Release Notes: Adolescent Brain Cognitive Development Study℠ (ABCD Study®) Data Release 4.0

Substance Use

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Change Log
October 2021 – Data Release 4.0

- Initial release

List of Instruments

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ABCD Parental Rules on Substance Use	prq01
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General Information

The following information refers to the Adolescent Brain Cognitive Development Study℠ (ABCD) Data Release 4.0 available from https://nda.nih.gov/abcd. An overview of the ABCD Study® is at https://abcdstudy.org and detailed descriptions of the assessment protocols can be viewed at https://abcdstudy.org/scientists/protocols.

This document describes the contents of various instruments available for download. To understand the context of this information, see *Release Notes ABCD README FIRST* and *Release Notes ABCD Imaging Instruments*.

To access additional detailed information about the instruments administered in this domain, the constructs they are intended to measure and relevant citations for each measure, please see: https://www.ncbi.nlm.nih.gov/pubmed/29559216

Instrument Descriptions

ABCD Parental Rules on Substance Use: Parental substance use approval and rules.

ABCD Parent and Youth Community Risk and Protective Factors (CRPF): Questions regarding perceived availability (Arthur, Briney, Hawkins, Abbott, Brooke-Weiss, & Catalano,

2007; Trentacosta, Criss, Shaw, Lacourse, Hyde & Dishion, 2011). Parent and youth complete independent forms. Youth form first given in two-year follow-up.

ABCD Youth Participant Last Use Survey Day 1 2 3 4 (PLUS): Measures recent OTC, nicotine, caffeine use just prior to neurocognitive tasks or MRI. Will help control for withdrawal or acute effects of nicotine, caffeine, OTC or prescription medications.

ABCD Parent Participant Last Use Survey Day 2 3 4 (PLUS): Measures youth's recent OTC, nicotine, caffeine use just prior to neurocognitive tasks or MRI. Will help control for withdrawal or acute effects of nicotine, caffeine, OTC or prescription medications.

ABCD Youth Substance Use Interview: Data from this module will provide information in the following domains**. Baseline Notes**: 1) baseline lifetime patterns of substance use (including total dose in standard units, maximum dose, first use, first regular use) of all major drug categories (alcohol, nicotine (cigarette, ENDS, smokeless tobacco, cigars, hookah, pipe, nicotine replacement), marijuana (smoked flower, blunts, vaped flower, edibles, vaped concentrates, smoked concentrates, THC-infused alcohol, tinctures, synthetic THC), CBD, other vaped products,cocaine, cathinones, methamphetamine, ecstasy/MDMA, ketamine, GHB, heroin, hallucinogens (others), salvia, psilocybin, steroids, inhalants, prescription depressants/sedatives, prescription opioids, OTC, others & a drop-down menu capturing rare substances of abuse (e.g., kava, kratom)); 2) low-level use (alcohol, nicotine, cannabis), 3) caffeine use in past 6-months and a 4) timeline follow back in past 6-months was collected to measure patterns of use. **Follow-up Sessions:** 1) yes/no information about whether they used and whether this was their first use (first use yes/no, age of first use) for each drug category since their last session was collected; 2) low-level use (alcohol, nicotine, marijuana) questionnaires were administered; 3) caffeine use in past month; 4) timeline follow back measured detailed patterns of use for each substance category since last session. Other instruments measured across **baseline** and **follow-up sessions**: 1) peer group deviance (measuring peer substance use); 2) substance use attitudes, including intentions to use, perceived harm (added at 1-year follow-up), peer tolerance (added at 1-year follow-up), and expectancies of substance use (alcohol, nicotine, marijuana; added at 1-year follow-up; ENDS, Vaping added at 3-year follow-up); 3) subjective response to substance use (alcohol, nicotine, marijuana); and 5) consequences of substance use, including alcohol hangover symptoms, alcohol problem consequences (RAPI), nicotine problem consequences (PATH Nicotine Dependence), marijuana problem consequences (MAPI), and other drug problem consequences (DAPI); cannabis withdrawal symptoms was added at 3-year follow-up. NOTE, for 2-year and 3-year follow-up sessions administered during the COVID-19 pandemic (starting March, 2020), some interviews were conducted virtually; see *1. NDA 4.0 Release Notes ABCD README FIRST* for guidance on how to control for this factor.

