Sexual Orientation and Anabolic-Androgenic Steroids in US Adolescent Boys

WHAT'S KNOWN ON THIS SUBJECT: Anabolic-androgenic steroid misuse is not uncommon among adolescent boys, and initial use in adolescence is associated with a host of maladaptive outcomes, including cardiovascular, endocrine, and psychiatric complications.

WHAT THIS STUDY ADDS: This is the first known study to examine prevalence rates of anabolic-androgenic steroid misuse as a function of sexual orientation. A dramatic disparity was found, in that sexual minority boys reported misuse at a much higher rate than heterosexual boys.

abstract

OBJECTIVES: We compared the lifetime prevalence of anabolic-androgenic steroid (AAS) misuse among sexual minority versus heterosexual US adolescent boys, and secondarily, sought to explore possible intermediate variables that may explain prevalence differences.

METHODS: Participants were 17,250 adolescent boys taken from a pooled data set of the 14 jurisdictions from the 2005 and 2007 Youth Risk Behavior Surveys that assessed sexual orientation. Data were analyzed for overall prevalence of AAS misuse and possible intermediary risk factors.

RESULTS: Sexual minority adolescent boys were at an increased odds of 5.8 (95% confidence interval 4.1–8.2) to report a lifetime prevalence of AAS (21% vs 4%) compared with their heterosexual counterparts, P < .001. Exploratory analyses suggested that increased depressive symptoms/suicidality, victimization, and substance use contributed to this disparity.

CONCLUSIONS: This is the first known study to test and find substantial health disparities in the prevalence of AAS misuse as a function of sexual orientation. Prevention and intervention efforts are needed for sexual minority adolescent boys. Pediatrics 2014;133:469–475
Anabolic-androgenic steroids (AAS) are a group of substances, including testosterone and synthetic derivatives, that aid in the synthesis of protein and increase the development of secondary male sex characteristics. Although these substances are used for a variety of reasons, the most common reasons are to enhance strength, performance, and/or muscularity. Long-term consequences of AAS misuse include cardiovascular, endocrine, and psychiatric complications. General population estimates suggest that AAS misuse is not uncommon among adolescent boys, with prevalence rates varying between 1.0% and 5.4%, and nearly one-quarter of adult men who misuse between the ages of 18 and 35. AAS misuse was strongly related to substance use, depressive symptoms/suicidality, and victimization. The prevalence of AAS misuse was related to lifetime substance use, and substance use is strongly related to AAS misuse. Some have argued that depressive symptoms/suicidality may lead to AAS misuse, as boys may experience increased depression as a function of perceiving their bodies as inconsistent with current Western ideals for males (ie, high muscularity and low body fat), which are unattainable for most boys. This discrepancy in ideal versus actual physique may be associated with the misuse of AAS, with aims of gaining increased muscle mass. Similarly, boys who are bullied or victimized may desire a highly muscular body in hopes that greater muscle mass would deter others from victimizing them. Last, substance use is strongly related to AAS misuse, and it has been suggested that AAS misuse falls within a broader cluster of poly-substance use.

To date, there have been no known examinations of the prevalence of AAS misuse as a function of sexual orientation, and focusing on adolescent boys is of particular significance due to the literature reviewed previously, suggesting that this is a developmental window when AAS misuse seems to begin for a sizable proportion of boys. Thus, the current study sought to assess the prevalence of lifetime misuse of AAS as a function of sexual orientation among a national sample of US adolescent boys. A binary Sexual Minority Status variable was created that allows for inclusion of as many jurisdictions as possible in the analysis sample. A binary Sexual Minority Status variable was created to identify individuals who endorsed a minority sexual or gender orientation on any of the 3 dimensions measured (‘gay or lesbian’ or ‘bisexual’ in Sexual Orientation, ‘same and opposite sex’ in Gender of Sexual Attraction). Nine of 14 jurisdictions included a question about sexual orientation identity; 12 of 14 jurisdictions included a question about gender of sexual attraction.

