Published in final edited form as:

J Addict Med. 2019 ; 13(2): 119–122. doi:10.1097/ADM.0000000000000459.

Is the NIAAA Screening Guide Useful for Identifying Adolescents at Risk for Later Cigarette Smoking? A Prospective Study in Primary Care Clinics

William G. Shadel, PhD¹, Rachana Seelam, MPH², Layla Parast, PhD², Lisa S. Meredith, PhD², and Elizabeth J. D'Amico, PhD²

¹RAND Corporation, Pittsburgh, PA

²RAND Corporation, Santa Monica, CA

Abstract

Objectives: This paper evaluated whether a 2-item assessment of alcohol use risk, developed by the National Institutes on Alcohol and Alcoholism (NIAAA SG), prospectively predicted smoking status among a sample of adolescents visiting their primary care physician.

Methods: We analyzed a sample of 651 adolescents (57.80% female; 56.53% Hispanic, 22.73% African-American, 14.44% White, 6.30% other) who completed the NIAAA SG at a baseline appointment and were assessed for future smoking risk. We obtained prospective data on smoking status using data from the 6-month post-baseline follow-up assessment.

Results: Logistic regression analyses revealed that adolescents who were identified as at risk by the NIAAA SG were more likely to report smoking within 6 months. However, the association between the NIAAA SG and future smoking status became non-significant after controlling for future smoking risk measured at baseline.

Conclusions: Questions that ask about past smoking and future smoking intentions are best used to screen adolescents in primary care for smoking risk.

Keywords

Adolescents; smoking; screening; primary care

Primary care (PC) settings are ideally suited to screening adolescents for smoking because more than 90% of adolescents visit the doctor annually (Patnode et al., 2013). PC providers are encouraged to ask about cigarettes and if an adolescent reports smoking, then treatment is recommended (see Fiore et al., 2008). These recommendations are consistent with SAMSHA's Screening, Brief Intervention, and Referral to Treatment (SBIRT) framework (Mitchell et al., 2013). However, despite these guidelines, screening rates for smoking in adolescent PC settings are very modest, likely due to time constraints and administrative burdens among other reasons (Collins et al., 2017).

Corresponding author: William G. Shadel, PhD; RAND Corporation, 4570 5th Avenue., Suite 600; Pittsburgh, PA 15223; phone: 412-683-2300; fax: 412-683-2300; shadel@rand.org.

Conflicts of Interest: None to declare.

PC providers are also encouraged to assess adolescents that have *never smoked* for their *susceptibility to future smoking* (Pbert et al., 2015) and to provide effective smoking prevention interventions (e.g., Hollis et al., 2005). However, this additional susceptibility screening is almost never done (Makni et al., 2002). Lack of time likely also precludes administration of smoking susceptibility assessments (Chung et al., 2006; Pbert et al., 2015). Efficiencies in screening time and administrative burden would be gained if screening devices, already being used for other disorders, could be used to identify adolescents that smoke from among those that have never smoked.

This study explored whether the National Institute on Alcohol Abuse and Alcoholism screening guide (NIAAA SG) prospectively predicted cigarette smoking among adolescents attending a PC visit. The NIAAA SG has been shown to identify youth at risk for problem drinking and marijuana use in PC settings (Clark et al. 2016; D'Amico et al. 2016). Given that substance use disorders often cluster together during adolescence (Young et al., 2002), a screening assessment for alcohol risk may be useful for predicting future cigarette smoking. We evaluated whether future cigarette smoking could be predicted from the NIAAA SG independent of three standard current smoking and future smoking susceptibility items, two that ask about lifetime smoking and one that asks about future smoking intentions (as discussed below; see also Pbert et al., 2015). In addition, we evaluated whether the two screening tools differ in their sensitivity, specificity, false positive rate and false negative rate for identifying future smoking.

METHODS

Study Setting

The sample in this paper overlaps with some of the sample reported in D'Amico et al. (2016, 2018). The sample was recruited from minority- and lower income-serving PC clinics in Pittsburgh, PA (three clinics) and Los Angeles, CA (one clinic).

Procedures

The study was approved by the RAND's Human Subjects Protection Committee. Every adolescent between the ages of 12 and 18 with a scheduled appointment was asked to participate. Consented participants were then screened using the NIAAA SG and completed a baseline survey; they were paid \$25. Participants were assured of the confidentiality of their responses and a certificate of confidentiality was also obtained for the study.