> ***Lifetime patterns & Follow-up Questions (Baseline***): At baseline, measures when they first used a drug, first regular (weekly) use, lifetime quantity (in standard doses), maximum dose (standard), last date of use. Follow-up questions about cigarettes,

ENDS, cannabis, heroin, methamphetamine, and cocaine are also given to assess for issues related to mode of use, route of administration, and flavoring.

Recent Use Patterns & Follow-up Questions (Follow-up): At follow-up sessions, measures if they used each drug and whether this was their first use (yes/no, and date of first use). Follow-up questions about cigarettes, ENDS, cannabis, heroin, methamphetamine, and cocaine are also given to assess for issues related to mode of use, typical dosage, route of administration, and flavoring.

Timeline Follow-back (Lifetime): At **baseline**, detailed patterns over past 6 months were measured. The TLFB method is used to obtain specific quantitative estimates of drug use over a period of time using memory cues and a calendar format (Sobell & Sobell, 1996). At **follow-up sessions**, up to the previous 12-months were measured using the TLFB calendar for any drug they endorsed using. Variables representing total standard dose, total days used, max dose (in standard unit in a single day), average standard doses on use days, total standard doses on weekend, and last date of use). Co-use days (marijuana+alcohol, marijuana+nicotine, nicotine+alcohol) were calculated (days where the participant reported use of both substances). Combined marijuana (cannabis) and nicotine use day variables are calculated, summing any modes of marijuana or nicotine use days together into singular variables. Note: "_calc" variables are included with 0's added to replace blank responses (in non-users). - See more at: https://www.ncbi.nlm.nih.gov/pubmed/29559216

Alcohol Low Level Use (iSip): Nine questions assess participants' earliest sipping experience (including when, context, what type of alcohol) and whether or not a full drink was consumed (items adapted from a survey developed by Jackson, Barnett, Colby, & Rogers, 2015). Youth only fill out the follow-up questions (beyond number of sips) for their first sipping occasion.

Nicotine Low Level Use: Ten questions assess first low-level experiences with nicotine products including (e.g., first puff of a combustible cigarette or e-cigarette, first dip of smokeless tobacco), type of nicotine product, where and when this occurred, and whether it led to further use (adapted from alcohol sipping measure). Youth only fill out the follow-up questions (beyond number of puffs) for their first use occasion.

Cannabis Low Level Use: Eight questions assess first low-level experiences with cannabis products including initial experiences with cannabis (first puff or taste of marijuana), where they obtained the substance, when these experiences occurred, whether it led to further use and subjective experience of feeling "high" (adapted from

alcohol sipping measure). Youth only fill out the follow-up questions (beyond number of puffs/tastes) for their first use occasion.

Patterns of Use, TLFB, Low-Level Use Note: Recording vaping vs. smoking MJ flower and concentrate: Due to significant rise in vaping behaviors in youth (see MTF, 2020 data), changes were made to the ABCD SU protocol to *separately* measure vaping versus smoking marijuana (MJ) flower and concentrate at all follow-up points administered **after 6/24/20**. **Baseline**: At the time of these changes, all baseline assessments were already completed. Thus, a variable indicating vaped MJ flower use "su_tlfb_vape_mj_fl_use" was added, but coded as zero if the youth reported no MJ puffing/tasting (tlfb_mj_puff=0), if they did report puffing/trying MJ flower, then "su_tlfb_vape_mj_fl_use" is reported as missing at baseline. Similarly, a variable reflecting vaped MJ concentrate "su_tlfb_vape_mj_oils_use" was added, although no youth reported using concentrate at baseline. **Low-level MJ use** variable denoting product type (first_mj_4) was recoded onto the same scale used for follow-up, which included vaped/smoked MJ flower and oil; however, route of information was not known for MJ flower at that timepoint, so those responses were kept as smoked flower (coded items 1-2). No additional variables regarding vaping were added but are available at follow-up time-points 1-3." **Follow-up Sessions**: **1) Recorded/recoded vaping vs. smoking MJ flower and concentrate (SU Patterns)**: Due to significant rise in vaping behaviors in youth (see MTF, 2020 data), changes were made to the ABCD SU follow-up protocol to *separately* measure vaping versus smoking marijuana (MJ) flower and concentrate (su_tlfb_mj_use_l measures smoking MJ flower while su_tlfb_vape_mj_fl_use measures vaping MJ flower; su_tlfb_mj_conc_use_l measures smoking MJ concentrate while su_tlfb_vape_mj_oils_use measures vaping MJ concentrate). Similar changes were made to measure whether this was the youth's first use of these products: tlfb_mj_first_use; su_tlfb_mj_fl_first_use, su_tlfb_mj_oils_first_use, tlfb_mj_con_first_use). Vaping/smoking MJ flower and concentrate were noted on the TLFB gating variable (tlfb_6mo_skip_l) and measured on TLFB calendar (*see note on calendar variables added below*). Note: in some cases, data on route of administration for MJ flower (su_tlfb_past_yr_prim_3_mj_l) was missing, when that occurred smoked MJ flower data remained the same and vaped MJ flower was coded missing. We *dropped* vaping from route of administration question for smoking MJ concentrate and recoded into: tlfb_6mo_10_concmj_l. For participants who completed the SU interview prior to 6/24/20, their answers were recoded by the SU WG (based on their response to original follow-up questions measuring route of administration indicating they typically smoked or vaped their flower or concentrate) and mapped onto the new variables outlined above. Options for cannabinoid content of MJ edibles was also recoded to exclude the CBD-only option (su_tlfb_past_yr_mj_edible_l). We also added gating question about whether they

