Title

Methodology and Demographics of a Brief Adolescent Alcohol Screen Validation Study

Journal

Pediatric Emergency Care, Publish Ahead of Print(11)

ISSN

0749-5161

Authors

Bromberg, Julie R
Spirito, Anthony
Chun, Thomas
et al.

Publication Date

2017-07-03

DOI

10.1097/pec.0000000000001221

Peer reviewed

Published in final edited form as:

Pediatr Emerg Care. 2019 November ; 35(11): 737–744. doi:10.1097/PEC.0000000000001221.

Methodology and demographics of a brief adolescent alcohol screen validation study

Julie R. Bromberg, MPH[1,2], **Anthony Spirito, PhD**[2], **Thomas Chun, MD, MPH**[1,2], **Michael J. Mello, MD, MPH**[1,2], **T. Charles Casper, PhD**[3], **Fahd Ahmad, MD, MSCI**[4], **Lalit Bajaj, MD**[5], **Kathleen M. Brown, MD**[6], **Lauren S. Chernick, MD, MSc**[7], **Daniel M. Cohen, MD**[8], **Joel Fein, MD, MPH**[9], **Tim Horeczko, MD, MSCR, FACEP, FAAP**[10], **Michael N. Levas, MD**[11], **Brett McAninch, MD**[12], **Michael Monuteaux, SC.D.**[13], **Colette C. Mull, MD**[14], **Jackie Grupp-Phelan, MD, MPH**[15], **Elizabeth C. Powell, MD, MPH**[16], **Alexander Rogers, MD**[17], **Rohit P. Shenoi, MD**[18], **Brian Suffoletto, MD, MS**[12], **Cheryl Vance, MD**[19], **James G. Linakis, PhD, MD**[1,2], **Pediatric Emergency Care Applied Research Network**

[1]Rhode Island Hospital, Providence, RI

[2]The Warren Alpert Medical School of Brown University, Providence, RI

[3]University of Utah, Salt Lake City, UT

[4]St Louis Children's Hospital/ Washington University, St. Louis, MO

[5]Children's Hospital Colorado, Aurora, CO

[6]Children's National Medical Center, Washington, DC

[7]Columbia University/Children's Hospital of New York-Presbyterian, New York, NY

[8]Nationwide Children's Hospital, Columbus, OH

[9]The Children's Hospital of Philadelphia, Philadelphia, PA

[10]Los Angeles Biomedical Research Institute at Harbor-UCLA Medical Center. Los Angeles, CA

[11]Medical College of Wisconsin, Milwaukee, WI

[12]University of Pittsburgh/ Children's Hospital of Pittsburgh of UPMC, Pittsburgh, PA

[13]Boston Children's Hospital, Boston, MA

[14]Nemours/Alfred I. duPont Hospital for Children, Wilmington, DE

[15]Cincinnati Children's Hospital Medical Center, Cincinnati, OH

[16]Lurie Children's Hospital of Chicago, Chicago, IL

[17]University of Michigan, Ann Arbor,MI

[18]Baylor College of Medicine/Texas Children's Hospital, Houston, TX

[19]University of California, Davis, CA

Address correspondence to: Julie R. Bromberg, MPH, Rhode Island Hospital, Department of Emergency Medicine, 593 Eddy Street, Claverick Building, 2nd Floor, Providence, RI 02903, jbromberg@lifespan.org, 401-444-8403 (p), 401-444-2249 (f).

Abstract

Objective—To determine the psychometric properties of the National Institute on Alcohol Abuse and Alcoholism (NIAAA) two-question alcohol screen within 16 Pediatric Emergency Care Applied Research Network (PECARN) pediatric emergency departments. This article describes the study methodology, sample characteristics and baseline outcomes of the NIAAA two-question screen.

Methods—Participants included 12–17 year olds treated in one of the participating pediatric emergency departments across the United States. After enrollment, a criterion assessment battery including the NIAAA two-question screen and other measures of alcohol, drug use and risk behavior was self-administered by participants on a tablet computer. Two subsamples were derived from the sample. The first subsample was re-administered the NIAAA two-question screen one week after their initial visit to assess test-retest reliability. The second subsample is being reassessed at 12 and 24 months to examine predictive validity of the NIAAA two-question screen.

Results—There were 4,834 participants enrolled into the study who completed baseline assessments. Participants were equally distributed across gender and age. Forty-six percent of participants identified as White and 26% identified as Black. Approximately one-quarter identified as Hispanic. Using the NIAAA two-question screen algorithm, approximately 8% were classified as low risk, 12% as moderate risk and 4% as highest risk. Alcohol use was less likely to be reported by Black participants, non-Hispanic participants and those less than 16 years old.

Discussion—This study successfully recruited a large, demographically diverse sample, in order to establish rates of the NIAAA screen risk categories across age, gender, ethnicity and race within pediatric emergency departments.

Keywords

alcohol screening; brief intervention; referral to treatment; SBIRT; adolescent

Introduction

Alcohol consumption and binge drinking increase throughout adolescence. According to 2014 Monitoring the Future data, 9%, 24% and 37% of 8th, 10th and 12th graders report past month drinking, respectively.[1] These rates are noteworthy since the earlier children initiate alcohol use, the more likely they are to experience alcohol-related problems or an alcohol use disorder later in life.[2–4] A strong relationship also exists between early alcohol use and other drug use, sex without contraception, delinquency, school failure and school drop-out.[5,6]

Many adolescents infrequently visit primary care providers[7] and often receive their medical care in Pediatric Emergency Departments (PEDs).[8] As many as 1.5 million adolescents use emergency departments as their only source of care.[9] These individuals are more likely to report substance use highlighting a need for PED-based alcohol screening.[10,11] Further, high school dropouts, who have higher rates of alcohol use compared to those enrolled in school,[12] frequently use the PED for healthcare.[13] Consequently, the PED visit can represent a unique opportunity to capture high-risk adolescents missed in other settings.

