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Prescription stimulant brand name recognition among a national sample of 10- to 18-year-old youth

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Abstract

Objective: The majority of prescription drugs, including prescription stimulants, are marketed using multiple brand names, doses, and formulations. There is limited research on the extent to which individuals correctly identify medication by brand name or packaging, but such identification is important for epidemiological studies especially among youth. Testing the ability of youth to identify medications was one aim of the National Monitoring of Prescription Stimulants Study, which focused on the prevalence of prescription stimulant use among youth.

Methods: Using the entertainment venue intercept method, youth 10 to 18 years of age (n = 11,048) were recruited across 10 metropolitan areas throughout the United States, shown pictures of eight formulations of prescription stimulants, and asked to identify them by name, dosage, and formulation.

Results: Overall, 27% of youth reported having seen one of the eight stimulant formulations and between 2% and 70% correctly identified name, dose, and formulation. Youths' reports of having seen and correctly identifying medication increased with age except for Daytrana®. Specifically, while 2.8% of youth reported using Adderall® in the past 30 days, only 71.4% correctly identified it.

Conclusions: These results provide strong evidence of the need for more stringent methods for youth to report drug use.

KEYWORDS
adolescents, pill recognition, prescription stimulants, youth

1 | INTRODUCTION

Medical and nonmedical use of drugs is most often assessed through self-reports from adults and youth. While most studies have focused on opioids, fewer have focused on stimulant use, despite a dramatic rise in the use of stimulants over the last 2 decades (Board et al., 2020; Clemow & Walker, 2014; Faraone et al., 2020; Hoots et al., 2020). A major challenge in assessing prescription drug use is knowing the accuracy of the reported history of drug use, including the brand name, dose, and formulation of the medication. Yet limited research has been conducted on how correctly people identify prescription drugs either by brand name or packaging (Hellier et al., 2010). To date, no data have been published on pill recognition among youth; such data could eventually inform epidemiologists and practitioners on the best methods to ascertain drug use from youth themselves.

In the National Monitoring of Adolescents Prescription Stimulants Study (N-MAPSS), conducted to determine signals for use and misuse among youth 10 to 18 years of age from geographically diverse areas of the United States (US), we found that 7.3% of youth reported currently using any of five stimulants, with 3.9% reporting nonmedical use (Cottler, Striley, & Lasopa, 2013). To determine a precise estimate of use, we developed and tested a series of questions with pictures of brand-level pills to understand if youth could correctly identify common medications and how correctness was associated with age and reported use of stimulant medications. We hypothesized that youth would know common brand name drugs, that correctness would increase with age, and that youth who reported using the drugs would report both having seen the drug and would correctly identify it.

2 | MATERIAL AND METHODS

Data came from N-MAPSS, which was designed to detect and evaluate current levels and potential signals of misuse, abuse, and diversion of prescription stimulants among pre-teens and adolescents (10–18 years of age). Four cross-sections of data were collected between the fall of 2008 and the spring of 2011. Youth 10–18 years of age (n = 11,048) were recruited via an entertainment venue intercept method in 10 metropolitan urban, suburban, and rural areas of Boston, New York, Philadelphia, Tampa, St. Louis, Cincinnati, Houston, Denver, Los Angeles, and Seattle. To implement N-MAPSS, our research team sent recruiter-interviewers (RIs) to youth-friendly entertainment venues (including shopping malls, sports and recreation centers, libraries, and parks) to locate a diverse and representative sample of youth. Additional details on N-MAPSS are explained elsewhere (Cottler et al., 2013).

RIs identified potential respondents based upon the eligibility criteria with the use of a study screener (which tracked recruitment efforts) and then briefly introduced the study purpose, topics to be covered by the survey, and the risks and benefits of study participation. RIs then answered any questions respondents had about the study and obtained implied assent, indicated by survey completion. RIs were not required by the Washington University Human Protection Research Office (for all cross-sections) or the University of Florida Human Protection Office (for the fourth cross-section) to obtain parental permission or informed consent because all survey data were anonymous.

The N-MAPSS research team adapted survey questions found to be reliable from the substance abuse module (SAM) (Horton, Compton, & Cottler, 2000) on quantity and frequency, and from the Washington University risk behavior assessment (RBA) on risk factors for misuse and nonmedical use (Shacham & Cottler, 2010), including route of administration, source of medication, and reasons for use. The assessment was divided into two parts: Part 1 included demographics such as gender, age, residence, race/ethnicity, health status, and diagnostic questions for attention deficit disorder (ADD) and attention deficit hyperactivity disorder (ADHD). Part I ended with a list of pictures of five different dosages of prescription amphetamine salts (AS; Adderall® XR 10 mg, Adderall XR 15 mg, Adderall® XR 20 mg, Adderall® IR 5 mg Adderall® IR 20 mg), 2 other prescription stimulants (Vyvanse® 30 mg, Vyvanse® 50 mg, Daytrana® 10 mg), a common over-the-counter (OTC) pain reliever (Aleve®), and a common OTC decongestant (Sudafed®; Figure 1). Youth were asked: "Have you ever seen this medicine?" Those who said "Yes" were asked to name the product.

