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Brief Underage Alcohol Use Screener Scores Predict Health Risk Behaviors

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Abstract

The aim of this study was to determine if adolescents' scores on a two-item underage alcohol use screener predict risky consequences of past-year alcohol use and other health risk behaviors in a non-clinical, school-based sample of adolescents. A predominantly minority sample of 756 middle and high school students completed in-school tablet-based surveys on past-year underage alcohol use and a range of health risk behaviors. Higher scores for Self Alcohol Risk and Peer Alcohol Risk were associated with higher risk for past year riding with a drunk driver, and past 90-day measures of cigarette use, marijuana use, unplanned sex and unprotected intercourse. The NIAAA Brief Alcohol Screener is a useful tool for school-based service providers, including school nurses, to identify and address the needs of adolescents at high risk for the development of alcohol use disorders, as well as a range of preventable health risk behaviors.

Keywords

Adolescent Health; Alcohol Screener; Drunk Driving; Health Risk Behavior; Sexual Risk Behavior; School Nursing

Conflict of Interest Disclosure Statement

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Introduction

Despite declines in alcohol consumption among adolescents over the last several decades, underage alcohol use remains an important public health problem in the United States. Specifically, underage alcohol use is associated with the onset and accelerated development of alcohol and other substance use problems and disorders during adolescence and emerging adulthood (Patrick & Schulenberg, 2014). Similarly, underage alcohol use is associated with maladaptive health outcomes among adolescents including: fatalities related to impaired driving and other unintended injuries, suicidality, neurocognitive deficits, interpersonal violence, and sexual risk behaviors (Hingson & White, 2014). Efforts to reduce alcohol consumption among adolescents have taken the form of alcohol-specific policy initiatives (e.g., restricting the availability or marketing of alcohol, increasing prices through taxation), as well as age-appropriate individual-, family-, school-, and community-level interventions (Hingson & White, 2014; World Health Organization, 2010). A recent policy statement by the American Academic of Pediatrics (AAP) highlighted the negative impact of underage alcohol use on the neurobiology and neuroplasticity of the developing brain, the emergence of psychiatric disorders, suicide attempts, unintended sexual activity, as well as accidental injuries and deaths. This policy statement recommended early and consistent screening for underage alcohol use to improve health outcomes among adolescents (Quigley and the Committee on Substance Use and Prevention, 2019).

Screening for alcohol use problems, brief intervention, and referral to additional treatment services (SBIRT), where warranted, is recognized as a promising strategy for reducing alcohol consumption and harms associated with prolonged or excessive alcohol use (American Association of Pediatrics Committee of Substance Abuse, 2011). This approach to service delivery has been identified by the Substance Abuse and Mental Health Services Administration (SAMHSA) as an evidence-based practice involving community-based screening to identify and reduce or prevent cases of substance use and abuse (see the SAMHSA website at <https://www.integration.samhsa.gov/clinical-practice/sbirt> for a range of publicly available SBIRT-related resources). A brief historical review of the development and implementation of the SBIRT paradigm in primary health care and other clinical practice settings can be found in Agerwala and McCance-Katz (2012). This approach to service delivery involves the implementation of empirically-supported behavior change strategies to disseminate effective, low-cost prevention and treatment service options into underserved community settings (American Public Health Association & Education Development Center, Inc., 2008; O'Donnell et al., 2014).

The SBIRT model has produced clinically and statistically significant reductions in alcohol and illicit drug use among adults in national, multisite evaluations (Babor, Del Boca, & Bray, 2017). Although additional evaluation of the effectiveness and feasibility of SBIRT among adolescents is necessary, SBIRT has been promoted as promising for early identification of adolescents experiencing alcohol or other substance use problems, and for facilitating their access and entry into developmentally appropriate intervention programs (Beaton, Shubkin, & Chapman, 2016; D'Souza-Li & Harris, 2016; Patton et al., 2014). Preliminary evidence suggests that, consistent with an SBIRT approach, brief motivational interventions for alcohol use produce modest reductions in alcohol

consumption that are bolstered by the low cost and efficiency of these interventions (Tanner-Smith & Lipsey, 2015). However, greater diffusion of SBIRT among adolescents has been hampered by barriers such as the lack of developmentally appropriate brief alcohol use screeners, failure to tailor SBIRT to reflect the experiences of adolescents, and limited understanding of implementation factors that influence intervention impact (Clark & Moss, 2010; Ozechowski, Becker, & Hougue, 2016; Winters, 2016).