In screening youth for alcohol use, it is important to identify both those who have alcohol use disorders and those who do not meet full diagnostic criteria but whose alcohol misuse may lead to significant psychosocial and behavioral problems. Medical[14,15] and federal organizations[16–18] recommend screening and behavioral counseling interventions to reduce alcohol misuse, and have developed resources to support implementation of these services. While these groups support alcohol screening, brief intervention and referral to treatment, and some have successfully integrated alcohol screening into practice within the PED[19], such screening and interventions are underutilized and requires further research[20]. In a recent study of US hospitals that treat injured youth, only 18% reported providing universal alcohol screening for their adolescent ED patients.[21] Several self-report screening instruments exist for adolescents including the AUDIT,[22] CAGE,[23] FAST,[24] TWEAK,[25] CRAFFT,[26,27] DSM-IV two item,[28] RUFT-CUT,[29] Newton Screen[30] and a single question regarding binge drinking.[31,32] None of these measures, however, has emerged as a preferred and widely implemented self-report screen.

In 2011, the National Institute of Alcohol Abuse and Alcoholism (NIAAA) recommended use of a brief adolescent alcohol screen[17], which asks about a patient's drinking frequency and friends' drinking. These two items were chosen because drinking frequency has been shown to identify adolescents with alcohol related problems,[33] and some studies demonstrate that the number of alcohol-using friends is the best predictor of an adolescent's alcohol use.[34,35] For this reason, asking questions about friends' alcohol use may be an important component of an alcohol screening tool. Initial analyses of the NIAAA two-question screen indicated that it may be an effective predictor of current and future alcohol problems[36,37], although the screen had not been rigorously tested before its release by NIAAA.[37,38]

We undertook a validation study to determine the concurrent, convergent, discriminant and predictive validity of the NIAAA two-question screen in a large, demographically diverse sample, using 16 PED sites that are part of the Pediatric Emergency Care Applied Research Network (PECARN). The present article describes the methodology employed by the study, the characteristics of our sample, and baseline outcomes on the NIAAA two-question screen responses by age, race, ethnicity and sex.

Materials and Methods

Initial screening criteria for inclusion in the study included youth who were: 1) 12–17 years of age; 2) seen in the PED for a non-life-threatening injury, illness or mental health condition; and, 3) medically, cognitively and behaviorally stable. Additional criteria excluded youth who were: 1) in severe acute emotional distress (e.g. suicidal, or suspected by the clinical staff of being a victim of child abuse); 2) cognitively impaired and unable to provide informed assent; 3) unaccompanied by an adult qualified to give written parental permission for the youth's participation in research; 4) unable to read and speak English or Spanish or whose parents were unable to read and speak English or Spanish; 5) were previously enrolled in this study; or had neither a telephone nor an address of residence.

Study Sites

PECARN, established in 2001, was the first federally funded pediatric emergency care research network and currently consists of 18 pediatric emergency departments located across the country and a data coordinating center. Sixteen of the sites participated in this study (see acknowledgement section). Sites were located in the Northeast, Middle Atlantic, West, Midwest and Southwest, primarily in urban areas. All sites received IRB approval prior to conducting research activities. Due to the potential legal implications of adolescent high-risk behavior (e.g., illicit alcohol or drug use), a Certificate of Confidentiality was obtained from the U.S. Department of Health and Human Services.

The PECARN Data Coordinating Center (DCC) devised a screening schedule, based on site research staff availability, to ensure that the sample was composed of teens who were treated in the PED across a broad range of times as well as all days of the week. The DCC scheduled five 4-hour screening shifts (3 required, 2 alternate) per site each week. These shifts were typically scheduled for the afternoon and early evening when PED patient volumes were highest. To minimize selection bias, research staff was instructed to approach patients in the order in which they arrived at the PED beginning at a pre-designated start time for the screening period.

Sensitivity was used as the basis for our sample size requirements. We assumed a target sensitivity of 90%. In order for the 95% confidence interval around sensitivity to be within ±2.5%, approximately 5000 participants were needed. Therefore, all sites had the same enrollment goal of 313 patients. Sites enrolled a maximum of two patients per shift, resulting in predetermined site enrollment goals of 3–10 patients per week. To encourage accelerated enrollment, those sites that enrolled more than 3 patients per week were compensated for any enrollments above the weekly minimum. Enrollment occurred between May 2013 and June 2015.

Study Procedures

Adolescents who met inclusion/exclusion criteria and their parent(s) were approached by study staff and asked to provide written assent and written parental permission, respectively. Adolescents and parents were made aware of the Certificate of Confidentiality during the consent process. Parents and youth were informed that parents would not have access to their teens' responses, and that participant confidentiality would only be breached to protect the safety and welfare of the participant, and only in accordance with state and federal law.

Recruitment and study procedures occurred during times when the patient and family were waiting to be seen by a PED clinician or during other waiting periods which occur in the usual course of ED care. After providing consent, parents completed a contact information questionnaire containing participant address, home phone, cell phone, email address, preferred method of contact and locator information (if assigned to follow-up). This initial questionnaire and all other study questionnaires were administered through DatStat™ (Seattle, WA), a secure, web-based survey system. Contact information was stored separately from participant assessment battery responses. Locator information was collected at baseline from the participant and their parent for those assigned to the 12- and 24-month

follow-up. The locator was contacted in an attempt to obtain updated contact information for any participants who could not be reached with the contact information provided at the time of enrollment.