After completing that section, youth turned in the booklet and were given Part II in which they were shown pictures of all dosages of Adderall® IR/Adderall® XR, Concerta®, Daytrana®, Ritalin®, and Vyvanse® and asked if they used any of them in the past 30 days. Youth were also asked about the number of close friends who had used the prescription stimulant Adderall®.

Fifth-year doctoral students in pharmacy went through each response for every drug and coded the responses as: correct brand name of medication but dose/formulation (i.e., immediate release [IR] or extended release [ER] incorrect; correct name of medication but nothing else specified (NOS); correct brand name of medication and dose and formulation correct; or completely incorrect. Phonetically correct misspellings were accepted as correct. Among youth reporting having seen the medication, those who reported any or all parts of the name, dose, or formulation type correctly were coded as "any correct." Others were coded "incorrect." For this study, the final sample of 11,042 youth excluded six youth who had seen the medication but had missing information on either the brand recognition or use of the medication. SAS 9.4 was used to conduct bivariate analyses of medication identification by age.

3 | RESULTS

Nearly half of the youth (48%) were male and from an urban location; one in five was African American. A high proportion of youth reported good to excellent health (89%). One of eight youth (12%) reported being told they had ADHD or ADD.

The survey page showing the 10 medications queried (eight prescription stimulants and two other medications) is shown in Figure 1. As shown in Table 1 3,023 (27.4%) youth reported having seen one of the eight stimulants pictured. Significant differences were noted between youth reporting having seen a stimulant medication and those who had not, including older age, living in a suburb, being Caucasian, reporting having ADHD/ADD, reporting more poor health, having a friend who used Adderall®, perceiving that stimulants were not a problem, and using a stimulant in the past 30 days. Also shown, is the significant finding that 66% of youth who have seen a stimulant vs 62% of those who have not reported seeing a stimulant believe that stimulant use was a moderate to very big problem among their peers.

Based on the pictures only, with the exception of Sudafed®, less than 10% of respondents reported having seen a specific pictured medication (Table 2). Between 6% and 9% reported having seen one of the five Adderall® products listed; between 4% and 6% reported having seen Vyvanse®; 7% reported seeing Daytrana®. Over 20% of the youth said they had seen at least one of the Adderall® products (IR or ER).

A.		Have you ever seen this medicine? ○ No ○ Yes →	What's the name of this medicine? Be as specific as you can. _____
B.		Have you ever seen this medicine? ○ No ○ Yes →	What's the name of this medicine? Be as specific as you can. _____
C.		Have you ever seen this medicine? ○ No ○ Yes →	What's the name of this medicine? Be as specific as you can. _____
D.		Have you ever seen this medicine? ○ No ○ Yes →	What's the name of this medicine? Be as specific as you can. _____
E.		Have you ever seen this medicine? ○ No ○ Yes →	What's the name of this medicine? Be as specific as you can. _____
F.		Have you ever seen this medicine? ○ No ○ Yes →	What's the name of this medicine? Be as specific as you can. _____
G.		Have you ever seen this medicine? ○ No ○ Yes →	What's the name of this medicine? Be as specific as you can. _____
H.		Have you ever seen this medicine? ○ No ○ Yes →	What's the name of this medicine? Be as specific as you can. _____
I.		Have you ever seen this medicine? ○ No ○ Yes →	What's the name of this medicine? Be as specific as you can. _____
J.		Have you ever seen this medicine? ○ No ○ Yes →	What's the name of this medicine? Be as specific as you can. _____

FIGURE 1 Prescription medication assessed in the National Monitoring of Prescription Stimulants Study (N-MAPSS)

Overall, the medications most often found to be correctly identified were the 10 and 20 mg doses of Adderall® XR (an ER formulation) at 69% and 70%, respectively. Up to 4% of the youth correctly identified all particulars (name, dose, and release type) of a pictured stimulant. While 21% of the youth said they had seen at least one of the Adderall® products (IR or ER), less than half of those youth (44%) correctly identified it. The medication most commonly "seen" was a red pill (Sudafed®); though 16% of the youth said they had seen it, less than one in five (19%) correctly identified it.