In the present study, we focus on documenting associations between scores on a brief developmentally-informed screener for underage alcohol use and a range of preventable health risk behaviors in a school-based sample of adolescents. Early screening for alcohol use and alcohol use problems is an important goal since screening for underage alcohol use is a critical component of alcohol use prevention and brief intervention efforts. Early intervention efforts can limit the acceleration and stabilization of alcohol use during adolescence and emerging adulthood, thereby slowing or halting the development of devastating and costly alcohol abuse and alcohol use disorders. In addition, early prevention efforts for alcohol use and abuse can limit adolescents' participation in alcohol-related health risk behaviors that are significant sources of preventable morbidity and mortality (e.g., motor vehicle accidents, unintended injuries, exposure to sexually transmitted infections [STIs], other forms of substance use).

Commonly used screening tools (e.g., the CRAFFT, AUDIT, CAGE, POSIT) have been validated for identifying children and adolescents who report underage alcohol use (Harris, Louis-Jacques, & Knight, 2014). However, the developmental appropriateness of these screening tools is limited by: (a) their focus on clinically significant alcohol use problems (i.e., heavy, episodic alcohol use or alcohol dependence symptoms) and (b) lack of attention to exploratory alcohol use and emerging early-stage alcohol problems. Therefore, while these instruments are useful for identifying adolescents reporting symptoms of advanced alcohol use, they may fail to detect students reporting early-stage alcohol problems. In addition, some screeners are impractical for practitioners to use in clinical, school or community settings due to their length, complex formats, or lack of manualized guidelines for addressing positive screening results (Pilowsky & Wu, 2013). The development and validation of very brief screeners to identify youth engaging in experimental alcohol use and experiencing initial alcohol-related problems makes routine alcohol screenings more practical in clinical, school and community settings by nurses, mental health counselors and social workers, enhancing the potential public health benefits of early alcohol use detection and intervention (Bray, Del Boca, McRee, Hayashi, & Babor, 2017).

To address the limitations of existing brief alcohol use screeners for detecting early-stage alcohol use problems, the National Institute of Alcohol Abuse and Alcoholism (NIAAA) and the American Academy of Pediatrics (AAP) developed a brief, two-item screener (NIAAA, 2011). Item development and age-graded response options were based on both national survey data and prospective longitudinal studies documenting age-related transitions in alcohol use and the development of alcohol-related problems and disorders. This empirically-derived, brief screening tool is developmentally-tailored for early, middle, and late adolescents via age-appropriate item delivery, response formats, and criteria for determining alcohol-related risk.

Recent cross-sectional and longitudinal evaluations of the NIAAA Brief Alcohol Use Screener provide clear support for the reliability and validity of the screening tool (D'Amico et al., 2016; Meca et al., 2017; Spirito et al., 2016). A large evaluation of the screener with adolescents in pediatric emergency departments (PEDs) demonstrated that moderate or high alcohol risk classifications on the screener provided the highest combined sensitivity and specificity for assigning an alcohol use disorder diagnosis (Spirito et al., 2016). A second, clinic-based evaluation of the NIAAA brief screener independently validated the published score cutpoints for the screener (Parast, Meredith, Stein, Shadel, & D'Amico, 2018). Longitudinal evaluation of data collected from adolescents in clinical settings document the predictive validity of the NIAAA screener for detecting adolescents at highest risk for future development of alcohol use disorders (AUDs) (Linakis et al., 2019). A school-based evaluation of this screener in a predominantly minority sample of adolescents (Meca et al., 2017) indicated that scores on this instrument were better predictors of measures of recent alcohol use (i.e., number of drinking days, largest number of drinks on a drinking day, number of days drunk) than other widely-used alcohol screening tools. Therefore, the NIAAA brief screener appears to be an excellent predictor of early-stage alcohol use problems and is likely to identify adolescents at risk for developing more serious alcohol problems, including AUDs.