METHODS
Participants and Procedure
Participants were 17,250 adolescents, of whom 635 (3.7%) were classified as sexual minorities (see Table 1 for sample characteristics). The study analyzed a data set that pooled 2005 and 2007 YRBS, from the 14 jurisdictions (Boston, Chicago, Connecticut, Delaware, Hawaii, Maine, Massachusetts, New York City, San Diego, San Francisco, Vermont, Rhode Island, Wisconsin, and Milwaukee), as these were the only jurisdictions in the United States that included 1 or more measures of sexual orientation (data from Vermont were included in the primary, but not the exploratory analyses, as this jurisdiction did not assess suicidality which was used in the exploratory analyses). The general approach to pooling the data and analyzing the pooled data set, along with the sexual orientation items and characteristics of the sample by jurisdiction, are described in detail in Mustanski et al. Measures

Sexual Orientation
Because the goal of this project was to present a broad epidemiologic view of AAS misuse among sexual minority adolescents in the United States, a pooled sexual orientation variable was created that allows for inclusion of as many jurisdictions as possible in the analysis sample. A binary Sexual Minority Status variable was created to identify individuals who endorsed a minority sexual orientation on any of the 3 dimensions measured (‘gay or lesbian’ or ‘bisexual’ in Sexual Orientation, ‘exclusive same sex’ or ‘exclusive opposite sex’ in Gender of Sexual Partners, and ‘attracted to same sex’ or ‘attracted to opposite sex’ in Gender of Sexual Attraction). Nine of 14 jurisdictions included a question about sexual orientation identity; 12 of 14 jurisdictions included a question about gender of sexual attraction.
TABLE 1 Characteristics of the Study Population

<table>
<thead>
<tr>
<th>Variable</th>
<th>Sexual Minority</th>
<th>Heterosexual</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAS misuse, percentage (frequency)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any</td>
<td>21 (133)</td>
<td>4.0 (665)</td>
<td>4.0 (693)</td>
</tr>
<tr>
<td>Moderate</td>
<td>8 (51)</td>
<td>1.5 (249)</td>
<td>1.7 (300)</td>
</tr>
<tr>
<td>Severe</td>
<td>4 (25)</td>
<td>0.7 (116)</td>
<td>0.8 (141)</td>
</tr>
<tr>
<td>Race/Ethnicity, %</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>35</td>
<td>38</td>
<td>38</td>
</tr>
<tr>
<td>Black/African American</td>
<td>26</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td>Hispanic/Latino</td>
<td>14</td>
<td>17</td>
<td>16</td>
</tr>
<tr>
<td>Asian</td>
<td>8</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>Multiracial/Hispanic</td>
<td>7</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Multiracial/non-Hispanic</td>
<td>4</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Native Hawaiian/Pacific Islander</td>
<td>5</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>American Indian/Alaskan Native</td>
<td>2</td>
<td>0.8</td>
<td>0.8</td>
</tr>
<tr>
<td>Depression/suicidality, mean (SD) $^a$</td>
<td>1.1 (1.3)</td>
<td>0.42 (0.83)</td>
<td>0.45 (0.86)</td>
</tr>
<tr>
<td>Victimization, z score, mean (SD)</td>
<td>0.44 (1.3)</td>
<td>–0.01 (0.65)</td>
<td>0.00 (0.70)</td>
</tr>
<tr>
<td>Substance use, z score, mean (SD)</td>
<td>0.76 (1.6)</td>
<td>–0.01 (0.70)</td>
<td>0.01 (0.77)</td>
</tr>
<tr>
<td>Age, y, mean (SD)</td>
<td>16.1 (1.3)</td>
<td>15.9 (1.3)</td>
<td>15.9 (1.3)</td>
</tr>
</tbody>
</table>

$^a$ 1 or more, $\chi^2 (1) = 225.53, P < .001, OR = 3.8, 95% CI (4.1–8.2). $^b$ 10 or more, $\chi^2 (1) = 118.65, P < .001, OR = 5.7, 95% CI (3.4–9.8). $^c$ 40 or more, $\chi^2 (1) = 57.96, P < .001, OR = 5.7, 95% CI (2.7–11.9). $^d$ Depression/suicidality range: 0 to 4.

AAS Misuse

Lifetime AAS misuse was assessed with the following item, “During your life, how many times have you taken steroid pills or shots without a doctor’s prescription?” The response options for this item included 0 times, 1 or 2 times, 3 to 9 times, 10 to 19 times, 20 to 39 times, or 40 or more times. A dichotomous score was created by coding no misuse as 0 and responses ≥1 or 2 times as 1. Two additional dichotomous variables were created to assess moderate and severe levels of AAS misuse. Moderate use was defined as ≥10, and severe use defined as ≥40.

