 2. Descriptive Data Overall and by Race

	level	All	White	Black	Asian	Other/Mixed	p
		10393	6882	1517	231	1763	
		Mean(SD)	Mean(SD)	Mean(SD)	Mean(SD)	Mean(SD)	
Age (Months)		118.95 (7.46)	119.01 (7.49)	118.93 (7.23)	119.35 (7.78)	118.68 (7.50)	0.310
Positive Urgency		7.97 (2.95)	7.72 (2.84)	8.77 (3.22)	7.61 (2.71)	8.28 (3.03)	< 0.001
Negative Urgency		8.48 (2.63)	8.39 (2.57)	8.80 (2.84)	8.10 (2.41)	8.63 (2.68)	< 0.001
Serious Suicidal Ideation (Past)		0.03 (0.18)	0.03 (0.17)	0.03 (0.17)	0.03 (0.17)	0.04 (0.20)	0.227
		n(%)	n(%)	n(%)	n(%)	n(%)	
Race	White	6882 (66.2)	6882 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	< 0.001
	Black	1517 (14.6)	0 (0.0)	1517 (100.0)	0 (0.0)	0 (0.0)	
	Asian	231 (2.2)	0 (0.0)	0 (0.0)	231 (100.0)	0 (0.0)	
	Other/Mixed	1763 (17.0)	0 (0.0)	0 (0.0)	0 (0.0)	1763 (100.0)	
Sex	Female	4974 (47.9)	3239 (47.1)	760 (50.1)	117 (50.6)	858 (48.7)	0.113
	Male	5419 (52.1)	3643 (52.9)	757 (49.9)	114 (49.4)	905 (51.3)	
Parental Education	< HS Diploma	384 (3.7)	145 (2.1)	124 (8.2)	6 (2.6)	109 (6.2)	< 0.001
	HS Diploma/GED	852 (8.2)	322 (4.7)	338 (22.3)	3 (1.3)	189 (10.7)	
	Some College	2666 (25.7)	1453 (21.1)	604 (39.8)	18 (7.8)	591 (33.5)	
	Bachelor	2748 (26.4)	2042 (29.7)	228 (15.0)	63 (27.3)	415 (23.5)	
	Post Graduate Degree	3743 (36.0)	2920 (42.4)	223 (14.7)	141 (61.0)	459 (26.0)	
Married Family	No	3151 (30.3)	1400 (20.3)	1061 (69.9)	32 (13.9)	658 (37.3)	< 0.001
	Yes	7242 (69.7)	5482 (79.7)	456 (30.1)	199 (86.1)	1105 (62.7)	
Household Income	< 50K	2983 (28.7)	1247 (18.1)	1001 (66.0)	36 (15.6)	699 (39.6)	< 0.001
	> =100K	4437 (42.7)	3532 (51.3)	179 (11.8)	141 (61.0)	585 (33.2)	
	> =50K& < 100K	2973 (28.6)	2103 (30.6)	337 (22.2)	54 (23.4)	479 (27.2)	
Hispanic	No	8451 (81.3)	5734 (83.3)	1442 (95.1)	212 (91.8)	1063 (60.3)	< 0.001
	Yes	1942 (18.7)	1148 (16.7)	75 (4.9)	19 (8.2)	700 (39.7)	

