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Preliminary Analysis of Low-Level Alcohol Use and Suicidality with Children in the Adolescent Brain and Cognitive Development (ABCD) Baseline Cohort

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Abstract

Cross-sectional analyses were conducted in the baseline cohort of the Adolescent Brain and Cognitive Development (ABCD) Study to determine if lifetime low-level alcohol use was associated with an increased likelihood of lifetime suicidality (N=10,773, ages 9-10). Among the lifetime suicide ideation and attempt groups, 37.7% and 36.2% reported lifetime low-level alcohol use, respectively; versus 22.2% in the non-suicidality group. Children reporting lifetime alcohol use (i.e., ≥ a sip) showed a nearly two-fold increase in their odds of lifetime suicidality compared to those with no previous alcohol use. Future prospective research with this cohort will continue to probe alcohol-suicidality associations.

Keywords

suicide prevention; substance use; children

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Declaration of interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

1. Introduction

Alcohol use is linked to suicidality during adolescence and young adulthood[1-4]. However, children as young as 9-years-old report drinking behavior[6,7] and suicidality[8,9]; therefore it is possible that an association between alcohol and suicidality can be detected much earlier in life than is currently known[5,10,11]. We aimed to cross-sectionally examine whether self-reported low-level alcohol use (lifetime alcohol drinks and/or sip, meaning any alcohol use by ages 9-10 years old, including sipping) is associated with an increased likelihood of lifetime suicidality (lifetime SI and SA) among children enrolled in the Adolescent Brain Cognitive Development (ABCD) study baseline cohort[12-14].

2. Methods

2.1. Protocol

ABCD is an NIH-funded 10-year longitudinal study being conducted across 21 sites in the U.S. (n=11,875)[15]. These analyses focus on the cross-sectional association between self-reported lifetime low-level alcohol use and lifetime suicidality at baseline study. A detailed account of the study protocol and recruitment strategy is previously published[12,16-20].

2.2. Measures

Participants and their parent/guardian were interviewed in separate rooms to maintain confidentiality. The analyses presented here drew from a subset of self- and parent-report questionnaires described below from the ABCD baseline data (Release 2.0.1).

Youth-report of lifetime (any previous) suicidal ideation (SI) or suicide attempt (SA) were obtained from a computerized version of the Kiddie-Schedule for Affective Disorders and Schizophrenia (K-SADS-PL DSM-5[21])[22]. The sample was separated into three groups; (1) SI, (2) SA and (3) non-suicidality (i.e., denied SI/SA). Participants who endorsed both SI and SA were classified as SA. Youth completed the iSay Sip Inventory[23] to characterize participants' lifetime low-level alcohol use (any previous alcohol use, including sips).

Demographic covariates included parent-reported demographic variables of participant sex, race/ethnicity, parental education and marital status from the PhenX toolkit[24-30]. Additional covariates included parent-reported Achenbach Child Behavior Checklist (CBCL[31]) T-scores to control for internalizing and externalizing problems; the Behavioral Inhibition System and Behavioral Approach System (BIS/BAS) subscale scores[32] measuring avoidance and approach sensitivities reflective of motivational traits[32-34]; sleep problems and average sleep duration assessed using the parent-reported Sleep Disturbance Scale for Children (SDSC)[35]; and parents/guardians report of the presence/absence of family history of alcohol use disorders in first- and second-degree relatives of the participant on the Developmental History Questionnaire[35-38].

2.3. Data Analysis

Differences in demographic and behavioral variables between the outcome variable groups for SI, SA and non-suicidality (i.e., NON) groups were determined using ANOVAs for

continuous variables and χ^2-tests for categorical variables. All covariates were included in primary, post-hoc, and secondary analyses.

A multilevel (2-level, participant within study site) multinomial logistic regression[40] was completed to examine whether any lifetime alcohol use increased odds of classification into SI/SA versus NON, with NON used as the reference group. Post-hoc analyses explored whether alcohol use increased likelihood of SA versus SI classification. The multilevel multinomial logistic regression was re-run with the sex at birth by alcohol use interaction term to explore whether the relationship between lifetime low-level alcohol use and classification of suicidality differed by birth sex.

3. Results

3.1. Participant Characteristics

A total of 10,773 participants (52% male) had valid data on the predictor (lifetime low-level alcohol use) and outcome (group membership to lifetime SI, lifetime SA, or non-suicidality and were included in the analyses. Approximately 54.7% of the participants were White, 13.3% Black, 19.5% Hispanic/Latino, and 12.5% “Other/Mixed”. The average age was 9.9 years.

