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## Behavioral Risk Profiles of Homeschooled Adolescents in the United States: A Nationally Representative Examination of Substance Use Related Outcomes

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### Abstract

**Background**—The homeschool population continues to grow in size and now accounts for 3.4% of all students in the United States.

**Objective**—Given the heterogeneous nature of the population, this study examines the relationship between different types of homeschoolers and a number of substance use related outcomes.

**Methods**—To conduct this study, we used pooled data (2002–2013) from the National Survey on Drug Use and Health (NSDUH). Respondents aged 12–17 who reported they had been homeschooled at any time during the previous 12 months were classified as homeschoolers ( $N=1,321$ ). Latent profile analysis (LPA) was conducted to identify latent subgroups of homeschoolers and multinomial regression was executed to assess the relationship between the subgroups and perceived substance use risk, availability, and past 12-month use.

**Results**—The LPA yielded four subgroups, which were summarized as (1) highly religious and engaged, (2) limited parental monitoring, (3) high parental warmth and support, and (4) secular permissive. Of these, the highly religious and engaged subgroup was the least likely to report using substances.

**Conclusion**—The results underscore the variation that exists among homeschoolers and the importance of examining the relationship between different types of homeschoolers and outcomes of interest.

### Keywords

Homeschooling; adolescents; substance use; latent class analysis; religion

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### Declaration of interest

The authors declare that they have no conflict of interest. The authors alone are responsible for the content and writing of the article.

Interest in homeschooling has continued to increase over the past few decades. According to the United States Department of Education (2015), the percentage of homeschooled students as a percent of the total student population has grown from 2.2% in 2007 to 3.0% in 2007, to 3.4% in 2012. In absolute figures, the number of homeschooled students has more than doubled since 1999, from 0.85 million to approximately 1.8 million in 2012 (Planty et al., 2009).

Despite the growing interest in homeschooling, relatively little research has been conducted in this area (Barth, 2015). Reviews of the extant research have noted the paucity of studies in general, as well as the methodological limitations of the existing research (Kunzman & Gaither, 2013; Murphy, 2014). For example, much of the existing research is characterized by small unrepresentative samples, and studies on important societal outcomes such as substance use are almost completely absent from the literature. To help address this gap in the knowledge base, the present study utilizes nationally representative data to examine the relationship between different types or classes of homeschoolers and a number of substance use related outcomes.

## Literature review

Homeschooling can be defined as a form of private education that is parent-led and home-based (Ray, 2015). Perhaps due to the paucity of research, homeschoolers are often perceived to be a relatively homogeneous population. Parents who engage in home-based education are frequently stereotyped as highly religious individuals (Drenovsky & Cohen, 2012).

To be clear, many parents do choose to homeschool for reasons that stem from their faith (Ray, 2013). Qualitative researchers have identified many reasons that reflect the concerns of religious parents (Glanzer, 2013; Hanna, 2012). Researchers have, however, identified rationales that speak to other groups including, for example, parents who are: secular (Steinmeier, 2014), African American (Ray, 2015), and have children with special needs (Hurlbutt, 2011).

Nationally representative data, collected by the Department of Education, exists on the reasons parents elect to homeschool (Planty et al., 2009). In declining order, the single most important reason was: to provide religious instruction (a rationale that accounts for 36% of homeschooled students), the school environment (concerns about substance use, negative peer pressure, safety; 21%), dissatisfaction with academic instruction at other schools (17%), “other reasons” (14%), and a desire to provide: a nontraditional education (7%), and an environment to address children’s health problems or special needs (6%). In practice, these rationales often overlap in informing parents’ decisions. For instance, the most widely cited reason by parents—which accounted for 88% of all homeschooled students—was concern about school environments and the associated detrimental effects related to substance use, peer pressure, etc.

As these data on parental motivations implicitly suggest, homeschoolers can be categorized into particular types or groups (Collom & Mitchell, 2005). Both qualitative and qualitative

researchers have sought to classify individuals into various typologies that reflect parents' overarching philosophical beliefs (Spiegler, 2010). Put differently, parents' beliefs regarding religion, engagement, monitoring, and other factors serve to create specific subcultures in the larger homeschooling movement.

In turn, over 70 publishers have created a variety of curricula to accommodate a wide array of philosophical orientations (Hanna, 2012). In addition to these prepackaged commercial options, some parents create their own curricula. Others eschew curricula entirely, as commonly occurs in the unschooling movement. Parents in the unschooling subculture typically deemphasize parental involvement and structure (Gray & Riley, 2013). Rather, in a manner akin to the "free range" parenting movement, unschoolers typically encourage their children to experiment and pursue their own interests with minimal parental monitoring. In place of structured assignments, learning occurs through lived experience (e.g., pursuing one's interests, experimenting, etc.).

In recognition of these diverse subcultures, researchers have recently begun to explore variation within the homeschooling movement. Martin-Chang, Gould, and Meuse (2011) examined the relationship between homeschooling and academic achievement. Homeschooled students were classified into "structured" and "unstructured" groups based upon two items that measured parents' level of involvement in organizing learning activities. These two groups were then compared with a carefully selected group of traditionally schooled students on concurrently administered standardized tests. The researchers found that structured homeschoolers outperformed the tradition students, while the unstructured homeschoolers appeared to record the lowest scores across the three groups.

In a similar manner, Green-Hennessy (2014) dichotomized homeschoolers into two groups based upon their reported level of religious service attendance using nationally representative data (i.e., high and low religious attendance). These two groups were compared to two analogous groups of traditionally schooled students on a number of outcomes, including substance use. The results indicated that high religious attendance groups of homeschoolers and traditional schooled students were less likely to report a substance use disorder compared to both low attendance groups.

In these two studies, one or two observed variables essentially functioned as rough proxies for various homeschooling subcultures or latent groups of homeschoolers. In tandem with the literature reviewed above, these studies suggest that different subgroups of homeschoolers exist and these different groups are associated with differential outcomes in areas such as substance use. To test this hypothesis, latent profile analysis (LPA) was conducted to identify latent subgroups of homeschooled adolescents and then multinomial regression analysis was executed to assess the relationship between the identified subgroups and perceived substance use risk, availability, and past 12-month use.