The Current Study

In addition to recent reliability and validity analyses of the NIAAA brief screener, there is emerging evidence that scores from this alcohol screener predict cannabis use disorder (CUD) diagnoses, as well as lifetime use of tobacco or illicit drugs in clinical samples of adolescents (Spirito et al., 2019). What is not currently apparent, however, is the extent to which scores from the NIAAA Brief Alcohol Screener predict health risk behaviors in a school-based, non-clinical sample of adolescents. For example, how does the two-item NIAAA brief screener perform in terms of predicting (1) discrete health risk behaviors *that co-occur with alcohol use* (e.g., drunk driving, riding with a drunk driver, sex while drunk) and (2) *other* health risk behaviors (i.e., tobacco use, marijuana use, unprotected sex, unplanned sex, sex under the influence of illicit drugs) in a non-clinical, school-based sample of adolescents? If we assess a range of other health risk behaviors, will scores on the two alcohol screener items predict this wider range of health risk behaviors in addition to early stage alcohol use problems?

Data on predictive relations between scores of a brief underage alcohol risk screener and adolescents' developmentally normative health risk behaviors (i.e., potentially health-impairing behaviors that large proportions of adolescents report [Rae, Sullivan, Razo, George, & Ramirez, 2002]) can illustrate for nurse practitioners, school nurses and other school-based frontline service providers the application of the screener to identify subgroups of adolescents who are more likely to engage in multiple health risk behaviors (Alayan & Shell, 2016). An example of the application of the NIAAA Brief Screener in school settings is important to promote the integration of SBIRT in nursing education and the further dissemination of SBIRT into school settings given: discrepancies between nurse practitioners' attitudes toward and utilization of SBIRT; the positive impact of SBIRT training on nursing students' perceptions of clients with substance abuse problems; and

inconsistent adoption of SBIRT in school-based health centers (Harris, Shaw, Sherman, & Lawson, 2016; Lunstead, Weitzman, Kaye & Levy, 2017; Puskar et al., 2013). In addition, information generated from an application of the NIAAA Brief Screener in school settings can be translated into tailored health-related content to be integrated into brief interventions following initial alcohol screening, as vignettes or as personalized feedback (American Public Health Association & Education Development Center, Inc., 2008; Del Boca, McRee, Vendetti, & Damon, 2017). We hypothesized that scores for the NIAAA brief screener would predict a range of adolescent health risk behaviors, and in particular, those that represent consequences of recent alcohol use (e.g., drunk driving/riding with a drunk driver, sex under the influence of alcohol).

METHODS

This study includes analyses of data from the first measurement occasion of a multi-site, three-year, six-wave longitudinal developmental study to investigate the concurrent and predictive validity of the Brief NIAAA Alcohol Use Screener (NIAAA, 2011) using a predominantly minority, non-clinical sample of middle and high school students. The main focus of the larger developmental study was to compare the performance of the Brief NIAAA Alcohol Use Screener with other widely used alcohol use screeners, as well the utility of the screener for the prediction of the development of serious alcohol use problems and alcohol use disorder symptoms during adolescence. Additional data were collected from study participants on alcohol-related risk behaviors (e.g., other substance use, driving while intoxicated, and sexual risk behaviors) to assess to what degree alcohol screener scores generalized to other adolescent risk behaviors. The Institutional Review Boards (IRBs) of American University and the University of Miami and the Research Review Committees from the two participating school districts (i.e., Prince George's County, MD and Miami-Dade County, FL) all approved the study.