vaped anything (gating to new vaping expectancies or motives questionnaires; xskipout_vape). Only the re-coded interview is released in NDA 4.0 for all relevant time-points. 2) **Changes to Low Level MJ Use Questionnaire**: Similar to the SU Patterns use interview, we added vaping wording (to instructions) and separated out vaping versus smoking MJ flower and concentrate as options for their first experience (first_mj_4_l); this was recoded based on route of administration responses, in the cases where route of administration was not available, smoked MJ flower remained coded the same (options 1-2). Additional options for who the MJ belonged to were also added (first_mj_6_l; options 13-18). 3) **Added vaping MJ flower/concentrates to TLFB Calendar**: Similar to the use variables, vaped MJ flower (tlfb_cal_scr_vmjf_) and vaped MJ oil (tlfb_cal_scr_vmjo_) variables were added. If the TLFB calendar was administered prior to these changes, responses were re-coded whenever possible to separately reflect vaping vs. smoking MJ flower or oil based on route of administration responses at that time-point (su_tlfb_past_yr_prim_3_mj_l, tlfb_6mo_10_concmj_l); if this information was missing, then their answers remained coded as smoked flower or smoked concentrate.

Caffeine Intake: Measures quantity/frequency of various caffeine beverage use in past 6 months (**baseline**) or past month (**follow-up** periods).

Peer Tolerance of Use: Measure of how youth believes their close friends would feel about them engaging in substance use behaviors, including drinking, smoking, using e-cigarettes, marijuana use, nonmedical use of prescription drugs, and “other drug” use. Modified from Monitoring the Future form (University of Michigan, Institute for Social Research, Survey Research Center. United States Department of Health and Human Services. National Institutes of Health. National Institute on Drug Abuse. 2009. Monitoring the Future: A continuing study of American youth. Ann Arbor, MI). Added at one-year follow-up

Peer Group Deviance: Measures friends’ use of alcohol, nicotine, marijuana, inhalants, and “other” drugs (Freedman, Thornton, Camburn, Alwin & Young-demarco, 1988).

PATH Inventory, Intention to Use: Measures the youth’s intention to use alcohol, nicotine and marijuana (Pierce, Choi, Gilpin, Farkas, & Merritt, 1996; Strong, Hartman, Nodora, Messer, James, White, et al., 2015).

Beginning at the 3-year follow up, there was a change to some questions in the Youth PATH Intention to Use Tobacco Survey (ITU) to differentiate between cigarettes and electronic nicotine delivery, detailed below:

> **path_alc_youth1_l** (Have you ever been curious about using a tobacco product such as cigarettes, e-cigarettes, hookah, or cigars?) Beginning at 3-year follow up, changed to:

Have you ever been curious about using a cigarette? (**path_alc_youth1a_l**)

Have you ever been curious about using an electronic nicotine or vaping product, such as e-cigarettes, vape pens, or Juuls? (**path_alc_youth1b_l**)