## Method

### Sample and procedures

Study findings are based on pooled, cross-sectional data collected annually as part of the National Survey on Drug Use and Health (NSDUH) between 2002 and 2013. The NSDUH provides population estimates for substance use and other variables in the U.S. general population aged 12 years and older. It utilizes multistage area probability sampling methods to select a representative sample of the U.S. civilian, non-institutionalized population. Study participants include household residents as well as residents of college dormitories, shelters, rooming houses, and group homes; residents of Alaska and Hawaii; and civilians residing on military bases. Multistage sampling designs commonly are used when attempting to provide nationally representative estimates. This is because interviewing all participants is not feasible so larger units are the first stage selected from which subsequent levels of strata are partitioned until individuals from households are selected. NSDUH estimates are based on survey data rather than on complete data for the entire U.S. population. As such, the use of sample design and person-level weight variables is necessary to produce unbiased estimates. Sample design (VESTR [variance estimation stratum] and VEREP [variance estimation replicate within stratum]) and person-level weight (ANALWT\_C) variables are provided for each cross-section of the NSDUH data.

NSDUH study participants were interviewed in private at their places of residence. Potential participants were assured that their names would not be recorded and that their responses would be kept strictly confidential. The NSDUH interview utilizes a computer-assisted interviewing (CAI) methodology to increase the likelihood of valid respondent reports of tobacco, alcohol, and illicit drug use behaviors (SAMHSA, 2014). The CAI methodology includes a combination of computer-assisted personal interviewing (CAPI) and audio computer-assisted self-interviewing (ACASI) methodologies. A more detailed description of the NSDUH design and procedures is available elsewhere (SAMHSA, 2014). Between 2002 and 2013, a total of 668,012 respondents completed the NSDUH survey; however, the current study restricted analyses to respondents between the ages of 12 and 17 that reported having been home-schooled at any time during the previous 12 months ( $n = 1,321$ ). Recent studies conducted using the NSDUH data suggest that—compared to traditionally-schooled students—homeschooled youth tend to be younger, more likely to reside in households earning less than \$75,000 per year, and are disproportionately non-Hispanic white. In general, homeschooled respondents surveyed in the NSDUH are also less likely to report the use of tobacco, alcohol, marijuana and other illicit drugs (see Vaughn et al., 2015).

### Measures

**Homeschool status**—Respondents were classified as homeschooled (0 = no, 1 = yes) on the basis of the following question: “Some parents decide to educate their children at home rather than send them to school. Have you been homeschooled at any time during the past 12 months?” Only participants who responded affirmatively to having been homeschooled were included in the analytic sample.

**Indicator variables**—Fifteen variables in the domains of religious engagement, parental engagement, and parental substance use views were selected as indicator variables for the latent modeling. The existing research suggests these observed variables may serve as indicators of various latent subcultures. The indicator variables utilized in the current study are described below.

**Adolescent religion**—Five measures of religion were utilized: frequency of religious service attendance, participation in religious youth groups, importance of religious beliefs, influence of religious beliefs, and importance of having religious friends. Sample items include, “During the past 12 months, how many times did you attend religious services?” (Excluding special occasions such as weddings, funerals, etc.) and “Your religious beliefs influence how you make decisions in your life.” Higher scores indicate greater levels of public and private religious engagement. A more detailed description of the aforementioned variables and their distribution in the general population of adolescents is available elsewhere (Salas-Wright, Vaughn, Hodge, & Perron, 2012).

**Parental engagement**—Six measures of parental engagement in the domains of parental academic support, monitoring, and warmth were utilized. Sample items include, “How often did your parents limit the amount of time you went out with friends on school nights?” and “How often did your parents let you know you’d done a good job?” All questions were in reference to the previous 12 months. Response options include: (1) “never”, (2) “seldom”, (3) “sometimes”, and (4) “always.”

**Parental substance use views**—Four questions tapped adolescent perceptions regarding their parents’ views on their regular use of cigarettes, alcohol, and marijuana/hashish. Sample items include, “How do you think your parents would feel about you trying marijuana or hashish once or twice?” and “How do you think your parents would feel about you having one or two drinks of an alcoholic beverage nearly every day?” Response options include (0) “neither approve nor disapprove”, (1) “somewhat disapprove”, and (2) “strongly disapprove.”

**Substance use-related factors**—A number of variables related to substance use risk, availability, and use were examined in the multinomial regression analyses. These substance use related variables are described below.

**Perceived risk of substance use**—Adolescents were asked about their perceptions regarding the physical and other risks associated with the regular use of cigarettes, alcohol, marijuana, and cocaine. While cocaine use is far less prevalent among youth than the use of cigarettes, alcohol, and marijuana, we include a measure of perceived risk of cocaine use as a marker of perceptions of lower prevalence illicit drug use. Consistent with coding structure suggested by SAHMSA in the NSDUH codebook, youth reporting they perceived “great risk” to be associated with the use of the aforementioned substances were coded as 1 and all other youth (i.e., no risk, slight risk, moderate risk) were coded as 0. We also provide supplementary information with respect to youth who reported perceptions of “moderate risk” as opposed to “no risk” or “slight risk.” This analytic approach is consistent with

recent studies highlighting the unique importance of strong views with respect to adolescent substance use (Salas-Wright, Vaughn, Todic, Córdova, & Perron, 2015).

**Access to illicit drugs**—Adolescents were asked about how difficult it would be to access marijuana and cocaine/crack. Consistent with coding structure suggested by SAHMSA in the NSDUH codebook, those reporting that it would be “fairly easy” or “very easy” were coded as 1 and youth reporting greater difficulty in accessing drugs (i.e., “fairly difficult,” “very difficult,” “impossible”) were coded as 0. Youth were also asked if they had been approached by someone who intended to sell them an illegal drug in the previous 30 days. Youth responding affirmatively were coded as 1 and all other youth coded as 0.