Participants

The sample consisted of 756 adolescents (53% girls; mean age 13.7 years at baseline; $SD=1.6$ years, range 11 to 18 years) who participated in an accelerated longitudinal school-based study of underage alcohol use. Participants were recruited from 6th (25.5% of the sample), 8th (37.4%), and the 10th (37.1%) grade classes in Miami-Dade County, FL (56%) and Prince George's County, MD (44%). In terms of race/ethnicity, the sample was primarily composed of Hispanic (41.4%) and non-Hispanic Black adolescents (33.6%). The rest of the sample was composed of non-Hispanic Whites (8.7%), Asians (5.2%), and "other racial/ethnic groups" (5.2%).

Procedure

Recruitment procedures.—Participants were recruited from randomly selected public middle and high schools (8 schools in Miami-Dade County and 6 in Prince George's County) to increase sample diversity in terms of geographic area, socioeconomic bracket, and ethnicity. Within each participating school, research staff gave presentations about the study in classrooms approved by the school principal. Interested adolescents were asked to bring consent/assent packets home to their parents or caregivers. Participants received \$25

gift cards to a national electronics retailer for each survey completed in the longitudinal study. Unique identifiers were assigned to participants to facilitate follow-up and minimize attrition in subsequent occasions of data collection.

Informed consent/assent procedures.—Prior to participation, all participants' primary caregivers provided written informed consent. Adolescents provided written informed assent prior to starting assessments. Consent and assent procedures were conducted in English or in Spanish, depending on each participant's preference, by fully bilingual assessors.

Assessment procedures.—Baseline data were collected during the 2014-2015 and 2015-2016 school years. Participants completed tablet-based assessments in the language of their choice (English or Spanish). Assessments were completed in classroom settings, and data were then uploaded to a secure, firewalled, cloud-based server. All of the assessment items were selected based on their developmentally appropriate characteristics and applicability to the cognitive abilities of middle and high-school students.

Measures

NIAAA Brief Alcohol Use Screener.—This brief screener (NIAAA, 2011) consisted of two items, asking about (1) adolescents' alcohol use and (2) peers' alcohol use during the last year. Adolescents' levels of peer risk were categorized as either "No Peer Risk" (i.e., no alcohol-using friends) or "Heightened Concern" (i.e., one or more alcohol-using friends). Adolescents' levels of self-risk were categorized into one of four levels: No Risk, Low Risk, Moderate Risk, or High Risk, based on the adolescent's age and alcohol use patterns. For respondents ages 11 and under, any alcohol use was defined as high risk. For respondents between ages 12 and 15, reports of 6 or more alcohol use days in the past year was defined as high risk, and 1 to 5 use days was defined as moderate risk. For respondents ages 16 or 17, 1 to 5 alcohol use days was defined as low risk. Moderate risk was defined as 6-11 alcohol use days for age 16 or 6-23 alcohol use days for age 17. Alcohol risk criteria (i.e., cut-offs for numbers of alcohol use days at different ages) are provided in the Users Guide for the NIAAA Brief Alcohol Use Screener (NIAAA, 2011).

Health risk behaviors.—Eight self-reported health risk behaviors were assessed via single items based on normative health risk behavior data available from the larger longitudinal study. These included items targeting tobacco "During the past 3 months, on how many days did you smoke cigarettes?" and marijuana "on how many occasions [if any] have you used marijuana [weed, pot, grass] or hashish [hash, hash oil] during the past 3 months?" use (Johnston, O'Malley, Miech, Bachman, & Schulenberg, 2016). Two items, similar to those in Barnes and Welte (1988), assessed driving under the influence (DUI) behaviors during the past year: "how many times have you driven a car or motorcycle when you felt at least a little bit drunk, "buzzed" or "tipsy"?" and "how many times have you ridden in a car when you knew the driver was drunk or high?". Four additional items assessed sexual risk behavior during the past three months (Jemmott, Jemmott, & Fong, 1998). Sex under the influence was assessed by: "have you been under the influence of alcohol before having sex?" and "have you been under the influence of illegal drugs while

having sex?”. Unprotected intercourse was assessed by “how often have you had vaginal or anal sex without using a condom?” and unplanned sex was assessed by “how many times have you had sex when you were not planning to?”. The last two items used the response format: *never* (0), *less than half the time* (1), *about half the time* (2), *not always, but more than half the time* (3), or *always* (4). All of these items have been used in existing large-scale epidemiological studies of substance use and related problems among adolescents or in evaluations of prevention and intervention programs.