The adolescent then completed the NIAAA two-question screen and the criterion assessment battery, described below, in either Spanish or English. Participants had the option of using an audio computer-assisted self-interview (ACASI) on the web-based questionnaire. With ACASI, participants hear pre-programmed audio via headphones for each question when it is displayed on the tablet screen. Questionnaire answers are then recorded by pressing a button on the tablet screen that corresponds to the answer they wish to select. This method permits confidential assessment, which has been shown to increase the veracity of self-reported data on sensitive topics.[39,40] For purposes of confidentiality, parents were asked, but not required, to leave the room while the adolescent completed the measures. If parents did not leave the room, they were required to sit out of view of the tablet screen. Administration of the questionnaire could be interrupted if medical care was needed, and resumed when the episode of medical care was completed. Although the assessments were in self-report format, the research staff remained nearby to clarify issues or answer any questions. Participants received a $10 gift card for completing the survey.

Two subsamples were, a priori, derived from the entire sample. The first subsample was re-administered the NIAAA two-question screen one week after their initial PED visit to assess test-retest reliability. The second subsample is being reassessed at 12 and 24 months with the two NIAAA questions and the criterion assessment battery to examine the predictive validity of the two-question screen. It was possible for participants to be randomly assigned to both subsamples.

One Week Follow-up

A random sample of enrolled participants was contacted by phone and email 7 days after the PED visit to complete the NIAAA two-question screen for a second time to determine test-retest reliability of the NIAAA two-question screen. Participant contact within this timeframe was required in order to be included in test-retest analyses. Participants received a $5 gift card for completing this follow up. Any participant who did not complete the questionnaire within a week of being contacted was considered incomplete and excluded from this analysis.

Twelve and 24 Month Follow-up

Follow-up at 12 and 24 months after the PED visit is currently underway for a random sample of enrolled youth to assess the predictive validity of the NIAAA two-question screen. All follow-up assessments will be completed by March 2017. Youths assigned to this group complete a web-based assessment at both follow-up points that includes the NIAAA two-question screen and the same criterion battery administered at baseline analysis. Participants receive a $25 gift card after completing each assessment.

Follow-up assessments for participants from all 16 sites are centrally conducted at the Principal Investigators' site by research staff. Teen and parent reminders are sent via email (or regular mail if a working email address was not provided) 6 months prior to both the 12-

and 24- month questionnaires. Additionally, two weeks prior to 12- and 24-month questionnaire activation dates, a reminder letter is sent via regular mail to the parent and teen. The reminder letter provides basic information about the follow up procedure and asks participants to call with any updated contact information or if they want to arrange an appointment to complete the questionnaire via telephone. On the follow-up activation date, a link to the web-based questionnaire is sent automatically via email. Participants have two months from the activation date to complete their questionnaire. Reminders are automatically sent weekly to teens and their parents via email), text message and telephone until the assessment is either completed or participants ask not to be contacted. After the two-month period, participants are no longer contacted to complete that survey and they are marked as an incomplete follow-up. Failure to complete the 12-month follow-up does not preclude 24-month follow-up participation.

Assessment

Table 1 lists the instruments administered in the criterion assessment battery. The NIAAA two-question screen was always administered first. However, to control for question order effects the other assessment battery measures were administered in random order to each successive participant by creating six differently ordered assessment battery protocols. Prior to the start of the assessment battery, research staff provided the participant with the definition and a photo representation of a standard drink (containing 0.6 fluid ounces of pure alcohol)[17]. The time frames (past 12 months and past month) used in the questionnaire were reviewed with the participant. The definition of a standard drink and time frames are also reviewed in the follow up surveys.

We adhered to the screening and risk-assignment protocol detailed by NIAAA[17] when administering the NIAAA two question screen. Two age-specific alcohol questions (past 12 month patient and peer use) are asked. A middle school version (which asks about peer alcohol use first) and a high school version (which asks about the individual's own use first) of the two question screen, were used. Based on their responses, teens were classified into one of four risk categories: non-drinker, lower risk, moderate risk and highest risk. Those reporting no days of alcohol use in the past year were classified as non-drinkers. All risk categories were assigned based on age and frequency of past year alcohol use as defined in the NIAAA screening and brief intervention manual[17]. For example, 12–15 year olds who reported any alcohol use were classified as either moderate or highest risk based on frequency report.

Demographic information (age, sex, race, ethnicity and school grade) was collected from each participant at baseline. The criterion assessment battery consists of validated measures of alcohol use and misuse, tobacco, marijuana and other drug use, violence, and other risky behaviors. Convergent validity is being assessed using the AUDIT,[41] an alcohol screen frequently used to monitor for alcohol use disorders in both adults and adolescents. Concurrent and predictive validity are being assessed with the Diagnostic Interview Schedule for Children (DISC[42]), a structured, DSM-based interview used to determine substance use diagnoses. The DISC was adapted so that DSM-5 diagnoses could be derived. The concurrent and predictive validity of the NIAAA two-question screen for other problem

behaviors are being assessed by comparing the screen to measures of other drug use (Drug Use Questionnaire-DUQ[43], CRAFFT[27], Newton Screen[30] and DISC[42]), mental health (Mental Health Inventory-MHI-5[44]), risky sexual behavior (Risk Behavior Questionnaire-RBQ[45]) and conduct disorder (Global Appraisal of Individual Needs-GAIN[46]).

Statistical Analysis

Counts and proportions were used to summarize participants' age, gender, race and ethnicity and their responses to the NIAAA two-question screen. The Mantel-Haenszel test was used to assess the age-adjusted association between demographic variables and responses to the NIAAA risk-assignment. Analyses were performed with SAS software, version 9.4 (SAS Institute, Cary, NC).