**Substance use**—Dichotomous (0 = no, 1 = yes) substance use measures included past 12-month use of tobacco, alcohol, cannabis, and other illicit drugs (e.g., cocaine/crack, ecstasy, hallucinogens, etc.). All substance use measures were based on respondent self-report.

**Sociodemographic factors**—Several salient sociodemographic variables were also included as indicator covariates in the latent modeling and control variables in the multinomial regression models. These include: age (range = 12–17), gender (female, male), race/ethnicity (i.e., non-Hispanic white, African American, American Indian/Alaska native, Asian, persons reporting more than one race, and Hispanic), and total annual family income (i.e., less than \$20,000; \$20,000–\$49,999; \$50,000–\$74,999; \$75,000 or greater). We also conducted supplementary analyses regarding urbanicity (metropolitan, nonmetropolitan area) with youth who completed the survey between 2007 and 2013.

### Statistical analyses

LPA and multinomial regression analyses were executed in successive steps to identify latent subgroups of homeschooled adolescents and, in turn, assess the relationships between different subgroups and substance use related outcomes. LPA is a latent modeling approach designed to assign individual cases to their most likely latent subgroups on the basis of observed data (McLachlan & Peel, 2000). Multinomial regression is a statistical procedure designed for nominal outcomes that contain categories that can be assumed to be unordered (Long & Freese, 2006).

Beginning with the LPA, a sequence of latent class models identified between 1 and 5 classes using Latent GOLD<sup>®</sup> 5.0 software (Vermunt & Magidson, 2013). Preliminary analyses revealed that modeling that allowed for more than five classes led to the creation of small and unstable classes. Four statistical criteria were used to identify the best-fitting model: Log Likelihood, Bayesian Information Criterion (BIC), Akaike’s Information Criterion (AIC), Consistent Akaike’s Information Criterion (CAIC). Lower BIC, AIC, and CAIC values and higher log likelihood values reflect better model fit (Celeux & Soromenho, 1996). We also report entropy which is a measure of classification certainty with greater values (ranging from 0.00 to 1.00) reflecting greater accuracy in classification. While these quantitative criteria are essential in the determination of the number of latent classes, researchers should also consider parsimony and the substantive interpretability of the solutions in the selection of the final model (Jung & Wickrama, 2008).



After identifying latent subgroups and assigning subjects to classes on the basis of the probability of membership, multinomial regression was used to predict class membership for each outcome. As is typically practiced, the class containing the greatest number of respondents was identified as the reference category. Using multinomial regression, relative risk ratios and corresponding 95% confidence intervals were estimated. Relative risk ratios refer to the likelihood of membership in one particular class versus a specified reference class and are interpretably akin to odds ratios (Zhang & Yu, 1998). Statistical procedures involving multinomial regression models were conducted using Stata 13.1SE survey data functions (StataCorp, 2013).

Treating class membership as a discrete variable that can be used in a separate analysis is a popular approach (see Kendler, Ohlsson, Sundquist, & Sundquist, 2013; Sullivan, Kessler, & Kendler, 1998; Vaughn et al., 2011) that allows for a substantial descriptive and analytic flexibility in terms of examining the characteristics of latent classes. However, one potential disadvantage of this approach is that it can yield downward biased estimates in examining the association between class membership and additional variables of interest (see Bolck, Croon, & Hagenaars, 2004). An alternative approach is a “three-step approach” that aims to preserve classification uncertainty by means of estimating and correcting classification errors (Vermunt, 2010). Both approaches are widely used and typically produce comparable results; however, the latter approach is considered to be more conservative. Therefore, we provide results of a sensitivity analysis conducted using the method that corrects for classification errors and note any places where there is minimal divergence between the two methodologies.

As described in the 2013 NSDUH Public Use File Codebook (SAHMSA, 2014), the methodological design of the NSDUH (e.g., survey weighting procedure, incentives, survey name, etc.) is intended to facilitate the pooling of data from multiple survey years. Per the instructions provided by SAHMSA for pooled data, we created an adjusted person level weight by dividing the final person level analysis weights (ANALWT\_C) by the number of years of combined data (in our case, twelve years). For all analyses (i.e., the LPA and multinomial regression), weighted prevalence estimates and standard errors were computed in keeping with the protocol described by SAHMSA in both the NSDUH Codebook (SAHMSA, 2014) and in online resources ([http://samhdafaqs.blogspot.com/2014\\_03\\_01\\_archive.html](http://samhdafaqs.blogspot.com/2014_03_01_archive.html)).

## Results

### Identification of latent classes

The examination of quantitative and qualitative criteria suggests that a four class solution was the optimal modeling of the data. As presented in Table 1, the Log Likelihood, BIC, AIC, and CAIC values for the five class solution are slightly lower than the values for the four class solution. However, the relatively minor differences between the four and five class solutions suggest that the addition of a fifth class would likely not be parsimonious. A fifth class would also result in only a limited number of cases in what would be Classes 4 and 5, thereby creating limitations related to statistical power. We also considered a potential three class solution in which Class 2 and Class 3 were effectively collapsed into a singular class

characterized by relatively low levels of religiosity, moderate-to-high levels of parental engagement, and high levels of parental disapproval of substance use. However, we determined that the levels of parental engagement were sufficiently distinct to warrant modeling each of these classes independently. It is also worth noting that—in the three class solution—the relative size of the classes labeled as Class 1 (45.32%) and Class 4 (14.06%) in our final model remained remarkably stable, lending additional credence to the validity of these latent classes.

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In Figure 1, we present the characteristics of the latent classes identified in the four class solution. Given that the response options were not uniform across the 15 indicator variables, we present adjusted scores in which the mean values for each of the indicators in each class were divided by the maximum possible score for each item and then multiplied by 100 (range = 0–100). Descriptive labels were applied to each of the four latent classes in order to highlight the distinguishing characteristics of class members with respect to religious engagement, parental engagement, and parental substance use views. For purposes of readability, we elected to use relatively short descriptive labels rather than to either provide long descriptive labels or leave the classes without labels. Although short labels may not provide an exhaustive description of the characteristics of the latent classes, we believe that the descriptive labels we have selected serve to highlight the characteristics that make each class of homeschooled adolescents unique and qualitatively distinct from the other latent classes.