Analytic Plan

All analyses were conducted within a Structural Equation Modeling (SEM) framework using Mplus version 7.2 (Muthen & Muthen, 1998-2012) and a sandwich covariance estimator (Kauermann & Carroll, 2001) to adjust the standard errors to account for the nesting of participants within schools. We used a robust maximum likelihood (MLR) estimator because MLR provides odds ratios, which facilitate straightforward interpretation of results for categorical variables. First, we documented significant group differences for each health risk behavior outcome across the NIAAA brief screener Self-Use Risk categories (i.e., No Risk, Low Risk, Moderate Risk, and High Risk) and between the Peer Risk (No Concern and Heightened Concern) categories. Second, we combined the Self-Use Risk categories with the Peer Risk categories to produce eight distinct alcohol use risk profiles, and sought to identify significant differences in health risk behaviors across these risk profiles as a way of evaluating the ability of the two-item NIAAA brief screener to predict specific adolescent health risk behaviors. At every step of the analysis, we controlled for age, gender, and data collection site (Miami-Dade versus Prince George’s Counties).

Results

Health Risk Behaviors across the NIAAA Brief Alcohol Use Screener Classifications

Self-use risk classification model.—Preliminary analyses indicated that models examining between risk group differences in (a) sex under the influence of alcohol or illicit drugs or (b) drunk driving were unreliable, due to the small numbers of adolescents reporting these health risk behaviors. Therefore, these behaviors were excluded from additional analyses.

Table 1 summarizes differences in probabilities of specific health risk behaviors across adolescent alcohol use classification groups. Relative to the No Risk category, adolescents classified into the Low ($OR=2.662$, $p=.038$), Moderate ($OR=3.074$, $p<.001$), and High Risk ($OR=7.606$, $p<.001$) alcohol use categories were significantly more likely to have ridden in a car with an impaired driver during the previous year. Compared to the No Risk category, adolescents in the Moderate ($OR=5.512$, $p=.008$) and High Risk ($OR=6.773$, $p=.011$) alcohol use categories were significantly more likely to have used cigarettes during the last 90 days. Additionally, adolescents in the Moderate ($OR=6.800$, $p<.001$) and High Risk ($OR=18.138$, $p<.001$) alcohol use categories were significantly more likely to have used marijuana during the last 90 days. Adolescents in the Moderate ($OR=3.117$, $p=.002$) or High Risk ($OR=4.007$, $p=.001$) alcohol use categories were also significantly more likely to have engaged in unplanned sex during the previous three months. Risk category

comparisons did not indicate any significant differences between the No Risk and the Low Risk groups with regard to cigarette use, marijuana use, or unplanned sex. Finally, relative to the No Risk category, the Low, Moderate, and High Risk alcohol use categories were not significantly more likely to have engaged in intercourse without a condom.

Peer risk classification model.—Table 2 summarizes differences in probabilities of specific health risk behaviors across peer alcohol use risk classification groups. Relative to the No Concern category, adolescents classified into the Heightened Concern category were significantly more likely to have ridden in a car with an impaired driver during the last year ($OR=3.834$, $p<.001$), to have used marijuana ($OR=11.834$, $p<.001$) and cigarettes ($OR=2.805$, $p=.017$), engaged in unprotected intercourse ($OR=3.164$, $p=.014$), and engaged in unplanned sex ($OR=2.977$, $p=.003$) during the 90 days prior to assessment.