From a final consented sample of 1,573 (D'Amico et al., 2016), adolescents were categorized as either higher risk or lower risk for alcohol use using the NIAAA SG. All adolescents identified as higher risk ($n = 294$) were randomly assigned to either a control or active treatment condition and followed for six months as part of a clinical trial (for details, see D'Amico et al., 2018). As an observation/control, a randomly selected subsample ($n = 518$) of the 1,279 lower risk adolescents was followed through six months. The current study focuses on higher risk youth who completed the six-month follow-up and lower risk youth who were randomized to complete the six-month follow-up. A total of 812 adolescents were followed, and $n = 668$ completed the follow-up.

Baseline Measures

Demographics—Age, gender, and race/ethnicity (White vs non-White) were collected.

NIAAA SG—Two screening questions were asked (NIAAA, 2011): 1) “In the past year, on how many days have you had more than a few sips of beer, wine, or any drink containing alcohol?”, and 2) “Do any of your friends drink alcohol?” Per NIAAA instructions, adolescents age 12 to 15 were categorized as higher risk if they reported any use; adolescents 16 to 18 were categorized as higher risk if they reported 6 days of use. Previous studies found that the NIAAA SG has good levels of test-retest reliability and sensitivity for detecting adolescents with problem drinking (D’Amico et al., 2016; Spirito et al., 2016)

Smoking Risk Status—Future smoking risk was assessed with participants’ responses to two sets of questions (Huang et al., 2005). (1) *Past smoking*: “During your life, how many times have you tried a cigarette, even one or two puffs?” and “During your life, how many times have you tried a whole cigarette?” A participant had to answer “0 times” to both questions to be considered as never smoking. Any response other than “never” to both questions was considered at risk of future smoking. (2) *Future smoking intentions*: “Do you think you will smoke a cigarette in the six months?” Participants could respond “definitely yes”, “probably yes”, “probably no”, or “definitely no”. Any response other than “definitely no” was at risk of future smoking. Responses to these questions were combined to provide an overall index of future smoking risk. Adolescents that were *committed to never smoking* ($n = 373$) reported never smoking on the past behavior items and “definitely no” on the future intentions item. *Moderate risk* adolescents ($n = 147$) reported past smoking and “definitely no” on future intentions. *High risk* adolescents ($n = 131$) reported past smoking and either “definitely yes”, “probably yes”, or “probably no” on future intentions.¹

Dependent Measure: Six Month Smoking Status

Participants reported whether they smoked any cigarettes in the past three months (see O’Loughlin et al., 2003).

RESULTS

The participants had a mean age of 15.6 ($SD = 1.86$) and were 57.80% female; the sample was 56.53% Hispanic, 22.73% African-American, 14.44% White, 6.30% other.

Logistic regression analyses were used and analyses accounted for missing data using a multiple imputation procedure (Buuren & Groothuis-Oudshoorn, 2011).² Table 1 presents results that prospectively predicted smoking status at the six-month follow-up from the demographic measures and the NIAAA SG. Adolescents identified as higher risk by the

¹The number of individuals who reported never smoking but who indicated an intention to smoke in the future was very small ($n = 14$) and not sufficient in this sample for meaningful analysis. Thus, they were excluded from further consideration.

²As noted in the text, 294 participants from the overall sample were randomized to one of two treatment conditions, one of which, CHAT, was designed to address their alcohol and drug use. Treatment condition was entered into the results as a covariate but results were unchanged. Thus, we opted to report results without treatment condition as an additional covariate. The main outcome results for this treatment trial can be found in D’Amico et al. (2018).

NIAAA SG had a significantly higher risk of reporting smoking six months later, after controlling for demographics. Table 2 presents results which prospectively predict smoking status at the six-month follow-up from demographics, the NIAAA SG, and baseline smoking risk status. Baseline smoking risk status was a strong predictor of later smoking, and with its inclusion, the NIAAA SG ceased to be a significant predictor of future smoking behavior.

Table 3 presents the sensitivity, specificity, false positive rate and false negative rate using the NIAAA SG vs. the baseline smoking risk status. These results show that specificity and false positive rates are similar between the two approaches. The sensitivity is much higher for the baseline smoking risk status compared to the NIAAA SG (0.91 vs. 0.62), meaning that the baseline smoking risk status approach correctly “captures” a higher proportion of adolescents that will report smoking at 6 months than the NIAAA SG.