Class 1 ( $n = 592$ ; 46.23%) is characterized by very high levels of religious engagement (e.g., attend religious services 25–52 times per year, “strongly agree” that their religious beliefs are “a very important part of their life,” etc.), relatively elevated levels of parental engagement, and uniform perceived parental disapproval of adolescent substance use. Given the clear importance of religiosity among this group of homeschooled youth, we refer to Class 1 as the “*Highly Religious and Engaged*” class.

Class 2 ( $n = 266$ ; 20.95%) is characterized by low-to-moderate levels of religious engagement, comparatively low levels of parental engagement (particularly with respect to parental monitoring), and uniformly disapproving parental views regarding adolescent substance use. In terms of parental monitoring, the mean scores for Class 2 of 1.83 for “Limit TV” and 2.32 for “Limit Time Out” are markedly lower than those of Classes 1 and 3. These scores also suggest that parents of these youth “seldom” place limits on these behaviors. In light of these distinctions, we refer to Class 2 as the “*Limited Parental Monitoring*” class.



Class 3 ( $n = 283$ ; 19.63%) is similar to Class 2 in terms of religious engagement and parental substance use views; however, youth in this class report highly elevated levels of parental academic support and warmth. Indeed, the mean score of 3.84 for “Help w/ Homework” indicates that the overwhelming majority of youth in this class (85.54%) report that their parents “always” provide help with homework when needed. Similarly, the mean score of 3.96 for “Parents Reinforce” suggests that nearly all class members (96.93%) report that their parents “always” let them know when they have “done a good job.” As such, we refer to Class 3 as the “*High Parental Support and Warmth*” class.

Finally, Class 4 ( $n = 180$ ; 13.19%) is characterized by low levels of religious engagement, low-to-moderate levels of parental engagement, and markedly low levels of perceived parental substance use disapproval. Indeed, only 1.96% of adolescents in this class report that their parents would “somewhat disapprove” of monthly marijuana use and 0.00% report that their parents would “strongly disapprove” of such use. Similarly permissive views are reported for tobacco and alcohol use. As such, we refer to Class 4 as the “*Secular Permissive*” class.

### **Sociodemographic characteristics of latent homeschool classes**

Table 2 presents the sociodemographic characteristics of the four latent homeschool classes. Class 1 (Highly Religious and Engaged) stands out as the youngest of all classes with a mean age of 13.91 years and also has the highest proportion of female (57.54%), non-Hispanic white (79.76%), and higher household income (i.e., > \$75,000 per year; 31.72%) respondents. Classes 2 (Limited Parental Monitoring) and 3 (High Parental Support and Warmth) are quite similar in terms of age, gender, and race/ethnicity, but a far larger proportion of youth in Class 2 (34.88%) reside in lower income households (i.e., < \$20,000 per year) as compared to youth in Class 3 (22.84%). Using available data (2007–2013), no significant differences were identified with respect to urbanicity (i.e., Metropolitan versus nonmetropolitan area).

Class 4 (Secular Permissive) stands out as the class with—far and away—the highest proportion of male (64.87%) respondents as well as respondents residing in households earning less than \$20,000 per year (44.21%). Class 4 also has the smallest proportion of non-Hispanic white respondents (37.90%) and the highest proportion of African American (17.85%) and Hispanic (33.88%) youth.

### **Substance use risk among the latent homeschool classes**

Figure 2 displays the survey adjusted prevalence estimates for tobacco, alcohol, cannabis, and other illicit drug use among the four latent classes. For all substances examined, members of Class 1 (Highly Religious and Engaged) report substantially lower levels of past 12-month use. Members of Class 2 (Limited Parental Monitoring) report the highest prevalence of past 12-month alcohol (33.77%) and illicit drug (12.39%) use of any of the latent homeschool classes.

Members of Class 2 (Limited Parental Monitoring) and Class 3 (High Parental Support and Warmth) report similar levels of tobacco and cannabis use. Members of Class 4 (Secular

Permissive) reported the highest levels of tobacco (28.44%) and cannabis (23.09%) use of any of the latent classes.

Table 3 presents the adjusted risk ratios for perceived substance use risk/availability and past 12-month use among members of Class 2–4 with Class 1 (Highly Religious and Engaged) specified as the reference group. Throughout the results section, we also provide supplementary information derived from examining the association between class membership and substance use risk variables of interest using bias-adjusted proportional assignment. As the overall results were highly similar, we do not provide comprehensive results of the sensitivity analysis but are careful to highlight any noteworthy discrepancies (i.e., differences in significance, nonoverlapping 95% confidence intervals) in results between the two approaches.

With respect to perceptions of risk associated with substance use, members of Classes 2–4 were significantly less likely to report the perception of “great risk” being associated with regular smoking and alcohol, marijuana, and cocaine use. The results from the analyses using adjusted proportional assignment were virtually identical with respect to the risk ratios and confidence intervals. We also ran additional analyses in which we examined youth who reported perceptions of “moderate risk” (as opposed to “no risk” or “slight risk”). This revealed a more nuanced pattern. Specifically, members of Classes 2–4 tended to be significantly *more* likely to report perceptions of “moderate risk” and less likely to report perceptions of “great risk” compared with the reference group.

In terms of ease of access to illicit drugs, members of Class 2 (Limited Parental Monitoring) were significantly more likely to report easy access to marijuana (RR = 2.18, 95% CI = 1.37–3.47) but not to cocaine/crack. However, results from the analyses conducted with adjusted proportional assignment found members of Class 2 to be more likely to also report easy access to cocaine/crack (RR = 1.89, 95% CI = 1.11–3.22). Members of Class 4 (Secular Permissive) were significantly more likely to report fairly/very easy access to marijuana (RR = 2.29, 95% CI = 1.12–4.68) and cocaine/crack (RR = 2.16, 95% CI = 1.01–4.64). A supplementary examination in which we separately examined access to power cocaine and crack use revealed no differences with respect to these two coca-based products.