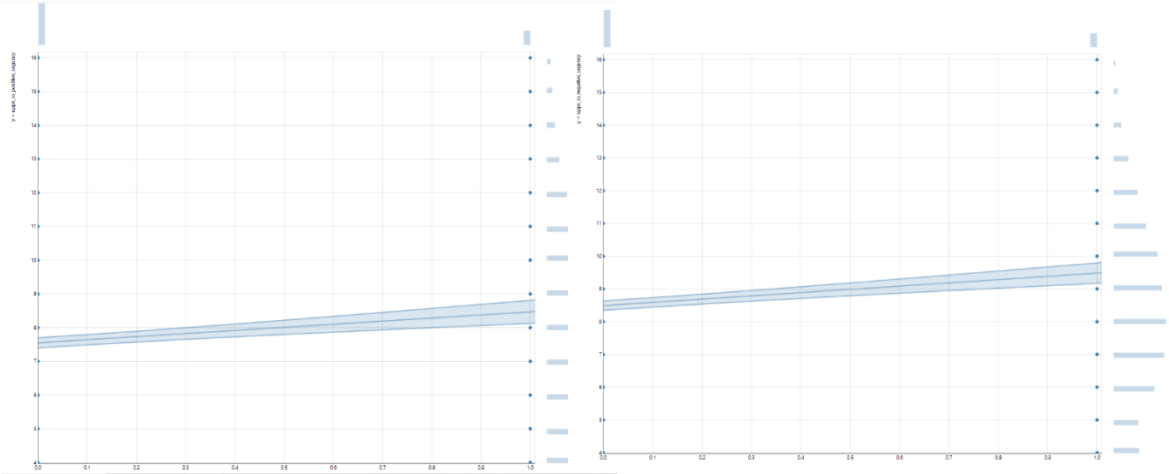
Table 3 summarizes our mixed-method regression model that adjusted for the nested nature of the data. These models were in the overall (pooled) sample. *Model 2* (Interaction Model) showed a significant interaction term between race and suicidal ideation history on positive and negative urgency in the pooled sample. Figure 2 shows interactions between suicidal ideation and race on positive and negative urgency in the pooled sample.

Table 3. The Results of Mixed Effect Models with the Interaction Terms

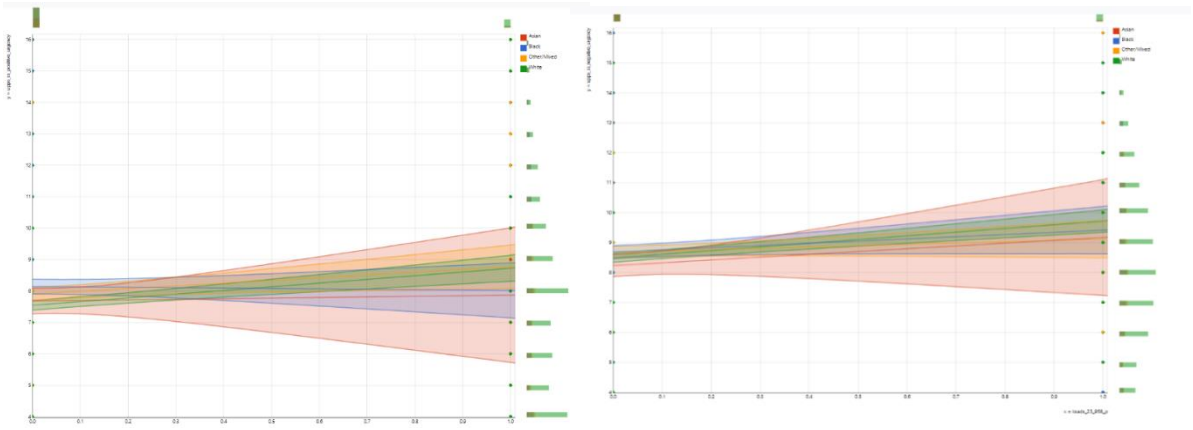
	B	SE	t	P	sig	Estimate	Std. Error	t value	Pr(>|t|)	sig
		Positive Urgency					**Negative Urgency**			
Model 1										
History of Serious Suicidal Ideation	0.91851***	0.16157	5.68	< 1e-6		0.99144***	0.14584	6.80	< 1e-6	
Race (Black)	0.55949***	0.09767	5.73	< 1e-6		0.18177*	0.08895	2.04	0.0410164	
Race (Asian)	0.10598	0.19854	0.53	0.59349		-0.26486	0.18014	-1.47	0.1415053	
Race (Other/Mixed)	0.34853***	0.08224	4.24	2.27E-05		0.16150*	0.07477	2.16	0.0308037	
Model 2										
History of Serious Suicidal Ideation	1.17702***	0.20232	5.82	< 1e-6		1.22991***	0.18253	6.74	< 1e-6	
Race (Black)	0.59701***	0.09870	6.05	< 1e-6		0.19737*	0.08987	2.2	0.02809	
Race (Asian)	0.13600	0.20135	0.68	0.4993932		-0.2548	0.18267	-1.39	0.16316	
Race (Other/Mixed)	0.35897***	0.08371	4.29	1.82e-05		0.19192*	0.07611	2.52	0.01169	
Race (Black) × History of Serious Suicidal Ideation	-1.29919**	0.48665	-2.67	0.0076042		-0.4999	0.43991	-1.14	0.25581	
Race (Asian) × History of Serious Suicidal Ideation	-0.99012	1.12483	-0.88	0.378748		-0.2932	1.01633	-0.29	0.77297	
Race (Other/Mixed) × History of Serious Suicidal Ideation	-0.31295	0.40612	-0.77	0.4409729		-0.7932*	0.3667	-2.16	0.03055	