Depressive Symptoms/Suicidality

Symptoms of depression and suicidality were assessed via 4 individual items, which included feeling sad or hopeless nearly every day for a 2-week period, as well as items assessing suicidal ideation, plans, and attempts over the previous 12 months. All but the latter item (regarding suicide attempts) were responded to via yes/no. The suicide attempts item was dichotomized into none/1 or more, and a total depression score was calculated on the sum of the 4 individual items (as has been done in previous research28), resulting in a possible range of scores of 0 to 4, with higher scores denoting increased depressive symptoms/suicidality. Scale score reliability for the current sample was adequate ($\alpha = 0.88$).

Victimization

Victimization was assessed via 6 individual items, which included feeling unsafe, being threatened, having property stolen, and getting into fights at school, along with items that assessed fights and injuries from fights outside of school (see Table 3 for items). Because questions used different response scales, z scores were calculated for each item and a composite score was created to obtain a global victimization score, with higher scores denoting greater victimization. Scale score reliability for the current sample was adequate ($\alpha = 0.76$).

History of Asthma

History of asthma was assessed via the self-report item, “Has a doctor or nurse ever told you that you have asthma?” This item was included as a control variable, as some forms of steroids (eg, prednisone, methylprednisolone) are used to treat asthma.

Statistical Analyses

Primary Analysis

The primary analysis was to estimate the prevalence of AAS misuse as a function of sexual orientation in adolescent boys from this data set. Given the complex sampling design inherent to the YRBS administration, the complex samples module of SPSS 21.0 (IBM SPSS Statistics, IBM Corporation, Chicago, IL) was used in conducting the primary analysis. In doing so, the SPSS complex samples module incorporates the weight, stratum, and primary sampling unit variables provided in the public data sets when executing statistical significance tests. Accordingly, to
assess the prevalence of AAS use as a function of sexual orientation, 2 (sexual orientation: heterosexual versus sexual minority) by 2 (AAS misuse: yes versus no) \( \chi^2 \) tests of independence were conducted, with an associated odds ratio (OR). Finally, history of asthma was controlled for in all analyses, as it could potentially be a confounding variable, given that some forms of steroids (eg, prednisone, methylprednisolone) are used to treat asthma.

**Exploratory Analyses**

To assess possible explanations of why there may be a sexual orientation health disparity with regard to AAS misuse, simultaneous multiple mediation (SMM) was used according to the bootstrapping strategy recommended by Preacher and Hayes.\(^{33}\) SMM allows researchers to determine not only whether an individual variable meets statistical criteria for mediation conditionally on the presence of other variables in the model, but also whether the combination of 2 or more variables meets criteria for mediation. One can also determine the relative magnitude of the indirect effects, in essence, comparing mediator variables’ unique ability to mediate, above and beyond other mediators in the model.\(^{33}\)

Bootstrapping is a nonparametric statistical approach in which cases from the original data set are randomly resampled (\( n = 2000 \)) with replacement, to reestimate the sampling distribution. An indirect effect is considered to be “significant” if zero is not contained between the lower and upper 95% confidence intervals (CIs). Bootstrapping is generally preferred over traditional methods of studying mediation (ie, the Causal Steps Approach and the Product-of-Coefficients Approach\(^{34}\)). One important advantage of this approach is that it does not require variables to conform to normal distributions. In the current study, SMM with 95% CIs was conducted via PROCESS, a statistical program compatible with SPSS.\(^{35,36}\)

**RESULTS**

**Primary Analysis: Prevalence of AAS**

Sexual minority boys were at significantly increased odds of 5.8 (95% CI 4.1–8.2), compared with heterosexual boys, to have a lifetime prevalence of AAS misuse (21% vs 4%). Similarly, sexual minority boys also reported significantly higher levels of moderate (8% vs 1.5%, OR 5.7, 95% CI 3.4–9.6) and severe (4% vs 0.7%, OR 5.7, 95% CI 2.7–11.9) AAS misuse, compared with heterosexual boys (see Table 1).

---

**TABLE 2** Sexual Orientation Items and Responses

<table>
<thead>
<tr>
<th>Item</th>
<th>Responses</th>
<th>Sexual Minority Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sexual orientation identity</td>
<td>1. Heterosexual (straight)</td>
<td>2, 3, 4</td>
</tr>
<tr>
<td>Gender of sexual partners</td>
<td>1. I have never had sexual contact</td>
<td>3, 4</td>
</tr>
<tr>
<td>Gender of sexual attraction</td>
<td>1. Males</td>
<td>1, 3</td>
</tr>
</tbody>
</table>