Results

All sites successfully screened and enrolled the required number of patients into the study. Figure 1 provides the STROBE diagram for eligibility and enrollment. Of the 12693 patients screened, 8857 (70%) met inclusion/exclusion criteria. Of the eligible patients, 7545 (85%) were approached. Of those approached, 5114 (68%) consented to participate in the study. Of those consented, 4834 (95%) completed baseline activities and were included in analyses. One hundred and thirteen (2%) participants withdrew or discontinued participation during their PED visit. Due to an error in the automated web-based survey, 167 (3%) participants were not asked the NIAAA two-question screen alcohol usage question and were excluded from analysis. This error was identified and corrected towards the end of recruitment. Two hundred seventy-four participants were assigned to the one-week follow-up group; 2209 participants were assigned to 12- and 24-month follow-up groups. Some participants (N=129) were assigned to both follow-up groups. All other participants (N=2480) only received the baseline assessment in the PED. See Figure 1.

As shown in Table 2, participants were reasonably well distributed across sex and age. With respect to race (Table 2), almost half identified as White, 26% identified as Black and 16% of the sample did not report a race. As shown in Table 3, approximately one-quarter identified as being Hispanic. More than half of the participants (59%) lived with both parents at baseline.

Table 4 details the NIAAA two-question screen risk levels among participants by age and gender at baseline. As shown in the table, approximately three-quarters of participants were non-drinkers. Based on the NIAAA criteria, approximately 8% were classified as lower risk, 12% as moderate risk, and 4% as highest risk. (Of note, the NIAAA two-question screen protocol classifies any past-year drinking by youth ages 12–15 as moderate risk or greater, and thus no one in that age group was classified as lower risk.) There were no significant sex differences in NIAAA risk level after adjusting for age group ($p=0.1256$).

Tables 5 and 6 illustrate the NIAAA two-question screen risk levels by race and ethnicity. At baseline, about three-quarters of White participants identified as non-drinkers. Black participants had a significantly larger percentage of non-drinkers ($p<0.0001$). Overall, there were significant differences between NIAAA risk levels among Whites and Black

participants, after controlling for age group ($p < 0.0001$). There were also significant differences between Hispanic and Non-Hispanic participants' NIAAA risk levels, after controlling for age group ($p=0.0081$); non-Hispanic participants were less likely to be drinkers than Hispanic participants.

Discussion

Early identification of high risk alcohol use is strongly recommended[14–18], yet there is no consensus with regard to the best alcohol screening tool for adolescents. A preliminary study identified the NIAAA two-question screen[36] as a potential tool for PED clinicians. Our validation study is being conducted to determine the concurrent, convergent, and predictive validity of the NIAAA two-question screen tool in a large, demographically diverse PED sample. By recruiting from 16 PEDs for this study, our findings should be generalizable to other PEDs nationwide. Further, this study represents, to our knowledge, the largest alcohol screening validation study to date. Smaller validation studies produce sample-specific cut-off scores[49.] This study's large sample allows examination of whether the cut-off scores proposed by NIAAA differ across age, gender, race and ethnicity.

Based on the NIAAA two-question screen, 16% of the PED adolescent patient population screen as either moderate or high alcohol risk which highlights the need for PED based alcohol screening. This number is comparable to that reported in other PED studies. In one study of 13–17 year old PED patients, 10% were identified as having alcohol misuse.[41] In another PED sample of adolescents 11–17 years, 15.8% of patients had a positive AUDIT score.[47] Another study of adolescents 13–19 years old treated for an injury in the PED reported that 18% met criteria for a DSM-IV alcohol use disorder.[48] Past year alcohol use is similar between this PED sample and the general US teen population. In the current sample, 25% of participants identify as using any alcohol in the past year compared to 24% of 2014 National Survey on Drug Use and Health participants report past year alcohol use[50]. With respect to race, we found that alcohol use and NIAAA two question screen risk levels were lower among Black participants compared to White participants. With respect to ethnicity, we found that alcohol use and NIAAA two question screen risk levels were higher among Hispanic participants compared to non-Hispanic participants.

Although this is the largest study of its kind to date, its limitations deserve mention. As a result of human subject protections constraints, we excluded unaccompanied minors from the study. It is conceivable that these individuals may have a different level of risk than those included in this analysis, and thus our sample may misrepresent risk. Future studies may wish to consider methods to waive parental permission so as to include those who are unaccompanied by a parent or guardian.

Conclusion

Previous research [10,11,51] demonstrates that PED patients are more at risk for alcohol use than the general adolescent population. Determining the validity of the NIAAA two-question screen tool is an important step to identifying the best and most efficient screening tool for use in PEDs. In this study, we successfully recruited a large, demographically diverse

sample to establish rates of the NIAAA screen risk categories across age, gender, ethnicity and race in the PED. Future analyses will address the psychometrics of the instrument and its predictive validity.

Acknowledgments

Funding sources: All phases of this study were supported in part by NIAAA 1R01AA021900 to A Spirito and JG Linakis. This project is supported in part by the Health Resources and Services Administration (HRSA), Maternal and Child Health Bureau (MCHB), Emergency Medical Services for Children (EMSC) Network Development Demonstration Program under cooperative agreement number U03MC00008, and is partially support by MCHB cooperative agreements: U03MC00001, U03MC00003, U03MC00006, U03MC00007, U03MC22684 U03MC22685. This information or content and conclusions are those of the author and should not be construed as the official position or policy of, nor should any endorsements be inferred by HRSA, HHS or the U.S. Government.