With respect to drug offers, members of Class 4 were significantly more likely to report recent receipt of a drug offer (RR = 4.19, 95% CI = 1.90–9.23). Results from the analyses conducted with adjusted proportional assignment found that members of Class 2 were also more likely to report receipt of a drug offer (RR = 3.19, 95% CI = 1.24–8.21). In terms of past 12-month substance use, members of Classes 2–4 were significantly more likely to report having used tobacco, alcohol, marijuana, and other illicit drugs as compared to Class 1 (Highly Religious and Engaged). The only difference noted in the supplementary analyses conducted using adjusted proportional assignment was a non-significant finding for illicit drug use among Class 3 (RR = 2.70, 95% CI = 0.86–8.49). Additionally, while all 95% confidence intervals overlapped for drug use outcomes, the upper limit of the confidence intervals did tend to be greater in the supplementary analysis.

### Supplementary contrasts with secular permissive class

Supplementary analyses (not shown) were conducted in which we specified Class 4 as the reference category in order to examine potential differences between Class 4 and Classes 2–3. In all supplementary analyses, we controlled for the same list of sociodemographic variables (i.e., age, gender, race/ethnicity, and household income) used in all primary regression-based analyses. We also situate these supplemental findings within the prevalence estimates provided in Table 3. Nevertheless, while we believe it is important to provide the maximum information possible (and thereby conducted supplementary analyses), we recommend that caution be exercised in interpreting results in which multiple reference groups are examined.

In reference to the perceived risk of drug use, members of Class 2 were significantly more likely than members of Class 4 to perceive the regular use of tobacco (RR = 2.55, 95% CI = 1.45–4.47), alcohol (RR = 1.99, 95% CI = 1.11–3.58), and marijuana (RR = 2.20, 95% CI = 1.21–4.00) as being of “great risk” to their health and well-being. Notably, results based in the adjusted proportional assignment approach did not find significant differences for tobacco or alcohol use (marijuana risk perception only [RR = 2.01, 95% CI = 1.04–3.90]). Members of Class 3 were also significantly more likely than members of Class 4 to perceive “great risk” as associated with the use of tobacco (RR = 2.64, 95% CI = 1.53–4.55), marijuana (RR = 3.07, 95% CI = 1.70–5.53), and cocaine (RR = 2.22, 95% CI = 1.14–4.31). These findings—contrasting Class 4 with Classes 2 and 3—are consistent with a clear pattern of differences with respect to the proportion of youth reporting perceptions of great risk associated with the use of the aforementioned substances (see Table 3).

In terms of drug access, only one significant association was identified; namely, compared to members of Class 4, members of Class 3 were significantly less likely to report having fairly/very easy access to cocaine/crack (RR = 0.45, 95% CI = 0.21–0.97). This is consistent with differences in the proportion of youth in Class 3 (18.78%) and Class 4 (33.67%) reporting fairly/very easy access to cocaine/crack. Notably, the results based in adjusted proportional assignment also found that youth in Class 3 (RR = 0.41, 95% CI = 0.20–0.60) were less likely to report easy access to marijuana as compared to Class 4. Significant differences were also identified for risk of receiving drug offers. Specifically, compared to members of Class 4, members of Class 2 (RR = 0.43, 95% CI = 0.20–0.91) and Class 3 (RR = 0.27, 95% CI = 0.12–0.62) were significantly less likely to have reported receipt of a drug offer in the past 30 days. This finding is also consistent with marked differences in the proportion of youth in Class 4 (17.51%) versus those in Classes 2 (9.18%) and 3 (5.57%) reporting receipt of a drug offer.

With respect to substance use, we found—controlling for the same list of sociodemographic confounds—no significant differences in terms of tobacco, alcohol, or other illicit drug use. Compared to members of Class 4, however, members of Class 2 (RR = 0.41, 95% CI = 0.20–0.85) and Class 3 (RR = 0.38, 95% CI = 0.18–0.81) were significantly less likely to report having used marijuana in the past 12 months. This pattern of differences is consistent with the difference in prevalence of marijuana use among youth in Classes 2 (12.02%) and 3 (9.67%) in contrast with youth in Class 4 (23.09%) and identical to the bias adjusted proportional assignment analyses.

### A supplementary examination of urbanicity (2007–2013)

The variable (i.e., “COUTYP2”) that allows for the classification of youth residing in rural versus urban areas—based on the classification of respondents counties as metropolitan or nonmetropolitan (i.e., not part of a metropolitan area and population of less than 20,000; see SAHMSA, 2014)—was not available prior to 2007. Rather than exclude data collected between 2002 and 2006 from the analytic sample, we elected to conduct the finite mixture modeling and regression analyses without using urbanicity as an indicator covariate/control variable. However, due to the potential importance of this construct, we carried out supplementary analyses in which we conducted the latent profile analysis exclusively with data collected between 2007 and 2013 and included urbanicity as an indicator covariate. We also ran supplementary analyses in which we included urbanicity as a control variable in the multinomial logistic regression analyses.

Results from our sensitivity analyses yielded a four class solution that was highly consistent with our primary analysis. The only noteworthy difference is that the proportional size of Class 1 increased slightly (from 46% to 55%) while the proportional size of Class 4 dropped from 13% to 5%. Moreover, we note that the proportion of youth in Class 4 classified into nonmetropolitan areas was slightly greater in the primary (14%) versus the supplementary (8%) latent profile analyses. Taken together, these findings seem to suggest that Class 4 (Secular Permissive) is disproportionately an urban subgroup. With respect to the regression models, although eliminating respondents from 2002–2006 ( $n = 585$ , 44% of sample) created power issues, we nevertheless observed a very similar pattern of results in terms of the general direction and magnitude of the relative risk ratios examined.