**TABLE 3** Victimization Items

<table>
<thead>
<tr>
<th>Item</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>During the past 12 mo, how many times has someone threatened or injured you with a weapon such as a gun, knife, or club on school property?</td>
<td></td>
</tr>
<tr>
<td>During the past 12 mo, how many times has someone stolen or deliberately damaged your property such as your car, clothing, or books on school property?</td>
<td></td>
</tr>
<tr>
<td>During the past 12 mo, how many times were you in a physical fight?</td>
<td></td>
</tr>
<tr>
<td>During the past 30 d, on how many days did you not go to school because you felt you would be unsafe at school or on your way to or from school?</td>
<td></td>
</tr>
<tr>
<td>During the past 12 mo, how many times were you in a physical fight in which you were injured and had to be treated by a doctor or nurse?</td>
<td></td>
</tr>
<tr>
<td>During the past 12 mo, how many times were you in a physical fight on school property?</td>
<td></td>
</tr>
</tbody>
</table>
Exploratory Analyses

Sexual minority status was significantly associated with increased victimization, increased depressive symptoms/suicidality, and increased substance use. Increased victimization, elevated depressive symptoms/suicidality, and increased substance use, were in turn all associated with increased AAS misuse. When victimization, depressive symptoms/suicidality, and substance use were controlled, the direct effect of sexual minority status on AAS misuse remained significant, but dropped (see Table 4).

To quantify the difference between the total and direct effects, indirect effects of sexual minority status to AAS misuse were tested. The global indirect effect of sexual minority status to AAS misuse through the combined mediators was significant. The depressive/suicidality, the victimization, and the substance use pathways all emerged as significant. However, the substance use pathway was stronger in magnitude than the depressive/suicidality and victimization pathways. The depressive/suicidality and victimization pathways did not differ from each other (see Table 4).

### DISCUSSION

The current study was the first known to examine the prevalence rate of lifetime AAS misuse as a function of sexual orientation. Results indicated sexual minority boys were at increased odds of 5.8 to have ever used AAS in their lifetime. Indeed, sexual minority boys reported a prevalence rate of 21% compared with 4% for heterosexual boys. Further, sexual minority boys also reported significantly higher rates of moderate and severe AAS misuse. These results underscore yet another avenue in which a health disparity exists for sexual minorities, particularly as assessed here, in sexual minority youth.

Preliminary analyses were also conducted to assess for variables that may explain the variance in AAS misuse accounted for by sexual minority status. Findings revealed that depressive symptoms/suicidality, victimization, and substance use were significant intermediate variables. When the magnitude of these indirect effects was contrasted, substance use proved to account for the most variance. This finding suggests that polysubstance use may be a salient pathway from sexual minority status to AAS misuse, and is consistent with previous research revealing that AAS misuse is strongly associated with use of a variety of other substances.30,37,38

Despite the combined intermediate variables accounting for significant variance in the relationship between sexual minority status and AAS misuse, the direct effect was still significant (although substantially reduced). It is therefore possible that there are additional unmeasured variables that account for the variance in this relationship. One salient construct, body dissatisfaction, was not assessed in the YRBS, a limitation of this work. Body dissatisfaction has been shown to be a strong predictor of AAS misuse, and gay male individuals also tend to report higher levels of body dissatisfaction compared with their heterosexual counterparts.16 Thus, it seems likely that this would also be an important variable to assess in the relationship between sexual orientation and AAS misuse.

Despite the novel findings from the current study, it is not without limitations. Of note, the design was cross-sectional. Thus, temporal inferences cannot be made, as it is possible that the intermediate variables (i.e., depressive symptoms/suicidality, substance use, and victimization) are outcomes rather than precursors of AAS misuse. Similarly, bidirectional relations may exist between these variables. We were also unable to explore the moderating role of rural versus urban living. Evidence from Canada suggests that sexual minority boys who live in rural communities are at increased odds of 7.7 of ever using AAS compared with their urban sexual minority counterparts.39 Thus, future research may wish to explore what psychosocial factors place rural sexual minority boys at risk for AAS misuse. Additionally, the depressive symptoms/suicidality variable included only 4