3.2. Prevalence of Alcohol Use and Suicidality

Nearly one-quarter of participants (23.5%) self-reported lifetime low-level alcohol use. A total of 7.6% reported lifetime history of SI, and 1.3% reported lifetime history of SA. Within the SI group and SA groups, 37.7% and 36.2% reported alcohol use, respectively, as did 22.2% in the NON group. Within the group who reported any alcohol use, 14.1% reported lifetime SI/SA, versus 7.2% among those with no history of alcohol use.

Differences were found across the three groups (SI/SA/NON) for sex (male %, SI 58%/ SA 57.2%/ NON 51.6%, p=<.001), race/ethnicity (white %, SI 55.3%/ SA 40.6%/ NON 55%, p=<.001), parent education (some college %, SI 32.3%/SA39.1% /NON 28.7%, p=<.001), parent marital status (married %, SI 66.5%/SA 50.7%/NON 70.1%, p=<.001), and for the covariates avoidance (mean and SD, SI 10.7 (3.9)/SA 11.0 (4.3)/NON 9.4 (3.7), p=<.001) and approach sensitivity ([reward responsiveness mean and SD, SI 11.4 (2.9)/SA 11.6 (3.1)/NON 11.0 (2.9), p=<.001], [drive mean and SD, SI 4.5 (3.2)/SA 5.7 (3.7)/NON 4.0 (3.0), p=<.001], [fun seeking mean and SD, SI 6.3 (2.8)/SA 7.3 (3.0)/ NON 5.6 (2.6), p=<.001]), internalizing (mean and SD, SI 52.3 (11.4)/SA 55.9 (12.6) /NON 48 (10.4), p=<.001) and externalizing behaviors (mean and SD, SI 49.7 (11.0)/ SA 53.6 (12.5)/NON 45.1 (10.0), p=<.001), average sleep duration (9-11 hours %, SI 46.6%/SA 31.2%/NON 48.7%, p=<.001), sleep problems (mean and SD, SI 38.6 (9.6)/ SA 40 (9.3)/NON 36.3 (7.9), p=<.001) and family history of alcohol use disorders (positive %, SI 18.6%/SA 17.4%/NON 14.7%, p=.002).

3.3. Multilevel, Multinomial Logistic Regression Models

Reporting lifetime alcohol use significantly increased children’s odds of being classified as SI (p=<.001, 95%CI 1.822, 2.399) and SA (p=.034, 95%CI 1.349, 3.763), versus NON

(Figure 1). Post-hoc analyses revealed that lifetime alcohol use did not increase the odds of being classified as SA versus being SI (p=.767, 95%CI .667, 1.742) group.

Several covariates were associated with increased odds of being classified as SI versus NON, including male sex (*p*=.002, 95%CI 1.095, 1.378), more internalizing behaviors [*p*=<.001, 95%CI 1.009, 1.027], and externalizing behaviors [*p*=<.001, 95%CI 1.019,1.035]), higher avoidance (*p*=<.001, 95%CI 1.066, 1.102), and approach sensitivity to fun seeking (*p*=<.001, 95%CI 1.021, 1.074). Similarly, covariates related to increased odds of classification as SA versus NON were more internalizing [*p*=<.001, 95%CI 1.032, 1.066] and externalizing [*p*=<.001, 95%CI 1.018, 1.057]) behaviors, more sleep problems (p=.018, 95%CI .959, .996) and higher avoidance sensitivity (*p*=.027, 95%CI 1.010, 1.134) and approach sensitivity to fun seeking (*p*=<.001, 95%CI 1.094, 1.312). The interaction of sex at birth and alcohol use did not increase odds of being classified as SI (*p*=.414, 95%CI .879, 1.391) or SA (*p*=.814, 95%CI .549, 2.163), versus NON.

4. Discussion

The relationship between alcohol use and suicidality in young adults is well established[27,43-46]. Here, we provide evidence that children as young as 9-10 years, a group underrepresented in the alcohol-suicide literature[41,42], are experimenting with alcohol and experiencing suicidality, and that associations between alcohol use and suicidality can be detected in this age group[42]. Future prospective research in this diverse cohort is needed to better understand biological and behavioral mechanisms that may be underlying any alcohol-suicidality relationships observed as these youth get older and alcohol use increases. Emotional functioning[47], avoidance and approach sensitivity (linked to negative affect and impulsivity[48,49]), and sleep problems[39,50,51] were accounted for in our statistical modeling and did not eliminate the relationship between alcohol use and suicidality, yet they warrant further examination of the influence they have on suicidality and psychopathology during adolescence since they were associated with increased odds of suicidality in this large sample of children.