As shown in Table 3, reports of seeing medications and correctly identifying them statistically significantly increased with age except for Daytrana®, which decreased with age. Interestingly, when data for IR and ER formulations of Adderall® were combined, results showed that while 25% of youth 16–18 years of age reported seeing any Adderall®, over half (56%) correctly identified it as Adderall® using the algorithm for coding brand identification described earlier.

Finally, shown in Figure 2 are the patterns of identification of the five Adderall® medications queried and how identification differed by use in the past 30 days. Over three quarters (78.1%) of the 11,042 youth reported not having seen or used an Adderall® product. Another nearly 12% of youth said they had seen Adderall®, incorrectly identified it, and reported no past 30 days use of the medication. A smaller proportion of youth (7.5%) reported having seen one or more Adderall® medications, correctly identified it as Adderall®, but reported no current use. Among the 2.8% of youth who reported some use of one of the five Adderall® medications queried (2 + 0.4 + 0.4%), 71.4% (2% overall) correctly identified it as Adderall®. Among self-reported users of Adderall®, an equal proportion of youth either mislabeled the medication or reported never having seen the pill (0.4% for each).

TABLE 1 Characteristics of youth reporting having seen any of the eight specific prescription stimulants assessed in the National Monitoring of Adolescents Prescription Stimulants Study (N-MAPSS; *N* = 11,042)

Demographics	Yes, had seen a stimulant (*N* = 3023)	No, had not seen any stimulant (*N* = 8019)	*p*-value	Total sample N = (11,042)
Male (%)	1465 (48%)	3815 (48%)	0.4053	5280 (48%)
Age group (%)				
10–12 years old	341 (11%)	1063 (13%)		1404 (13%)
13–15 years old	1022 (34%)	3660 (42%)	<0.001***	4382 (40%)
16–18 years old	1660 (55%)	3596 (44%)		5256 (47%)
Mean age (±SD)	15.4 (2.1)	14.9 (2.1)		15.1 (2)
Residence (%)				
Urban	1357 (45%)	3896 (49%)		5253 (48%)
Suburban	1204 (40%)	2919 (36%)	0.0013*	4123 (37%)
Rural	462 (16%)	1204 (15%)		1666 (15%)
Race/ethnicity (%)				
Asian	167 (5%)	688 (9%)		855 (8%)
African American	528 (17%)	1657 (22%)		2185 (20%)
Caucasian	1488 (50%)	3223 (39%)	<0.001***	4711 (43%)
Hispanic	822 (17%)	1368 (19%)		2025 (18%)
Other	412 (11%)	793 (11%)		1205 (11%)
Ever had attention deficit hyperactivity disorder/ADD (%)				
No	1973 (65%)	6625 (83%)		8598 (78%)
Yes	717 (24%)	665 (8%)	<0.001***	1382 (12%)
Don't know	332 (11%)	772 (9%)		1054 (10%)
Health status (%)				
Excellent	1198 (40%)	3616 (45%)		4814 (44%)
Good	1426 (47%)	3578 (45%)	<0.001***	5004 (45%)
Fair/Poor	396 (13%)	808 (10%)		1204 (11%)
Friend(s) used Adderall® (%)	1389 (46%)	1605 (15%)	<0.001***	2994 (27%)
Believe Rx Stimulants are a problem with peers (%)				
Not a problem	460 (15%)	1518 (19%)		1978 (18%)
Small problem	536 (18%)	1510 (19%)	<0.001***	2046 (19%)
Moderate problem	941 (31%)	2138 (27%)		3079 (28%)
Big/very big problem	1061 (35%)	2759 (35%)		3820 (35%)
Used a prescription stimulant in the last 30 days (%)	308 (3%)	47 (0.5%)	<0.001***	355 (3.2%)

*Significant at 0.05 level of significance; ***Significant at less than 0.0001 level of significance.

4 | DISCUSSION

For the first time, we report on stimulant pill identification among youth 10–18 years of age. Of the few studies reporting on medication recognition among professionals who handle medications such as nurses, physicians, pharmacists, and poison control specialists, only from 35 to 55% could accurately identify all medications (Schiff et al., 2006; Vasudevan et al., 1996). No other study has examined pill identification among youth, despite the importance in assessing the accuracy of self-reported drug use history in this population.