Combined self-use and peer risk classification model.—In the final model (see Table 3), we documented significant differences in health risk behaviors across the combined four alcohol self-use risk categories (i.e., No-Risk, Low-Risk, Moderate-Risk, High-Risk) and two alcohol peer-use risk categories (i.e., No Concern and Heightened Concern). Cross-tabulation of the two screener items yielded eight new risk profiles. Approximately 80% of adolescents in this school-based sample were categorized as either No Risk/No Concern ($n=400$, 63.8%) or No Risk/Heightened Concern ($n=106$, 16.9%). Other risk profiles included Low Risk/Heightened Concern ($n=12$, 1.9%), Moderate Risk/No Concern ($n=39$, 6.2%), Moderate Risk/Heightened Concern ($n=42$, 6.7%) and High Risk/Heightened Concern ($n=20$, 3.2%). Two other risk profiles had fewer than 10 members [i.e., Low-Risk/No Concern ($n=3$, 0.5%) and High Risk/No Concern ($n=5$, 0.8%).] and were removed from this model. We then dummy-coded the remaining six combined risk profiles and tested for significant between-category differences in the five health risk behaviors. This model produced multiple singularities related to low cell counts. Based on the assumption that relations among the eight combined alcohol risk categories were ordinal (Meca et al., 2017), a continuous predictor variable was created using the eight screener-derived alcohol risk categories. The distribution for this variable was reasonably normal (Skewness = 1.74; Kurtosis = 1.75).

Table 3 summarizes results from the final model. For each one-unit increase in the combined Self- and Peer-Alcohol Use risk variable, there was an expected 64% increase in the odds of riding in a car with an impaired driver during the previous year ($OR=1.642$, $p<.001$), a 120% increase in the odds of marijuana use during the previous 90 days ($OR=2.210$, $p<.001$), a 74% increase in the odds of cigarette use during the previous 90 days ($OR=1.738$, $p<.001$), and a 47% increase in the odds of engaging in unplanned sex during the previous 90 days ($OR=1.471$, $p<.001$). No significant between-group differences were documented across the combined alcohol risk profiles for intercourse without condom use.

Discussion

The findings of the present study document that specific adolescent health risk behaviors are associated significantly with adolescents' own, and their perceptions of peers', underage alcohol use as indexed by a brief, developmentally-informed 2-item underage alcohol use

screening tool. Previous studies have highlighted the role of adolescents' risky patterns of alcohol use in the increased likelihood of driving under the influence or riding with an intoxicated driver (Buckley et al., 2017), as well as other forms of substance use, with increases in both short- and long-term risk for morbidity and mortality (Moss, Chen, & Yi, 2014; Terry-McElrath, O'Malley, & Johnston, 2013). Underage alcohol consumption in the company of peers is also significantly associated with a wide range of sexual and other risk behaviors during adolescence (Hingson & White, 2014; Monahan, Rhew, Hawkins, & Brown, 2014; Stueve & O'Donnell, 2005). Valid and reliable brief alcohol screeners that accurately detect adolescents' early-stage alcohol use problems should also predict adolescents' scores for multiple health risk behaviors since they tend to cluster together (Nobel, Paul, Turon, & Oldmeadow, 2015), providing valuable information to front-line health care providers in school, including nurse practitioners (e.g., Alayan & Shell, 2016).

Our findings provide preliminary evidence that a brief validated screener, designed to detect early-stage alcohol use problems and AUDs among children and adolescents in health care settings (Linakis et al., 2019; Parast et al., 2018; Spirito et al., 2016), also predicts adolescents' self-reported health risk behaviors that (a) co-occur with alcohol use or (b) are associated with alcohol use. Relations among underage alcohol use and many health risk behaviors are largely driven by complex, multi-level developmental systems that probabilistically increase adolescents' vulnerability to adverse health outcomes (Jackson, Henderson, Frank, & Haw, 2012; MacArthur et al., 2012). The use of very brief, efficient and cost-effective screening tools in school healthcare settings provides an exceptional opportunity to access and identify children and adolescents prior to the onset of clinically significant alcohol use problems associated with participation in multiple correlated health risk behaviors. Identifying adolescents with early-stage alcohol use problems provides not only a 'window of opportunity' for brief interventions (Stanis & Andersen, 2014), but also the chance to integrate health promotion content to engage marginalized, underserved youth who are particularly vulnerable to the development of adverse health outcomes (Boynton-Jarrett, Hair, & Zuckerman, 2013; Bray et al., 2017; Del Boca et al., 2017).