*P < 0.05 **P < 0.01 ***P < 0.001

Age, marital status, race, and ethnicity (Hispanic) are controlled in both models.



Positive urgency all **Negative urgency overall**



Positive urgency by race **Negative urgency by race**

Figure 2. Association between Suicide History and Positive and Negative Urgency by Child Race

4. Discussion

Our findings showed that history of serious suicidal ideation is associated with higher positive and negative urgency, however, the link between negative and positive urgency and suicidality in American adolescents depends on race. That is, the links between negative and positive urgency and suicidality are more salient in White than Black and Mixed/Other race children, respectively.

There are a few studies showing differential correlates of suicide by race. In a study among 7076 non-Hispanic White or African American 9-10 years old adolescents from the ABCD study, overall, having married parents was associated with lower odds of ever having attempted suicide (OR = 0.50; 95% CI = 0.28–0.91; p = 0.022). However, an interaction was found between race and marital status on the outcome, suggesting that the protective effect of having married parents against suicidal attempts (OR = 6.62; 95% CI = 2.21–19.86; p = 0.001) is weaker for African American than White children. As a result of diminished protective effects of marital status against suicidal attempts in African American adolescents, African American children from White families remain at risk (Assari, Boyce, Bazargan, & Caldwell, 2020). In other studies (Assari, Moghani Lankarani, & Caldwell, 2017; Assari, 2015; Assari, Lankarani, & Lankarani, 2013; Assari, Schatten, Arias, Miller, Camargo, & Boudreaux, 2019; Assari, 2018; Assari, 2018), predictors of suicidality are shown to vary in White and Black children and adults. While discrimination becomes a significant predictor of suicide in Black children (Assari, Moghani Lankarani, & Caldwell, 2017), discrimination does not seem to be a major factor for White children. A large body of research has also shown the effect of religious involvement as a strong protective factor against suicidality of Black populations. Joe and others have also published extensively on suicidal ideation and attempts of Black population (Shropshire, Pearson, Joe, Romer, & Canetto, 2008; Chatters, Taylor, Lincoln, Nguyen, & Joe, 2011; Joe & Marcus, 2003; Joe & Bryant, 2007; Joe, Clarke, Ivey, Kerr, & King, 2007; Joe, Marcus, & Kaplan, 2007; Lee & Wong, 2020; Taylor, Chatters, & Joe, 2011; Joe & Kaplan, 2001).

This study had several limitations. The design was cross sectional. Our measure of suicidality was very simplistic. We did not measure a wide range of non-SEP confounders such as history of psychiatric disorders. The sample was not random. We also did not measure parenting and family context. Our sample size was also imbalanced, being the largest in White, and the smallest in Asian children. Despite these limitations, these results are the first to explore variation of the link between various aspects of impulsive personality and suicidality across diverse racial groups of children.

Our results have implications for practice and research. Researchers may not consider race as a control variable in suicide research. Race, may have a direct effect, but also alters the correlates of suicide. The results may help tailor suicide prevention across racially diverse groups of children. Emotion regulation, impulsivity, and negative and positive urgency may have less salient effects for suicidality of Black than White children. Investing on such impulsive traits may have larger effects for suicide prevention of Black than White children.

5. Conclusions

Racial groups of children differ in the link between positive and negative urgency and suicide history. This means that for Black children, positive urgency is a less salient determinant of suicide than White children. For other/mixed race children, negative urgency is a less salient determinant of suicide than White children. However, boys with high and low parental education do not vary much in their negative urgency, and they all have high levels of negative urgency. The results are important given the role of negative and positive urgency on suicidality.

Conflicts of Interest: The author declares no conflict of interest.

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Conflicts of Interest: The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results.

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