Rates of lifetime SI (7.6%) and SA (1.3%) have important clinical relevance in suicide prevention. First, our findings underscore a need for suicide risk screening with children as young as 9-10 years-old (e.g., school, primary care)[51-54]. To date, there are no validated suicide risk screening tools for youth as young as 9 years of age[53-57,68]. Additionally, nearly all the available interventions for suicidality are designed for adults[60]. Prevention and interventions need to be adapted to meet the unique needs of children[58,59]. Considering that children who have attempted suicide are up to 6 times more likely to attempt suicide again in adolescence[61], this vulnerable population deserves greater attention from researchers, funding organizations and policymakers[61,62].

4.1. Limitations

Given the cross-sectional nature of these analyses, causal inferences cannot be determined from these results. Nevertheless, establishing an association between alcohol use and suicidality in children is clinically valuable as it can aid in identifying at-risk youth. Children who present with suicidality could be screened for alcohol use and vice versa.

Further, establishing this association paves the way for examining causal mechanisms in future research.

Also, self-report data have inherent limitations, particularly in research on sensitive topics such as illegal or stigmatized behaviors. The reporting of alcohol use and suicidality may be influenced by stigma, desirability bias, fear of intervention by child protection or social services[63,64] and loss of autonomy[65]. Although this remains possible, ABCD was designed minimize these effects. Research assistants underwent extensive training to alleviate concerns about disclosure of responses to parent/guardian. Additionally, proportions of the sample reporting alcohol use and suicidality are higher than expected based on previous research[7,66,67], thus, systematic underreporting is unlikely. In follow-up ABCD studies, we will implement validity checks on self-report items by examining consistency over time on responses to repeated measures of substance use and SI/SA.

4.2. Conclusions

This is the first large sample study to demonstrate that alcohol use (even low-level) is associated with increased odds of suicidality in children as young as 9-10 years. Increased efforts to prevent low-level alcohol use among children as young as 9-10 years old is warranted and may help reduce the rising rates of suicide.

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Highlights

- Determine if low-level alcohol use increases the likelihood of suicidality in children.
- Children who reported any lifetime alcohol use (i.e., a sip or more) showed a nearly two-fold increase in their odds of reporting lifetime suicidality compared to their counterparts who reported no previous alcohol use.
- Longitudinal research will help establish the causal relationship and etiology of the alcohol-suicidality association.

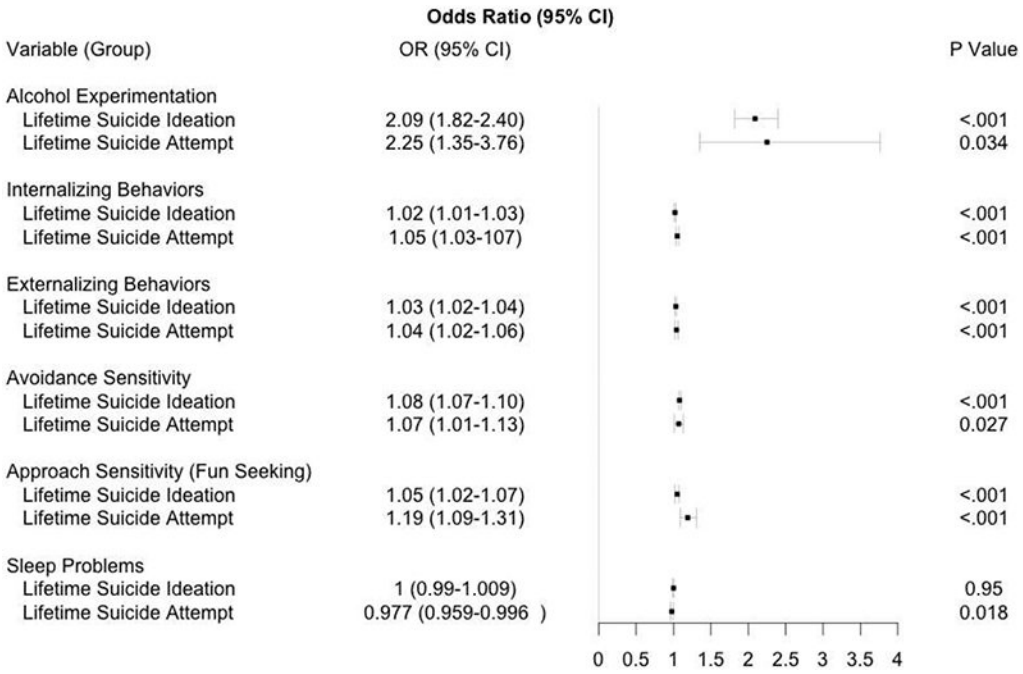

FIGURE 1:
Forest Plot of Significant Predictors per Group