### TABLE 4 Exploratory Analyses

<table>
<thead>
<tr>
<th>Pathway</th>
<th>B</th>
<th>SE</th>
<th>95% CI</th>
<th>t</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sexual Minority → AAS</td>
<td>1.8</td>
<td>0.12</td>
<td>1.5–2.0</td>
<td>15.0</td>
<td>0.001</td>
</tr>
<tr>
<td>Sexual Minority → Depression/suicidality</td>
<td>0.62</td>
<td>0.03</td>
<td>0.55–0.68</td>
<td>18.5</td>
<td>0.001</td>
</tr>
<tr>
<td>Sexual Minority → Substance use</td>
<td>0.52</td>
<td>0.02</td>
<td>0.47–0.56</td>
<td>20.9</td>
<td>0.001</td>
</tr>
<tr>
<td>Sexual Minority → Victimization</td>
<td>0.33</td>
<td>0.03</td>
<td>0.28–0.39</td>
<td>12.8</td>
<td>0.001</td>
</tr>
<tr>
<td>Sexual Minority → AAS*</td>
<td>0.88</td>
<td>0.17</td>
<td>0.54–1.2</td>
<td>5.1</td>
<td>0.001</td>
</tr>
<tr>
<td>Depression/suicidality → AAS</td>
<td>0.22</td>
<td>0.05</td>
<td>0.12–0.32</td>
<td>4.3</td>
<td>0.001</td>
</tr>
<tr>
<td>Substance use → AAS</td>
<td>1.4</td>
<td>0.06</td>
<td>1.2–1.4</td>
<td>22.8</td>
<td>0.001</td>
</tr>
<tr>
<td>Victimization → AAS</td>
<td>0.42</td>
<td>0.05</td>
<td>0.31–0.52</td>
<td>7.9</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Indirect effects

<table>
<thead>
<tr>
<th>Pathway</th>
<th>B</th>
<th>SE</th>
<th>95% CI</th>
<th>t</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sexual Minority → (Global*) → AAS</td>
<td>0.98</td>
<td>0.10</td>
<td>0.80–1.2</td>
<td>9.3</td>
<td>0.001</td>
</tr>
<tr>
<td>Sexual Minority → Dep/suicidality → AAS</td>
<td>0.14</td>
<td>0.03</td>
<td>0.07–0.21</td>
<td>4.5</td>
<td>0.001</td>
</tr>
<tr>
<td>Sexual Minority → Substance use → AAS</td>
<td>0.70</td>
<td>0.08</td>
<td>0.56–0.88</td>
<td>6.9</td>
<td>0.001</td>
</tr>
<tr>
<td>Sexual Minority → Victimization → AAS</td>
<td>0.14</td>
<td>0.03</td>
<td>0.09–0.20</td>
<td>4.4</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Indirect effect contrasts

<table>
<thead>
<tr>
<th>Pathway</th>
<th>B</th>
<th>SE</th>
<th>95% CI</th>
<th>t</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Substance use - Depression/suicidality</td>
<td>0.57</td>
<td>0.09</td>
<td>0.41–0.74</td>
<td>5.3</td>
<td>0.001</td>
</tr>
<tr>
<td>Substance use - Victimization</td>
<td>0.56</td>
<td>0.07</td>
<td>0.43–0.73</td>
<td>4.3</td>
<td>0.001</td>
</tr>
<tr>
<td>Victimization - Depression/suicidality</td>
<td>0.002</td>
<td>0.04</td>
<td>−0.09–0.10</td>
<td>0.04</td>
<td>0.97</td>
</tr>
</tbody>
</table>

Indirect effects are interpreted as “significant” if 0 is not contained between the lower and upper 95% CI.

* The effect of sexual minority status to AAS misuse, controlling for depression/suicidality, substance use, and victimization.

* The global indirect effect, including the combined effects of depression/suicidality, substance use, and victimization.
items, 3 of which focused on suicidality. Therefore, given the weight of suicidality in its calculation, this variable may more accurately reflect severe levels of depressive symptoms. Further, some researchers have argued that the manner in which AAS misuse is assessed in surveys, such as the YRBS, is biased in overreporting misuse. Specifically, Kanayama et al argue that because the wording of the item does not explicitly state AAS, but rather “steroids,” participants may erroneously respond to this item thinking about corticosteroids, or over-the-counter sports supplements. On the other hand, Blashill contends that these concerns may be minimized in that the steroid item from the YRBS immediately follows other items assessing illicit substances, and thus, participants may respond to the steroid item within the context of thinking about illicit “steroids.” We also statistically controlled for history of asthma, with aims of reducing the bias in responses to lifetime AAS misuse that may have been influenced by interpreting the item to include glucocorticoids. However, because of the possible ambiguity of the item, the prevalence rates may be inflated. At the same time though, there is no conceptual or scientific evidence to suggest that this inflated prevalence rate would vary as a function of sexual orientation and therefore does not account for the large health disparity found in the current study. Additional limitations include the variability in how sexual minority status was assessed across the different jurisdictions in the pooled YRBS. Finally, future research may benefit from examining within-group differences among sexual minority boys with regard to AAS misuse.