DISCUSSION

The NIAAA SG can identify adolescents with problematic levels of drinking and marijuana use in PC settings (Clark et al., 2016; D’Amico et al., 2016) and this study explored whether it could also be used to identify adolescents that smoke. Adolescents identified as higher risk by the NIAAA SG were more likely to report smoking cigarettes within 6 months compared to those identified as lower risk. However, the NIAAA SG lost its predictive utility once a set of three smoking screening items (Pbert et al., 2015) was considered. Results also showed that the set of three smoking screen items were able to correctly identify as high risk a greater proportion of adolescents that were smoking at 6 months, than the NIAAA SG. This is not unexpected given that the NIAAA SG is specific to alcohol. However, these results demonstrate that the NIAAA SG can correctly identify a reasonable proportion of these adolescents (62%) which is helpful in settings where the use of the three smoking screen items may not be feasible.

Limitations of the research were: 1) although focusing on urban minority and low-income adolescents is a strength, results may not generalize to different locales and populations; 2) the outcome measure was smoking in the past three months - we do not have data on other outcomes (e.g., daily smoking) and it is possible that participants not reporting smoking had smoked outside of the three-month window; and 3) the number of adolescents who reported smoking within six months was relatively small.

In conclusion, the NIAAA SG can be used to screen adolescents for problem alcohol and marijuana use; and on its own the NIAAA SG can be used to screen for smoking. However, if assessments of past smoking and future smoking susceptibility can be administered, the NIAAA SG should not be used: for example, three-items that combine an assessment of past smoking with future smoking intentions can be used to screen adolescents for smoking in PC settings. Either screening approach could be woven into the SBIRT framework (see Mitchell et al., 2013) and offered as time efficient methods for screening adolescents for all manner of substance abuse problems in primary care settings.

ACKNOWLEDGEMENTS

This research was supported by a grant from the National Institute of Alcohol Abuse and Alcoholism (R01AA021786) to Elizabeth J. D'Amico. We thank the clinics that participated and supported this project and are grateful to Kirsten Becker and Jennifer Parker for overseeing survey administration.

We thank the clinics that participated and supported this project and are grateful to Kirsten Becker and Jennifer Parker for overseeing survey administration.

Funding source: This research was supported by a grant from the National Institute of Alcohol Abuse and Alcoholism (R01AA021786) to Elizabeth J. D'Amico.

REFERENCES

- Buuren S, Groothuis-Oudshoorn K (2011). Multivariate imputation by chained equations in R. *J Stat Softw* 2011; 45: 1–67.
- Chung P, Lee T, Morrison J, et al. Preventive care for children in the United States: quality and barriers. *Annu Rev Public Health* 2006; 27: 491–515. [PubMed: 16533127]
- Clark DB, Martin CS, Chung T, et al. Screening for underage drinking and Diagnostic and Statistical Manual of mental disorders, 5th edition alcohol use disorder in rural primary care practice. *J Pediatr* 2016; 173: 214–220. [PubMed: 27059911]
- Collins L, Smiley S, Moore R et al. Physician tobacco screening and advice to quit among U.S. adolescents – National Survey on Drug Use and Health, 2013 *Tob Induc Dis* 2017; 15: 2 DOI: 10.1186/s12971-016-0107-6.
- D'Amico EJ, Parast L, Shadel WG et al. Brief motivational interviewing intervention to reduce alcohol and marijuana use for at-risk adolescents in primary care. *J Consult Clin Psychol* 2018; 86: 775–786. [PubMed: 30138016]
- D'Amico EJ, Parast L, Meredith LS et al. Screening in primary care: What is the best way to identify at-risk youth for substance use? *Pediatrics* 2016; 138: e20161717 DOI: 10.1542/peds.2016-1717. [PubMed: 27940696]
- Fiore MC, Jaen CR, Baker TB, et al. Treating Tobacco Use and Dependence: 2008 update. Clinical Practice Guideline. Rockville, MD: U.S. Department of Health and Human Services. Public Health Service, 2008.
- Hollis JF, Polen MR, Whitlock EP, et al. Teen reach: outcomes from a randomized, controlled trial of a tobacco reduction program for teens seen in primary medical care. *Pediatrics*. 2005; 115:981–989. [PubMed: 15805374]
- Huang M, Hollis J, Polen M et al. Stages of smoking acquisition versus susceptibility as predictors of smoking initiation in adolescents in primary care. *Addict Behav* 2005; 30: 1183–1194 [PubMed: 15925127]
- Makni H, O'Loughlin J, Tremblay M et al. Smoking prevention counseling practices of Montreal general practitioners. *Arch Pediatr Adolesc Med* 2002; 156: 1263–1267. [PubMed: 12444841]
- Mitchell SG, Gryczynski J, O'Grady KE et al. SBIRT for adolescent drug and alcohol use: Current status and future directions. *J Subst Abuse Treat* 2013; 44: 463–472. [PubMed: 23352110]
- NIAAA. Alcohol screening and brief intervention for youth: A practitioners guide NIH Publication No. 11–7805. Rockville, MD: NIAAA, DHHS and AAP, 2011.
- O'Loughlin J, DiFranza J, Tyndale RF et al. Nicotine-dependence symptoms are associated with smoking frequency in adolescents. *Am J Prev Med* 2003; 25: 219–225. [PubMed: 14507528]
- Patnode CD, O'Connor E, Whitlock EP et al. Primary care-relevant interventions for tobacco use prevention and cessation in children and adolescents: a systematic evidence review for the U.S. Preventive Services Task Force. *Ann Intern Med* 2013; 158: 253–260. [PubMed: 23229625]
- Pbert L, Farber H, Horn K, et al. State-of-the-art office-based interventions to eliminate youth tobacco use: The past decade. *Pediatrics* 2014; 135: 734–747.
- Spirito A, Bromberg JR, Casper TC et al. Reliability and validity of a two-question alcohol screen in the pediatric emergency department. *Pediatrics* 2016; 138: e20160691 DOI: 10.1542/peds.2016-0691 [PubMed: 27940674]