## Discussion

Little research exists on homeschoolers and substance use, despite the growth in the heterogeneous homeschool population and the salience of substance use as an outcome among adolescents (Kunzman & Gaither, 2013; Murphy, 2014). Building upon a previous study by Green-Hennessy (2014), we employed a nationally representative sample to identify latent subgroups among homeschooled adolescents and then assess the relationship between the various groups and three substance use outcomes: perceived substance use risk, availability, and past 12-month use.

Consistent with our hypothesis, LPA identified four relatively discrete groups, which were distinguished as: (1) Highly Religious and Engaged, (2) Limited Parental Monitoring, (3) High Parental Warmth and Support, and (4) Secular Permissive. In terms of the relationship between each of the four groups and the substance use outcomes, the Highly Religious and Engaged Class appears to be relatively unique. Members of this group were disproportionately likely to perceive great risk associated with the regular use of cigarettes, alcohol, marijuana, or cocaine. Although members of the Highly Religious and Engaged group were not necessarily more likely to have access to illicit substances or receive an offer to use substances than members of some other groups, they reported lower levels of use relative to the other three groups across all four measure of substance use.

These results are consistent with those obtained by Green-Hennessy (2014) who segmented homeschoolers into two groups based upon religious attendance and found that members of the high attendance group were less likely to report having a substance use disorder compared to members of the low attendance group. In turn, these findings are congruent with a larger body of research that links various measures of religion with lower levels of substance use (Koenig, King & Carson, 2012). Indeed, the inverse relationship between religion and adolescent substance use is so well established that researchers have begun to focus on various theoretical explanations (Salas-Wright, Vaughn, Maynard, Clark, & Snyder, 2014).

As alluded to in the introduction, homeschoolers typically form extensive social networks with other families that share similar philosophical orientations (Murphy, 2014). These networks are operationalized in the form of prayer groups, educational co-ops, structured “mom schools,” and other forms (Kunzman & Gaither, 2013). Such groups may provide adolescents with positive peer groups that reinforce parental messages discouraging substance use. Catalano and Hawkins’ (1996) social development model underscores the importance of positive interactions with pro-social actors as a protective factor regarding substance use. In religious subcultures, the pro-social messages are imbedded in a sacred narrative that serves to underscore their salience (Pargament, 2007).

The present study adds to the literature in a number of ways. Previous work has dichotomized homeschoolers based upon observed measures that assess religious attendance (Green-Hennessy, 2014) or involvement in organizing learning activities (Green-Hennessy, 2014; Martin-Chang et al., 2011). Although such studies represent important contributions to the literature, they fail to accurately depict the diverse underlying groups that exist in the heterogeneous homeschool population. Conversely, the LPA may provide a more accurate picture of the various groups and, in the process, shed light on different homeschool groups.

Perhaps particularly interesting in this regard is the Secular Permissive group, whose profile appears to bear some resemblance to the values that define the unschooling movement (Gray & Riley, 2013). This movement is characterized by limited parental engagement and a strong emphasis upon adolescent autonomy and experimentation. These values are consistent with youths’ perceptions regarding relatively limited parental monitoring and permissive views regarding substance use. Yet, apart from marijuana use, adolescents in the Secular Permissive group were no more likely than adolescents in groups 2 (Limited Parental Monitoring) or 3 (High Parental Warmth and Support) to use substances, despite members of these two latter groups frequently endorsing the notion that substance use is associated with great risk. This result is consistent with unschoolers’ contention that providing a permissive environment that emphasizes adolescents’ autonomy fosters independent, capable individuals who can make appropriate choices.

Future research might compare the Secular Permissive group with other groups on different outcomes, such as independent thinking, self-esteem, or internal locus of control. Since these traits are values that unschoolers frequently attempt to engender, it would be interesting to see if differences emerge on such outcomes. Indeed, future research might build upon the present study by examine the relationship between various groups of

homeschoolers and a diverse array of outcomes. Ideally, the outcomes examined would reflect the concerns and aims of homeschoolers (Murphy, 2014).

## Limitations

As is the case in any research, the study limitations should be noted. For example, the study relied upon self-report measures. It is possible that youth might have under-reported their levels of substance use due to the possible presence of parents or guardians in the household while the survey was being administered. Although the nationally representative sample suggests the results can be generalized to the larger national population of homeschooled adolescents in the United States, the results cannot be generalized to homeschoolers in other nations, where different classes of homeschoolers may exist (Kunzman & Gaither, 2013). Additionally, the NSDUH public use data file does not include a measure of state or region of the United States. This is regrettable given that it is possible that state- or regional-level variation may exist. The cross-sectional nature of the data precludes any assessment of causality. The pooled data allow for a sufficient sample size for analysis, but may fail to capture changes in the homeschool population over the 2002–2013 timeframe. Similarly, combining samples across 11 years assumes that there were no significant changes that affected behavior and attitudes toward substance use during this time period. The measure of homeschooling used in this study—homeschooled at any time during the past 12 months—may not accurately capture individuals who were homeschooled outside this timeframe or employed hybrid models. It is possible, for example, that the sample included individuals who were homeschooled for a short period of time (e.g., due to illness) and that the results may not accurately reflect the perspectives of long term homeschoolers.

## Conclusion

Homeschoolers represent a growing heterogeneous population (U.S. Department of Education, 2015). Despite this growth, relatively little research exists on homeschoolers and much of what does exist is characterized by qualitative methods, convenience samples, and lack of appropriate controls in quantitative studies (Kunzman & Gaither, 2013; Murphy, 2014). This study sought to address these limitations by, for example, using nationally representative data to examine the relationship between different types of homeschoolers and a number of substance use related outcomes.