The results from the current study may also inform prevention and intervention efforts. Given the dramatic disparity in the prevalence of AAS misuse among sexual minority boys, it would seem that this is a population in which greater attention is needed. To date, there are limited data on AAS prevention efforts aimed at adolescent boys. The most well-known prevention intervention, Adolescents Training and Learning to Avoid Steroids, was conducted among high school football players, and consisted of 7 weekly, 50-minute class sessions, focusing on the consequences of AAS, healthy alternatives to AAS, role play of drug refusal, and anti-AAS media messages. The program increased healthy behaviors and reduced intent to use AAS, and these effects were sustained over a 1-year period. Prevention efforts focusing on sexual minority adolescent boys may borrow from some of these techniques, but may also benefit from addressing the unique challenges that gay and bisexual adolescents face, namely sexual minority stress. Further, although preliminary, the data from the current study also suggest that addressing depressive symptoms/suicidality, substance use, and victimization may alter the pathway of sexual minority status to AAS misuse. Body image variables were not included in this study, however, Kanayama et al recommend integrating treatment of body image disturbance with treatment of AAS misuse.

CONCLUSIONS

Sexual minority boys reported a lifetime prevalence of AAS misuse at 21%, compared with 4% for heterosexual boys. Depressive symptoms/suicidality, victimization, and substance use may account for significant variance in the relationship between sexual minority status and AAS misuse. Prevention and intervention efforts would benefit from focusing on this highly at-risk group.

ACKNOWLEDGMENTS

The YRBS 2005–2007 Pooled Dataset, was compiled by the Center for Population Research in LGBT Health, includes data from: the Rhode Island Youth Risk Behavior Surveillance System, High School 2007, Center for Health Data and Analysis, Rhode Island Department of Health, and Office of School Support and Improvement, Rhode Island Department of Education, and supported in part by the National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention Cooperative Agreement 1U87DP001261-01. The authors acknowledge the assistance of the YRBS programs of Boston, Chicago, Connecticut, Delaware, Hawaii, Maine, Massachusetts, Milwaukee, New York City, Rhode Island, San Diego, San Francisco, Vermont and Wisconsin, Vermont Department of Health, and the Centers for Disease Control and Prevention. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institute of Child Health and Human Development, the National Institutes of Health, the Centers for Disease Control and Prevention, or state departments of health or departments of education.

REFERENCES


Sexual Orientation and Anabolic-Androgenic Steroids in US Adolescent Boys
Aaron J. Blashill and Steven A. Safren
Pediatrics 2014;133;469; originally published online February 2, 2014;
DOI: 10.1542/peds.2013-2768

Updated Information & Services
including high resolution figures, can be found at:
/content/133/3/469.full.html

References
This article cites 35 articles, 4 of which can be accessed free at:
/content/133/3/469.full.html#ref-list-1

Citations
This article has been cited by 2 HighWire-hosted articles:
/content/133/3/469.full.html#related-urls

Subspecialty Collections
This article, along with others on similar topics, appears in the following collection(s):
Adolescent Health/Medicine
/cgi/collection/adolescent_health:medicine_sub
Substance Abuse
/cgi/collection/substance_abuse_sub

Permissions & Licensing
Information about reproducing this article in parts (figures, tables) or in its entirety can be found online at:
/site/misc/Permissions.xhtml

Reprints
Information about ordering reprints can be found online:
/site/misc/reprints.xhtml

PEDIATRICS is the official journal of the American Academy of Pediatrics. A monthly publication, it has been published continuously since 1948. PEDIATRICS is owned, published, and trademarked by the American Academy of Pediatrics, 141 Northwest Point Boulevard, Elk Grove Village, Illinois, 60007. Copyright © 2014 by the American Academy of Pediatrics. All rights reserved. Print ISSN: 0031-4005. Online ISSN: 1098-4275.

American Academy of Pediatrics
DEDICATED TO THE HEALTH OF ALL CHILDREN™
Sexual Orientation and Anabolic-Androgenic Steroids in US Adolescent Boys
Aaron J. Blashill and Steven A. Safren
Pediatrics 2014;133;469; originally published online February 2, 2014;
DOI: 10.1542/peds.2013-2768

The online version of this article, along with updated information and services, is
located on the World Wide Web at:
/content/133/3/469.full.html