Young SE, Corley RP, Stallings MC, et al. Substance use, abuse and dependence in adolescence: prevalence, symptom profiles and correlates. *Drug Alcohol Depend* 2002; 68:309–322. [PubMed: 12393225]

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Table 1.

Logistic regression analyses prospectively predicting smoking uptake from baseline variables and the NIAAA SG.

	Odds Ratio [95% CI]	<i>p</i>
Study site	1.95 [1.21, 3.16]	= 0.0065
NIAAA High ^a	4.01 [2.59, 6.20]	< 0.0001
Age	1.50 [1.31, 1.73]	< 0.0001
Female ^b	1.12 [0.71, 1.75]	= 0.6287
White ^c	0.81 [0.42, 1.56]	= 0.5274

^aReference group is low NIAAA screener group

^bReference group is male

^cReference group is non-White

Table 2.

Logistic regression analyses prospectively predicting smoking uptake from baseline variables and the NIAAA while also controlling for baseline smoking risk status.

	Odds Ratio [95% CI]	<i>p</i>
Study site	1.79 [1.01, 3.18]	= 0.0459
NIAAA High ^a	1.65 [0.97, 2.79]	= 0.0628
Smoking Risk Status ^b		
High risk	34.82 [16.73, 72.47]	< 0.0001
Moderate risk	6.07 [2.88, 12.81]	< 0.0001
Age	1.32 [1.12, 1.57]	= 0.0012
Female ^c	1.20 [0.71, 2.02]	= 0.5005
White ^d	0.59 [0.27, 1.29]	= 0.1838

^aReference group is low NIAAA screener group

^bReference group is Committed to never smoking

^cReference group is male

^dReference group is non-White

Table 3.

Sensitivity, specificity, false negative rate and false positive rate using the NIAAA SG vs. the baseline smoking risk status ^a

	Sensitivity	Specificity	False Negative Rate (1-Sensitivity)	False Positive Rate (1-Specificity)
NIAAA SG	0.62	0.70	0.38	0.30
Smoking Risk Status ^b	0.91	0.69	0.09	0.31

^aSensitivity = proportion of adolescents smoking at 6 months that were correctly identified as high (or moderate) risk; specificity = proportion of adolescents not smoking at 6 months that were correctly identified as low risk; false negative rate = proportion of adolescents smoking at 6 months that were incorrectly identified as low risk; false positive rate = proportion of adolescents not smoking at 6 months that were incorrectly identified as high (or moderate risk)

^bBaseline smoking status was categorized for this analysis as “high risk” (high risk adolescents and moderate risk adolescents) vs. “low risk” (adolescents committed to never smoking)