The authors wish to acknowledge the Pediatric Emergency Care Applied Research Network (PECARN) and the participating PECARN sites including: Baylor College of Medicine/Texas Children's Hospital; Boston Children's Hospital; The Children's Hospital of Philadelphia; Children's National Medical Center; Cincinnati Children's Hospital Medical Center; Columbia University/Children's Hospital of New York-Presbyterian; Hasbro Children's Hospital; Lurie Children's Hospital of Chicago; Medical College of Wisconsin; Nationwide Children's Hospital; Nemours/Alfred I. duPont Hospital for Children; St. Louis Children's Hospital/Washington University; University of California, Davis Children's Hospital – Colorado; University of Michigan, University of Pittsburgh/Children's Hospital of Pittsburgh of UPMC. Our efforts would not have been possible without the commitment of the investigators and research coordinators from these sites. We also thank the PECARN Steering Committee members: R. Stanley (chair), B. Bonsu, C. Macias, D. Brousseau, D. Jaffe, D. Nelson, E. Alpern, E. Powell, J. Chamberlain, J. Bennett, J. M. Dean, L. Bajaj, L. Nigrovic, N. Kuppermann, P. Dayan, P. Mahajan, R. Ruddy and R. Hickey. A special thanks to the staff at the Data Coordinating Center including: H. Gramse, S. Zuspan, J. Wang, J. M. Dean, M. Ringwood and T. Simmons for their dedication and assistance throughout the study. Lastly, the authors wish to thank the participants and their parents for participating in this study.

References

1. Johnston, L, O'Malley, P, Miech, R. , et al. Monitoring the Future national survey results on drug use: 1975–2014: Overview, key findings on adolescent drug use. Ann Arbor: Institute for Social Research, The University of Michigan; 2015.
2. Dawson DA, Goldstein RB, Chou SP, et al. Age at first drink and the first incidence of adult-onset DSM-IV alcohol use disorders. Alcoholism, clinical and experimental research. Dec; 2008 32(12): 2149–2160.
3. Gruber E, DiClemente RJ, Anderson MM, et al. Early drinking onset and its association with alcohol use and problem behavior in late adolescence. Prev Med. May-Jun;1996 25(3):293–300. [PubMed: 8781007]
4. Hawkins JD, Catalano RF, Kosterman R, et al. Preventing adolescent health-risk behaviors by strengthening protection during childhood. Arch Pediatr Adolesc Med. Mar; 1999 153(3):226–234. [PubMed: 10086398]
5. Hays RD, Ellickson PL. Associations between drug use and deviant behavior in Hays RD, Ellickson, P. L. Associations between drug use and deviant behavior in teenagers. Addict Behav. May-Jun;1996 21(3):291–302. [PubMed: 8883481]
6. Weinberg NZ, Glantz MD. Child psychopathology risk factors for drug abuse: overview. J Clin Child Psychol. Sep; 1999 28(3):290–297. [PubMed: 10446678]
7. Elixhauser A, Machlin SR, Zodet MW, et al. Health care for children and youth in the United States: 2001 annual report on access, utilization, quality, and expenditures. Ambul Pediatr. Nov-Dec;2002 2(6):419–437. [PubMed: 12437388]
8. Oster A, Bindman AB. Emergency department visits for ambulatory care sensitive conditions: insights into preventable hospitalizations. Med Care. Feb; 2003 41(2):198–207. [PubMed: 12555048]
10. Cunningham R, Knox L, Fein J, et al. Before and after the trauma bay: the prevention of violent injury among youth. Ann Emerg Med. Apr; 2009 53(4):490–500. [PubMed: 19162376]

11. Rhodes KV, Gordon JA, Lowe RA. Preventive care in the emergency department, Part I: Clinical preventive services--are they relevant to emergency medicine?. Society for Academic Emergency Medicine Public Health and Education Task Force Preventive Services Work Group. Acad Emerg Med. Sep; 2000 7(9):1036–1041. [PubMed: 11044001]
12. Chen, C, Yi, H, Faden, V. Trends in Underage Drinking in the United States, 1991–2009. Washington, DC: National Institute of Alcohol Abuse and Alcoholism; 2011.
13. Monti PM, Colby SM, Barnett NP, et al. Brief intervention for harm reduction with alcohol-positive older adolescents in a hospital emergency department. Journal of consulting and clinical psychology. Dec; 1999 67(6):989–994. [PubMed: 10596521]
14. Committee on Substance Abuse. American Academy of Pediatrics. Policy statement-alcohol use by youth and adolescents: a pediatric concern. Pediatrics. 2010; 125:1078–1087. [PubMed: 20385640]
15. American College of Emergency Physicians. [Accessed June 1, 2016] Alcohol screening in the emergency department policy statement. Available at: http://www.acep.org/Content.aspx?id=29074
16. NHTSA. Toward a comprehensive strategy to stop impaired driving: alcohol screening and brief intervention overview. Washington, DC: National Highway Traffic Safety Administration; 2005. DOT HS 809 935
17. NIAAA. [Accessed June 1, 2016] Alcohol screening and brief intervention for youth: a practitioner's guide. Available at: www.niaaa.nih.gov/YouthGuide
18. SAMHSA. [Accessed June 6, 2016] Screening, brief intervention and referral to treatment. Available at: http://www.samhsa.gov/sbirt
19. Pailler ME, Fein JA. Computerized behavioral health screening in the emergency department. Pediatr Ann. Mar; 2009 38(3):156–160. [PubMed: 19353905]
20. Yuma-Guerrero PJ, Lawson KA, Velasquez MM, et al. Screening, brief intervention, and referral for alcohol use in adolescents: a systematic review. Pediatrics. 2012; 130(1):115–122. [PubMed: 22665407]
21. Schweer LH. Pediatric SBIRT: understanding the magnitude of the problem. J Trauma Nurs. Jul-Sep;2009 16(3):142–147. [PubMed: 19888019]
22. Saunders JB, Aasland OG, Babor TF, et al. Development of the Alcohol Use Disorders Identification Test (AUDIT): WHO Collaborative Project on Early Detection of Persons with Harmful Alcohol Consumption--II. Addiction. Jun; 1993 88(6):791–804. [PubMed: 8329970]
23. Ewing J. Detecting Alcoholism: The CAGE Questionnaire. JAMA. 1984; 252:1905–1907. [PubMed: 6471323]
24. Hodgson R, Alwyn T, John B, et al. The FAST Alcohol Screening Test. Alcohol Alcohol. Jan-Feb; 2002 37(1):61–66. [PubMed: 11825859]
25. Russell M, Martier SS, Sokol RJ, et al. Screening for pregnancy risk-drinking. Alcoholism, clinical and experimental research. Oct; 1994 18(5):1156–1161.
26. Knight JR, Sherritt L, Shrier LA, et al. Validity of the CRAFFT substance abuse screening test among adolescent clinic patients. Archives of pediatrics & adolescent medicine. Jun; 2002 156(6): 607–614. [PubMed: 12038895]
27. Knight JR, Shrier LA, Bravender TD, et al. A new brief screen for adolescent substance abuse. Archives of pediatrics & adolescent medicine. Jun; 1999 153(6):591–596. [PubMed: 10357299]
28. Vinson DC, Kruse RL, Seale JP. Simplifying alcohol assessment: two questions to identify alcohol use disorders. Alcoholism, clinical and experimental research. Aug; 2007 31(8):1392–1398.
29. Kelly TM, Donovan JE, Chung T, et al. Alcohol use disorders among emergency department-treated older adolescents: a new brief screen (RUFT-Cut) using the AUDIT, CAGE, CRAFFT, and RAPS-QF. Alcoholism, clinical and experimental research. May; 2004 28(5):746–753.
30. Newton AS, Dong K, Mabood N, et al. Brief emergency department interventions for youth who use alcohol and other drugs: a systematic review. Pediatr Emerg Care. May; 2013 29(5):673–684. [PubMed: 23640153]
31. Canagasaby A, Vinson DC. Screening for hazardous or harmful drinking using one or two quantity-frequency questions. Alcohol Alcohol. May-Jun;2005 40(3):208–213. [PubMed: 15797883]