The results of the latent class analysis indicated the existence of four relatively distinct subgroups of homeschooled adolescents. Of these four groups, multinomial regression indicated that the Highly Religious and Engaged subgroup was the least likely to use substances during the past 12 months. The results underscore the variation that exists among homeschoolers and the importance of examining the relationship between different types of homeschoolers and substance use and related variables. Future researchers might build upon these results by examining the relationships between various groups of homeschoolers and other outcomes of interest, particularly those that intersect the concerns of homeschoolers.

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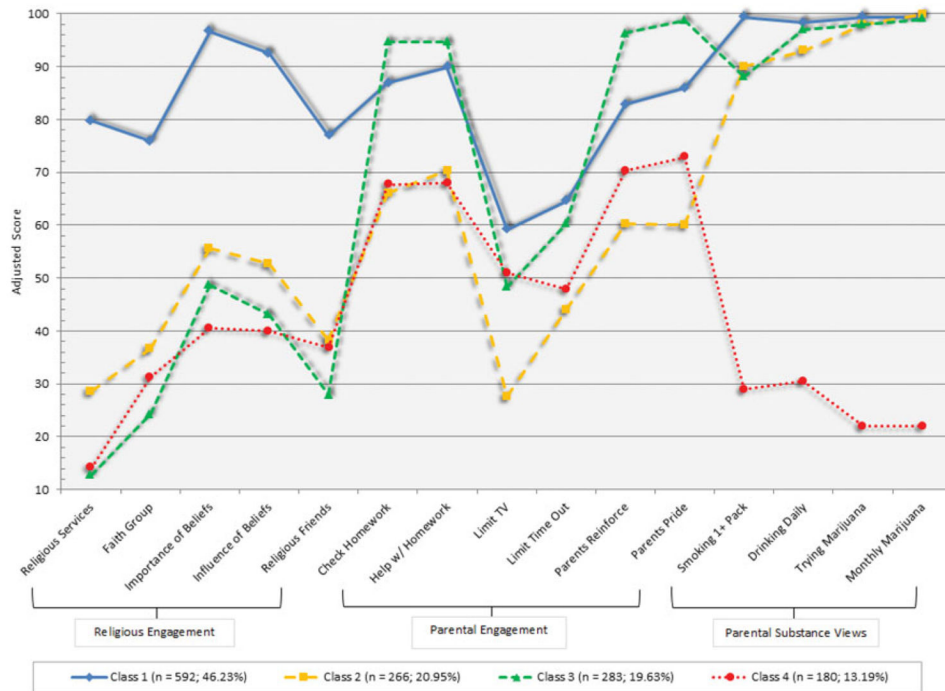


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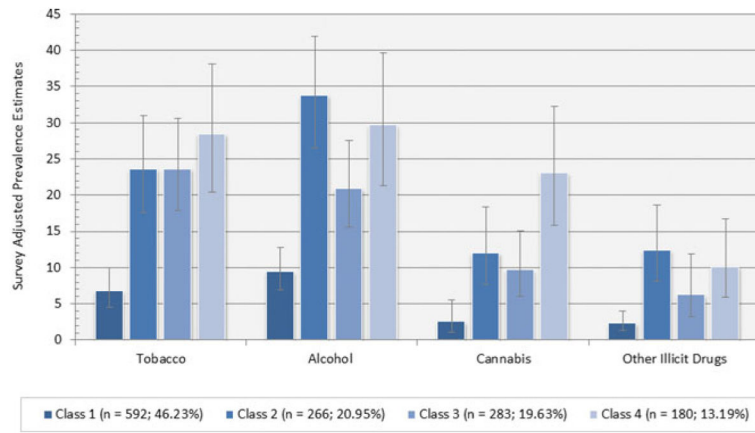
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**Figure 1.** Profiles of homeschooled adolescents in the United States. Given that the response options were not uniform across the 15 indicator variables, we present adjusted scores in which the mean values for each of the indicators in each class were divided by the maximum possible score for each item and then multiplied by 100 (range = 0–100).



**Figure 2.** Prevalence of substance use within past 12 months with 95% confidence intervals across the latent classes.

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**Table 1**

Fit indices for latent classes.

Class solution	Log likelihood	BIC	AIC	CAIC	Entropy
1 Class	-19623.84	39556.68	39333.68	39599.68	n/a
2 Classes	-17960.24	36401.96	36054.49	36468.96	0.86
3 Classes	-17343.58	35341.08	34869.14	35432.08	0.89
4 Classes	-17136.75	35099.91	34503.51	35214.91	0.86
5 Classes	-16968.28	34935.44	34214.56	35074.44	0.84

Note: BIC = Bayesian Information Criterion, AIC = Akaike's Information Criterion, CAIC = Consistent Akaike's Information Criterion.

**Table 2**

Sociodemographic characteristics by latent class.

	Class 1: Highly religious and engaged ( <i>n</i> = 592; 46.23%) <i>M</i> (SD)/ <i>N</i> (%)	Class 2: Limited parental monitoring ( <i>n</i> = 266; 20.95%) <i>M</i> (SD)/ <i>N</i> (%)	Class 3: High parental support and warmth ( <i>n</i> = 283; 19.63%) <i>M</i> (SD)/ <i>N</i> (%)	Class 4: Secular permissive ( <i>n</i> = 180; 13.19%) <i>M</i> (SD)/ <i>N</i> (%)	Full sample ( <i>N</i> = 1321) <i>M</i> (SD)/ <i>N</i> (%)	<i>F</i> / $\chi^2$ Significance
Sociodemographic Factors						
Age	13.91 (1.70)	14.78 (1.67)	14.56 (1.75)	14.84 (1.83)	14.35 (1.77)	< .001
Gender						
Female	327 (57.54)	122 (49.54)	121 (44.44)	72 (35.13)	642 (50.34)	< .001
Male	265 (42.46)	144 (50.46)	162 (55.56)	108 (64.87)	679 (49.66)	
Race/Ethnicity						
Non-Hispanic White	469 (79.76)	167 (63.28)	173 (60.52)	75 (37.90)	884 (67.01)	< 0.001
African American	32 (6.31)	23 (12.37)	37 (14.29)	30 (17.85)	122 (10.67)	
American Indian/Alaska Native	5 (0.25)	2 (0.30)	6 (1.08)	7 (1.21)	20 (0.55)	
Asian/Pacific Islander	9 (1.40)	5 (2.27)	5 (2.31)	3 (5.84)	22 (2.35)	
Multiracial	15 (0.73)	14 (2.29)	8 (1.18)	9 (3.32)	46 (1.49)	
Hispanic	62 (11.54)	55 (19.49)	54 (20.62)	56 (33.88)	227 (17.93)	
Household Income						
< \$20,000	66 (10.79)	93 (34.88)	79 (22.84)	75 (44.21)	313 (22.61)	< 0.001
\$20,000–\$49,999	197 (34.68)	98 (36.74)	116 (42.88)	60 (28.00)	347 (35.84)	
\$50,000–\$74,999	145 (22.82)	40 (14.70)	39 (15.63)	22 (11.27)	246 (18.18)	
> \$75,000	184 (31.72)	35 (13.69)	49 (18.65)	23 (16.52)	291 (23.37)	
Urbanicity <sup>d</sup>						
Metropolitan	251 (76.32)	94 (76.87)	106 (75.92)	70 (84.39)	521 (77.31)	ns
Nonmetropolitan	110 (23.68)	36 (23.13)	49 (24.08)	20 (15.61)	215 (22.69)	