In practical terms, the NIAAA Brief Alcohol Use Screener can be used in school settings to facilitate multiple objectives including: the assessment of referred students; screening students into school-based intervention programs; and screening students into school- or community-based services (Benningfield, Riggs, & Stephan, 2015; Curtis, McLellan, & Gabellini, 2014; Mitchell et al., 2012). The latter two studies provide concrete empirical examples of the implementation of brief screeners in school settings to achieve universal or selected prevention or service delivery goals (e.g., Maslowsky, Capell, Moberg, & Brown, 2017). The User Guide for the NIAAA Brief Alcohol Use Screener (NIAAA, 2011) also contains specific, developmentally appropriate brief alcohol use interventions for children and adolescents, based on their age and assessed alcohol risk levels.

The findings of our study also have implications for school-based prevention and intervention efforts to address adolescent health risk behaviors and related adverse health outcomes. First, these results highlight the importance of further research with higher risk samples of adolescents (e.g., those in alternative schools) to document the extensiveness of co-occurring patterns of adolescent health risk behaviors with scores on brief, validated

alcohol use screeners (Mitchell, Gryczynski, O'Grady, & Schwartz, 2013). Of particular importance is the extent to which scores on brief alcohol screeners are predictive of health risk behaviors among youth who are particularly vulnerable to adverse health outcomes facilitated by co-occurring issues such as substance use, mental health problems and unstable living conditions (Henderson, Chaim, Hawke, and the National Youth Screening Project Network, 2017). The use of a person-centered typological analytic strategy has been shown to be useful for identifying subgroups of adolescents at highest risk for adverse developmental outcomes (e.g., Houck et al., 2006).

Second, further implementation research on SBIRT protocols for adolescents in schools will improve our current understanding of challenges to program acceptance, feasibility, utilization, and sustainability (Del Boca et al., 2017; Harris et al., 2016). Third, the impact of alcohol use reduction education materials or messages may be enhanced if these materials are modified to include content on linkages between underage alcohol use and other health risk behaviors (Toll et al., 2014). Framing health intervention program content and messages with references to positive, multifaceted health gains that are congruent with, and tailored to, adolescents' short- and long-term goals may be more engaging, developmentally appropriate, and motivating vis-à-vis making progress toward alcohol risk-reduction objectives (Kingsbury, Gibbons, & Gerrard, 2015).

School Nursing Implications

These findings also have implications for school nursing practice and education. First, the use of very brief, developmentally-informed and tailored alcohol screeners can facilitate the implementation of SBIRT in school settings by reducing administration burden to nurses and students alike, while improving the accuracy of adolescents' reports of early-stage alcohol use problems. Second, the reduction of administrative burden may encourage more schools to implement SBIRT initiatives to further diffuse low-cost, empirically-supported substance abuse prevention into underserved communities, reducing the inconsistent use of screening resources and protocols by school nurses and staff of school-based health centers (Harris et al., 2016; Lunstead et al., 2017). Third, the NIAAA Brief Alcohol Screener provides guidance on how to address positive screens using specific, appropriate brief intervention options based on clients' ages and alcohol risk classifications. This scaffolding and other publicly available resources provide convenient and empirically-supported strategies for integrating specific SBIRT content into nursing practitioner training protocols (Belfiore, Blinka, BrintzenhofeSzoc, & Shields, 2018). Last, these student learning resources may facilitate clinical practice and skill development among school nurses and enhance their self-efficacy while also normalizing service provision to adolescents experiencing early-stage alcohol use problems (Mitchell et al., 2013; Puskar et al., 2013).