32. Williams R, Vinson DC. Validation of a single screening question for problem drinking. J Fam Pract. Apr; 2001 50(4):307–312. [PubMed: 11300981]
33. Chung T, Colby SM, Barnett NP, et al. Alcohol use disorders identification test: factor structure in an adolescent emergency department sample. Alcoholism, clinical and experimental research. Feb; 2002 26(2):223–231.
34. Chassin L, Pillow D, Curran P, et al. Relation of parental alcoholism to early adolescent substance use. A test of three mediating mechanisms. J Abnorm Psychol. 1993; 102:3–19. [PubMed: 8436697]
35. Wills T, Windle M, Cleary S. Temperament and novelty-seeking in adolescence: A test for convergence of dimensions of temperament with constructs from Cloninger's Theory. Journal of Personality and Social Psychology. 1998; 74:387–406. [PubMed: 9491584]
36. Chung T, Smith GT, Donovan JE, et al. Drinking frequency as a brief screen for adolescent alcohol problems. Pediatrics. Feb; 2012 129(2):205–212. [PubMed: 22218839]
37. Brown S, Donovan J, McGue M, et al. Youth alcohol screening workgroup II: determining optimal secondary screening questions. Alcoholism, clinical and experimental research. 2010; 34(s2): 267A.
38. Smith GT, Chung T, Martin CS, et al. Youth alcohol screening workgroup I: Measuring consumption of alcohol as a screener in children and adolescents. Alcoholism: Clinical and Experimental Research. 2010; 34(Supplement s2):276A.
39. Islam MM, Topp L, Conigrave KM, et al. The reliability of sensitive information provided by injecting drug users in a clinical setting: clinician-administered versus audio computer-assisted self-interviewing (ACASI). AIDS Care. 2012; 24(12):1496–1503. [PubMed: 22452446]
40. Reichmann WM, Losina E, Seage GR, et al. Does modality of survey administration impact data quality: audio computer assisted self interview (ACASI) versus self-administered pen and paper? PLoS One. 2010; 5(1):e8728. [PubMed: 20090953]
41. Fairlie AM, Sindelar HA, Eaton CA, et al. Utility of the AUDIT for screening adolescents for problematic alcohol use in the emergency department. International journal of adolescent medicine and health. Jan-Mar;2006 18(1):115–122. [PubMed: 16639865]
42. Fisher PW, Shaffer D, Piacentini JC, et al. Sensitivity of the Diagnostic Interview Schedule for Children, 2nd edition (DISC-2.) for specific diagnoses of children and adolescents. J Am Acad Child Adolesc Psychiatry. May; 1993 32(3):666–673. [PubMed: 8496131]
43. Spirito, A. Reliability data on the Drug Use Questionnaire. Providence, RI: Brown University; 2001.
44. Stewart, ALWJ, Sherbourne, CD, Wells, KB. Measuring functioning and well-being: The medical outcomes study approach. Durham, NC: Duke University Press; 1992.
45. Shaw DS, Wagner EF, Arnett J, et al. The factor structure of the Reckless Behavior Questionnaire. Journal of youth and adolescence. 1992; 21:305–323. [PubMed: 24263845]
46. Dennis, MD, Scott, CK, Godley, MD. , et al. Comparisons of adolescents and adults by ASAM profile using GAIN data from the Drug Outcome Monitoring Study (DOMS). Bloomington, IL: Chestnut Health Systems; 1999.
47. Ehrlich PF, Maio R, Drongowski R, et al. Alcohol interventions for trauma patients are not just for adults: justification for brief interventions for the injured adolescent at a pediatric trauma center. The Journal of trauma. Jul; 2010 69(1):202–210. [PubMed: 20622591]
48. Chung T, Colby SM, Barnett NP, et al. Screening adolescents for problem drinking: performance of brief screens against DSM-IV alcohol diagnoses. J Stud Alcohol. Jul; 2000 61(4):579–587. [PubMed: 10928728]
49. Centers for Disease C, Prevention. Brener ND, et al. Methodology of the Youth Risk Behavior Surveillance System--2013. MMWR Recomm Rep. Mar 1; 2013 62(RR-1):1–20.
50. SAMHSA. [Accessed May 26, 2016] 2014 National Survey on Drug Use and Health: Detailed Tables. 2015. http://www.samhsa.gov/data/sites/default/files/NSDUH-DetTabs2014/NSDUH-DetTabs2014.pdf
51. Cunningham RM, Bernstein SL, Walton M, et al. Alcohol, tobacco, and other drugs: future directions for screening and intervention in the emergency department. Acad Emerg Med. Nov; 2009 16(11):1078–1088. [PubMed: 20053226]