- The individual responses to these questions are not available in Release 4.0, but will be available in Release 5.0. In Release 4.0, the following logic is used for 3-year follow up data to populate the variable **path_alc_youth1_l**:
    - Response options are: 1, Very curious | 2, Somewhat curious | 3, A little curious | 4, Not at all curious | 5, Don't know | 6, Refused to answer
    - If the response for EITHER new question is **<5** populate "path_alc_youth1_l" with the LOWEST of the two numbers (i.e., the greatest endorsed curiosity)
    - If response to BOTH new questions are **5** populate "path_alc_youth1_l" with 5.
    - If **one response is 5 and one is 6** for the two new questions, populate "path_alc_youth1_l" with 5
    - If response to BOTH new questions are **6** populate "path_alc_youth1_l" with 6.

path_alc_youth4_l (Do you think you will try a tobacco product soon?) Changed to:

Do you think will try a cigarette soon? **(path_alc_youth4a_l**)

Do you think you will try an electronic nicotine or vaping product, such as e-cigarettes, vape pens, or Juuls, soon? (**path_alc_youth4b_l**)

- The individual responses to these questions are not available in Release 4.0, but will be available in Release 5.0. In Release 4.0, the following logic is used for 3-year follow up data to populate the variable **path_alc_youth4_l**:
    - Response options are: 1, Definitely yes | 2, Probably yes | 3, Probably not | 4, Definitely not | 5, Don't know | 6, Refused to answer
    - If the response for EITHER new question is **<5** populate "path_alc_youth4_l" with the LOWEST of the two numbers (i.e., the greatest likelihood of trying soon)
    - If response to BOTH new questions are **5** populate "path_alc_youth4_l" with 5.
    - If **one response is 5 and one is 6** for the two new questions, populate "path_alc_youth4_l" with 5
    - If response to BOTH new questions are **6** populate "path_alc_youth4_l" with 6.

path_alc_youth7_l (If one of your best friends were to offer you a tobacco product, would you try it?) Changed to:

If one of your best friends were to offer you a cigarette, would you try it? (**path_alc_youth7a_l**)

If one of your best friends were to offer you an electronic nicotine or vaping product, such as e-cigarettes, vape pens, or Juuls, would you try it? (**path_alc_youth7b_**l)

- The individual responses to these questions are not available in Release 4.0, but will be available in Release 5.0. In Release 4.0, the following logic is used for 3-year follow up data to populate the variable **path_alc_youth7_l**:
  - Response options are: 1, Definitely yes | 2, Probably yes | 3, Probably not | 4, Definitely not | 5, Don't know | 6, Refused to answer
  - If the response for EITHER new question is **<5** populate "path_alc_youth7_l" with the LOWEST of the two numbers (i.e., the greatest likelihood of trying if friend offered)
  - If response to BOTH new questions are **5** populate "path_alc_youth7_l" with 5.
  - If **one response is 5 and one is 6** for the two new questions, populate "path_alc_youth7_l" with 5
  - If response to BOTH new questions are **6** populate "path_alc_youth7_l" with 6.

Perceived Harm of Substances: Measure of youth's opinion regarding how much people risk harming themselves (physically or in other ways) if they engage in various substance use behaviors, including drinking, smoking, using e-cigarettes, marijuana use, nonmedical use of prescription drugs, and "other drug" use. Modified from Monitoring the Future form (University of Michigan, Institute for Social Research, Survey Research Center. United States Department of Health and Human Services. National Institutes of Health. National Institute on Drug Abuse. 2009. Monitoring the Future: A continuing study of American youth. Ann Arbor, MI). Added at one-year follow-up.

Alcohol Expectancies Questionnaire – Adolescent, Brief (AEQ-AB): Measures thoughts, feelings and beliefs about effects of alcohol use. Asked If "heard of" alcohol. The AEQ-AB was designed as a brief version of Alcohol Expectancy Questionnaire-Adolescent (Brown, Christiansen and Goldman, 1987; Greenbaum, Brown and Friedman, 1995). This 7-item instrument is intended for use among clinicians to assess and test alcohol expectancy effects (Stein, Katz, Colby, Barnett, Golembeske, Lebeau-Craven and Monti, 2006). Added at 1-year follow-up.

Adolescent Smoking Consequences Questionnaire (ASCQ) – Modified (added at 1-year follow-up): Measures thoughts, feelings and beliefs about the effects of cigarettes. Asked if "heard of" tobacco (Lewis-Esquerre, Rodrigue & Kahler, 2005)

Marijuana Effect Expectancy Questionnaire-Brief (MEEQ-B): Measures thoughts, feelings and beliefs about effects of marijuana. Asked if "heard of" marijuana (Torrealday, Stein, Barnett, Golembeske, Lebeau, Colby & Monti, 2008).