Notes:

\* *p* < 0.05.

\*\* *p* < 0.01.

\*\*\* *p* < 0.001.

All percentages are reported as column percentages.



Urbanicity data for 2007–2013 data only.

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**Table 3**

Substance use characteristics of the latent classes.

	Class 1: Highly religious and engaged (n = 592, 46.23%)			Class 2: Limited parental monitoring (n = 266; 20.95%)			Class 3: High parental support and warmth (n = 283; 19.63%)			Class 4: Secular permissive (n = 180; 13.19%)				
	%	95% CI	RR (95% CI)	%	95% CI	RR (95% CI)	%	95% CI	RR (95% CI)	%	95% CI	RR (95% CI)		
Substance Use														
Risk/Availability														
<i>Great risk:</i>														
Smoking	76.05	(71.4–80.2)	<b>0.38</b>	(50.5–66.2)	<b>0.38</b>	(0.25–0.59)	57.97	(50.1–65.5)	<b>0.40</b>	(0.26–0.60)	41.40	(30.4–53.3)	<b>0.15</b>	(0.09–0.26)
Having 4–5 drinks	50.88	(45.5–56.2)	<b>0.61</b>	(32.7–49.5)	<b>0.61</b>	(0.39–0.95)	37.69	(30.4–45.5)	<b>0.53</b>	(0.35–0.81)	27.07	(18.6–37.6)	<b>0.31</b>	(0.18–0.53)
Smoking marijuana	72.53	(67.2–77.3)	<b>0.32</b>	(35.0–51.3)	<b>0.32</b>	(0.21–0.50)	51.19	(43.4–58.9)	<b>0.45</b>	(0.29–0.68)	26.26	(17.6–37.2)	<b>0.15</b>	(0.08–0.27)
Using cocaine	78.28	(73.3–82.5)	<b>0.43</b>	(54.7–70.0)	<b>0.43</b>	(0.27–0.68)	66.75	(58.8–73.8)	<b>0.55</b>	(0.34–0.88)	46.61	(34.9–58.7)	<b>0.25</b>	(0.13–0.48)
<i>Fairly/very easy access:</i>														
Marijuana	21.57	(17.5–26.3)	<b>2.18</b>	(34.5–50.7)	<b>2.18</b>	(1.37–3.47)	30.20	(23.5–37.8)	1.34	(0.85–2.10)	43.40	(32.3–55.2)	<b>2.29</b>	(1.12–4.68)
Cocaine/crack	18.14	(14.2–22.9)	1.54	(20.2–35.4)	1.54	(0.93–2.55)	18.78	(13.3–25.8)	0.98	(0.58–0.64)	33.67	(23.2–46.0)	<b>2.16</b>	(1.01–4.64)
<i>Receipt of drug offer (past 30 days)</i>	3.57	(2.1–6.1)	1.79	(5.4–15.1)	1.79	(0.78–4.15)	5.57	(3.1–9.8)	1.13	(0.46–2.79)	17.51	(11.4–26.0)	<b>4.19</b>	(1.90–9.23)
Substance Use														
<i>Past 12-month use of:</i>														
Tobacco	6.78	(4.6–9.9)	<b>3.24</b>	(17.6–30.9)	<b>3.24</b>	(1.74–6.04)	23.63	(17.8–30.6)	<b>4.01</b>	(2.27–7.08)	28.44	(20.4–38.1)	<b>4.71</b>	(2.43–9.12)
Alcohol	9.44	(6.9–12.8)	<b>4.11</b>	(26.5–41.9)	<b>4.11</b>	(2.34–7.20)	20.88	(15.5–27.5)	<b>2.30</b>	(1.33–3.97)	29.66	(21.3–39.6)	<b>3.31</b>	(1.73–6.33)
Marijuana	2.53	(1.1–5.5)	<b>3.17</b>	(7.6–18.4)	<b>3.17</b>	(1.10–9.08)	9.67	(6.1–15.1)	<b>2.93</b>	(1.07–8.01)	23.09	(15.9–32.3)	<b>7.74</b>	(2.76–21.7)
Other Illicit Drugs	2.29	(1.3–4.0)	<b>5.66</b>	(8.0–18.6)	<b>5.66</b>	(2.64–12.1)	6.25	(3.2–11.8)	<b>2.56</b>	(1.03–6.36)	10.14	(6.0–16.7)	<b>4.15</b>	(1.63–10.5)

Notes: Reference class is Class 1: “Highly Religious and Engaged” (n = 592; 46.23%). Risk Ratios (RR) adjusted for age, gender, race/ethnicity, and household income. RRs and 95% Confidence Intervals (CI) in bold are significant at  $p < 0.05$ .