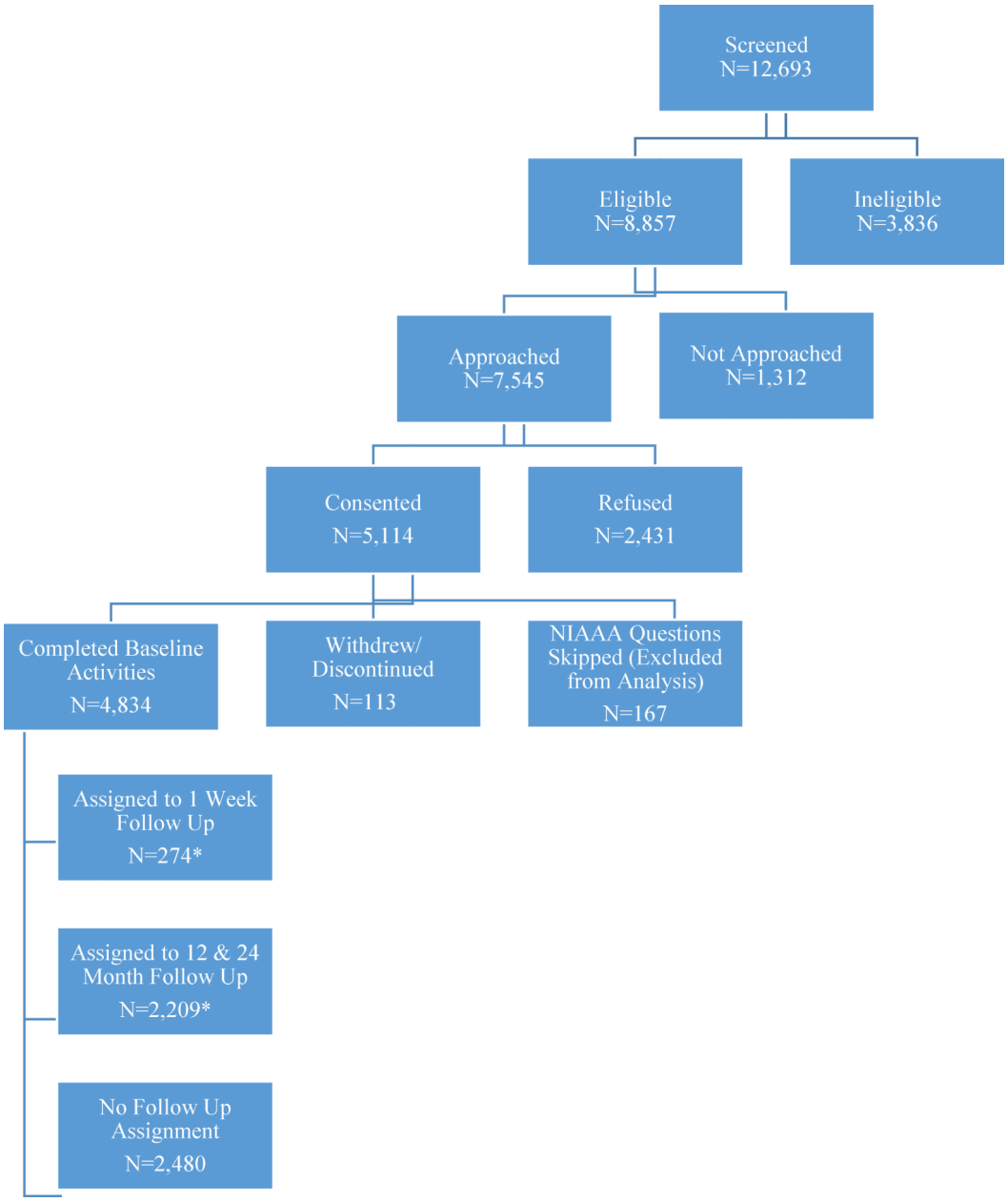

Figure 1.
STROBE Diagram
*129 participants were assigned to both follow up groups.