Limitations

The present findings should be interpreted in light of several important limitations. First, the analyses presented here are cross-sectional and thus cannot support specific causal statements about relations between alcohol use screener scores and adolescent health risk behaviors. Second, although the sample was large and diverse, several of the health risk behaviors assessed were reported by small percentages of participants. Therefore, models

for alcohol risk group differences in these health risk behaviors should be interpreted with caution. Third, the alcohol use and health risk behavior variables were assessed via self-report, thereby introducing potential biases, including those associated with inaccurate recall, social desirability, and common-method variance. Last, adolescents' reports of alcohol use and health risk behaviors may have been influenced by unmeasured third variables (social influence processes, behavioral control, reward sensitivity, contextual factors), confounding relations investigated in the present study. Despite these limitations, this school-based study's findings provide preliminary evidence that scores from the two-item NIAAA Brief Alcohol Use Screener predict a range of health risk behaviors that either co-occur with, or are associated with, underage alcohol use. These health risk behaviors place adolescents at elevated risk for adverse health outcomes that are preventable sources of morbidity and mortality during this developmental period. This information can be used by front-line health care providers in school settings in efforts to improve health outcomes among vulnerable groups of adolescents.

Human Subjects Approval Statement

We certify that the present research study was approved by the IRBs at the two universities (American University [AU Protocol 12199], University of Miami [UM Protocol 20120849] and the research review boards at the two school districts (Miami-Dade County, FL; Prince George's County, MD) where the research was carried out. We have read and we confirm that the contents of the manuscript, including the treatment of human research participants, is consistent with the *APA Ethical Principles of Psychologists and Code of Conduct* (APA Standard 8).

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Table 1.

Differences in Recent Health Risk Behaviors across Self Alcohol Use Risk Profiles

Outcome	Predictor	Odds Ratio	<i>p</i> -Value	95% CI
Drunk Riding	Low Risk	2.662	.038	1.180-6.030
	Moderate Risk	3.074	<.001	1.791-5.290
	High Risk	7.606	<.001	4.254-13.641
Marijuana Use	Low Risk	1.898	.477	0.328-11.078
	Moderate Risk	6.800	<.001	3.173-14.634
	High Risk	18.138	<.001	6.340-52.166
Cigarette Use	Low Risk	2.460	.507	.174-35.153
	Moderate Risk	5.512	.008	1.570-19.477
	High Risk	6.773	.011	1.566-29.517
No Condom Use	Low Risk	3.554	.079	0.868-14.659
	Moderate Risk	0.884	.809	0.192-3.647
	High Risk	2.111	.523	0.216-20.868
Unplanned Sex	Low Risk	1.245	.603	0.549-2.835
	Moderate Risk	3.117	.002	1.518-6.425
	High Risk	4.007	.001	1.790-9.325

Table 2.

Differences in Recent Health Risk Behaviors between Peer Alcohol Use Risk Profiles

Outcome	Predictor	Odds Ratio	<i>p</i> -Value	95% CI
Drunk Riding	Peer Risk	3.834	<.001	2.256-6.534
Marijuana Use	Peer Risk	11.834	<.001	4.097-34.372
Cigarette Use	Peer Risk	2.805	.017	1.671-165.339
No Condom Use	Peer Risk	3.164	.014	1.268-7.935
Unplanned Sex	Peer Risk	2.977	.003	0.746-11.972

Table 3.

Differences in Recent Health Risk Behaviors Across Combined Alcohol Use Risk Groups

Outcome	Predictor	Odds Ratio	<i>p</i> -value	95% CI
Drunk Riding	Combined Self Risk and Peer Risk	1.642	<.001	1.443-1.869
Marijuana Use	Combined Self Risk and Peer Risk	2.210	<.001	1.776-2.752
Cigarette Use	Combined Self Risk and Peer Risk	1.738	<.001	1.260-2.402
No Condom Use	Combined Self Risk and Peer Risk	1.173	.374	0.826-1.670
Unplanned Sex	Combined Self Risk and Peer Risk	1.471	<.001	1.187-1.825