Acute Subjective Response to Alcohol: From the Self-Rating of the Effects of Alcohol (SRE): asks the respondent to think back about their drinking and to list the number of standard drinks required to experience the effects of alcohol; the first 5 times of drinking, the past 3 months of regular drinking, and the period of heaviest drinking are queried. (Schuckit, Smith, & Tipp, 1997). Added at 1-year follow-up.

Acute Subjective Response to Tobacco: Assesses early response to tobacco smoking, and it may also be used for marijuana smoking. Seven items inquire about pleasant and unpleasant experiences and ask respondents if they encountered various effects while smoking a tobacco cigarette for the first time (Pomerleau, Pomerleau, & Namenek, 1998).

Acute Subjective Response to Marijuana: Assesses early response to marijuana smoking. Eleven items inquire about pleasant and unpleasant experiences and ask respondents if they encountered various effects while using marijuana for the first time (Agrawal, Madden, Martin & Lynskey, 2013; Agrawal, Madden, Martin & Lynskey, 2013).

Hangover Symptom Scale: Measures frequency of hangover symptoms over the last 6 months. HSS queries 13 hangover symptoms that are manifestations of toxic neurologic effects, measured on a scale ranging from never to 100% of drinking occasions (Slutske, Piasecki, & Hunt-Carter, 2003).

Rutgers Alcohol Problem Index (RAPI): Symptom frequency checklist of alcohol-related problems over past 6 months. RAPI queries how many times in the last year the participant has felt certain consequences for drinking alcohol (White, H.R. & Labouvie, E.W. 1989).

PATH Nicotine Dependence: Symptom frequency checklist of nicotine-related problems over past 6 months (Pomerleau, O. F., Pomerleau, C. S., Namenek, R. J., 1998; Prokhorov, A.V., Pallonen, U.E., Fava, J.L., Ding, L., & Niaura, R. 1996).

Marijuana Dependence Index (MAPI): Symptom frequency checklist of marijuana-related problems over past 6 months. MAPI (adapted from the RAPI) queries the frequency of physiological and psychological consequences of marijuana use (Johnson & White, 1989; Simons, Coreia, Carey & Bursar, 1998).

Drug Problem Index (DAPI): Symptom frequency checklist of "other" drug-related problems over past 6 months (Adapted from MAPI).

Vaping Motives: This inventory was created by a subgroup on the ABCD Substance Use workgroup, including Drs. Krista Lisdahl, Mary Heitzeg, Marsha Lopez, Susan Tapert, and Gaya Dowling. The instructions were modified from the MTF 2020 interview and Tobacco Motive Inventory and items were modified from the Reasons for ENDS

Use, PATH Study, Tobacco Motive Inventory with additional items created by the subgroup.

ABCD Youth Alcohol Screen: Past day alcohol use - Breathalyzer

ABCD Youth Toxicology Test: Past day drug use - Oral Fluid Draeger

ABCD Youth NicAlert Test: Recent tobacco use – Urine NicAlert

ABCD Youth Hair Sample: Information collected by RAs at the time of collecting ~100 strands of hair for metabolites indicating substance use in past month or longer.

ABCD Youth Hair Results: Toxicology results of hair for metabolites indicating substance use in past month or longer.

ABCD Mid-Year Phone Interview (MYPI) – Substance Use: At 6-month and 18-month follow-up, youth are asked a series of Yes/No questions over the phone about their substance use over the past 6 months.

ABCD Parent Substance Use Density, Storage, and Exposure: This inventory measures three household substance use issues: household density, second-hand exposure, and storage. Household density was developed by the ABCD Substance Use workgroup subgroup consisting of Drs. Krista Lisdahl, Mary Heitzeg, Kenneth Sher, Susan Tapert, Christina Lessov-Schlaggar, and Andrew Health. The survey is based on semi-structured household substance use interviews. It measures household substance use density (i.e., number of adults or youth who use each substance) in up to three households where the youth spends regular time. Second-hand cigarette, ENDS or smoked cannabis exposure in these households is also measured (modified from PhenX “Current Environmental Tobacco Exposure 060701”; assessing total days and hours per day in a typical week for each substance). It also asks parents how each household stores alcohol and drugs (visible/unlocked, hidden/unlocked, or locked) (Bartels et al, 2016; Friese, Grube & Moore, 2012).

Summary Scores – Caffeine summary scores can be found in the **ABCD Summary Scores Substance Use** Instrument.

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