Table 1

Criterion Assessment Battery

Instruments	Construct
NIAAA two question screen	Alcohol Risk
Newton ED Screening Tool	Alcohol/Marijuana Misuse
AUDIT	Alcohol Use/Misuse
DISC	Alcohol/Tobacco/Marijuana DSM-5 diagnoses
Reckless Behavior Questionnaire	Risk Behaviors
YRBSS, physical activity section	Physical Activity
Drug Use Questionnaire	Drug Use
CRAFFT	Alcohol/Drug Misuse
GAIN	Conduct Disorder
MHI-5	Mental Health Status

Table 2

Race of enrolled participants

	12 years old		13 years old		14 years old		15 years old		16 years old		17 years old		Overall
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	
Race	198 (48%)	154 (44%)	169 (43%)	196 (49%)	165 (41%)	187 (42%)	162 (45%)	251 (48%)	175 (50%)	247 (48%)	127 (47%)	200 (47%)	2231 (46%)
White													
Black	110 (27%)	79 (23%)	109 (28%)	95 (24%)	128 (32%)	111 (25%)	105 (29%)	129 (25%)	88 (25%)	117 (23%)	79 (29%)	128 (30%)	1278 (26%)
American Indian/Alaska Native	6 (1%)	7 (2%)	8 (2%)	9 (2%)	7 (2%)	5 (1%)	9 (3%)	5 (1%)	6 (2%)	20 (4%)	5 (2%)	10 (2%)	97 (2%)
Asian	2 (0%)	7 (2%)	7 (2%)	5 (1%)	8 (2%)	4 (1%)	6 (2%)	8 (2%)	7 (2%)	3 (1%)	2 (1%)	4 (1%)	63 (1%)
Native Hawaiian or Other Pacific Islander	3 (1%)	2 (1%)	5 (1%)	1 (0%)	2 (1%)	3 (1%)	3 (1%)	4 (1%)	5 (1%)	6 (1%)	4 (1%)	5 (1%)	43 (1%)
More Than One Race	29 (7%)	30 (9%)	22 (6%)	33 (8%)	28 (7%)	43 (10%)	25 (7%)	44 (8%)	27 (8%)	45 (9%)	22 (8%)	21 (5%)	369 (8%)
Unknown or Not Reported	63 (15%)	69 (20%)	69 (18%)	62 (15%)	60 (15%)	94 (21%)	49 (14%)	80 (15%)	41 (12%)	75 (15%)	32 (12%)	59 (14%)	753 (16%)
Overall	411	348	389	401	398	447	359	521	349	513	271	427	4834

Pediatr Emerg Care. Author manuscript; available in PMC 2020 November 01.

Table 3

Ethnicity of enrolled participants

	12 years old		13 years old		14 years old		15 years old		16 years old		17 years old		Overall
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	
Ethnicity													
Hispanic or Latino	101 (25%)	115 (33%)	109 (28%)	101 (25%)	105 (26%)	132 (30%)	91 (25%)	140 (27%)	69 (20%)	127 (25%)	61 (23%)	108 (25%)	1259 (26%)
Not Hispanic or Latino	272 (66%)	205 (59%)	262 (67%)	274 (68%)	279 (70%)	298 (67%)	254 (71%)	365 (70%)	266 (76%)	366 (71%)	208 (77%)	313 (73%)	3362 (70%)
Unknown or Not Reported	38 (9%)	28 (8%)	18 (5%)	26 (6%)	14 (4%)	17 (4%)	14 (4%)	16 (3%)	14 (4%)	20 (4%)	2 (1%)	6 (1%)	213 (4%)
Overall	411	348	389	401	398	447	359	521	349	513	271	427	4834

Table 4

Characteristics of participants by NIAAA risk level

		Non-drinker	Lower risk	Moderate risk	High risk	Overall
Age	**Sex**					
12–15	**Male**	1327 (85%)	0 (0%)	192 (12%)	38 (2%)	1557
	Female	1406 (82%)	0 (0%)	242 (14%)	69 (4%)	1717
16	**Male**	227 (65%)	77 (22%)	25 (7%)	20 (6%)	349
	Female	310 (60%)	135 (26%)	34 (7%)	34 (7%)	513
17	**Male**	135 (50%)	75 (28%)	43 (16%)	18 (7%)	271
	Female	228 (53%)	122 (29%)	59 (14%)	18 (4%)	427
Overall		3633 (75%)	409 (8%)	595 (12%)	197 (4%)	4834

167 patients were excluded due to skip pattern error.

The p-value testing the association between gender and NIAAA risk level controlling for age group is 0.12.

Table 5

NIAAA risk level by race of participant

	Non-drinker	Lower risk	Moderate risk	High risk	Overall
Race					
White	1637 (73%)	203 (9%)	272 (12%)	119 (5%)	2231
Black	1020 (80%)	102 (8%)	133 (10%)	23 (2%)	1278
American Indian/Alaska Native	70 (72%)	9 (9%)	14 (14%)	4 (4%)	97
Asian	49 (78%)	4 (6%)	8 (13%)	2 (3%)	63
Native Hawaiian or Other Pacific Islander	31 (72%)	6 (14%)	4 (9%)	2 (5%)	43
More Than One Race	274 (74%)	21 (6%)	57 (15%)	17 (5%)	369
Unknown or Not Reported	552 (73%)	64 (8%)	107 (14%)	30 (4%)	753
Overall	3633 (75%)	409 (8%)	595 (12%)	197 (4%)	4834

167 patients were excluded due to skip pattern error.

The p-value testing the association between race and NIAAA risk level controlling for age group is <0.01.

The p-value testing the difference between NIAAA risk level profiles among whites and blacks controlling for age group is <0.01.

Table 6

NIAAA risk level by ethnicity of participant

	Non-drinker	Lower risk	Moderate risk	High risk	Overall
Ethnicity					
Hispanic or Latino	914 (73%)	111 (9%)	182 (15%)	52 (4%)	1259
Not Hispanic or Latino	2545 (76%)	288 (9%)	390 (12%)	139 (4%)	3362
Unknown or Not Reported	174 (82%)	10 (5%)	23 (11%)	6 (3%)	213
Overall	3633 (75%)	409 (8%)	595 (12%)	197 (4%)	4834

167 patients were excluded due to skip pattern error.

The p-value testing the association between ethnicity and NIAAA risk level controlling for age group is 0.04.

The p-value testing the difference between NIAAA risk level profiles between Hispanics and non-Hispanics controlling for age group is <0.01.