More than one in four youth (27.4%) said they had seen at least one stimulant; they were older, more likely to live in the suburbs, were Caucasian, reported having ADHD/ADD, reported poor health

TABLE 2 Identification of medication by brand name in the national monitoring of adolescents prescription stimulants study (N-MAPSS; $N = 11{,}042$)[a]

Pill picture	Saw medication	All correct (correct name, dose and release type)	Correct name NOS	Correct name but dose or release incorrect	Any correct	All incorrect (nothing correct)
Any Adderall (%)	2371 (21%)	58 (2%)	928 (39%)	57 (2%)	1043 (44%)	1328 (56%)
Adderall XR 10 mg (%)	985 (9%)	23 (2%)	578 (59%)	76 (8%)	677 (69%)	305 (31%)
Adderall IR 5 mg (%)	936 (9%)	18 (2%)	103 (11%)	1 (0%)	122 (13%)	814 (87%)
Adderall IR 20 mg (%)	816 (7%)	24 (3%)	145 (18%)	0 (0%)	169 (21%)	647 (79%)
Adderall XR 20 mg (%)	961 (9%)	42 (4%)	544 (57%)	87 (9%)	673 (70%)	288 (30%)
Adderall XR 15 mg (%)	617 (6%)	20 (3%)	102 (17%)	2 (0%)	124 (20%)	493 (80%)
Vyvanse 30 mg (%)	714 (6%)	1 (0%)	12 (2%)	2 (0%)	15 (2%)	699 (98%)
Vyvanse 50 mg (%)	431 (4%)	2 (0%)	25 (6%)	0 (0%)	27 (6%)	404 (94%)
Daytrana 10 mg (%)	737 (7%)	0 (0%)	71 (10%)	1 (0%)	72 (10%)	665 (90%)
Sudafed (%)	1751 (16%)	0 (0%)	327 (19%)	0 (0%)	327 (19%)	1424 (81%)
Aleve (%)	803 (7%)	5 (1%)	98 (12%)	0 (0%)	103 (13%)	700 (87%)

Note: The picture card only showed 5 of the 12 dosage/formulation combinations of Adderall and Adderall XR products.

[a]Sample size for correct and incorrect identification of individual prescription stimulant drug varies depending on the number of youth reporting having seen the drug.

TABLE 3 Correct identification of stimulant medication by age group among those who have seen the stimulant

Pill picture		10–12 years ($N = 1406$)	13–15 years ($N = 4383$)	16–18 years ($N = 5259$)	*p* value
Any of the five Adderall IR/Adderall® XR	Seen	18%	18%	25%	
	Correct ID[a]	20%	32%	56%	<0.0001***
Either of the two Vyvanse 30 mg/50 mg	Seen	9%	7%	10%	
	Correct ID[a]	1%	2%	6%	0.0022*
Daytrana 10 mg	Seen	6%	6%	8%	
	Correct ID[a]	14%	12%	8%	0.1117
Sudafed or Aleve	Seen	13%	19%	22%	
	Correct ID[a]	7%	16%	23%	<0.0001***

[a]Among those who reported seeing the pill.

*Significant at 0.05 level of significance; ***Significant at less than 0.0001 level of significance.

status, had friends who used Adderall®, thought stimulants were not a problem, and had used a stimulant. Only 6%–9% of youth reported having seen a specific formulation of Adderall®. Of note, of the youth who indicated having seen one of the Adderall® formulations, up to 70% could identify at least the name, dose, or formulation type. When only the images of the five Adderall®-named products were considered, without taking individual characteristics such as appearance, dosage, or formulation into account, slightly more than one-fifth of the youth (21%) reported having seen any Adderall®, yet only 44% of those correctly identified it. The most commonly seen medication was a red pill (Sudafed®); however, less than one in five who said they saw this pill knew what it was. Further, older youth, as expected, were more likely to correctly identify the medication they reported having seen. This finding might be based on the likelihood that youth are increasingly responsible for their own medication adherence. What is quite interesting is that nearly one in five 10- to

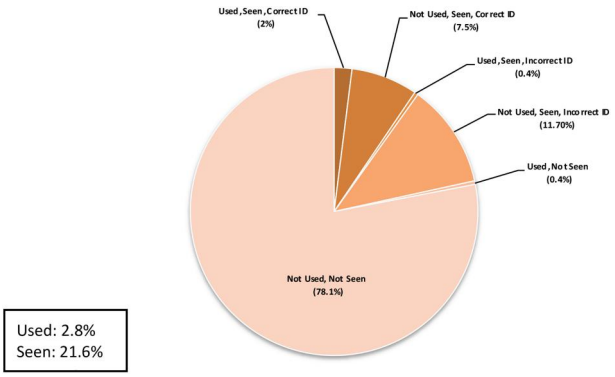

FIGURE 2 Past 30 days use of five dosages and formulations of Adderall use and identification patterns among 10 to 18 year old youth ($N = 11{,}048$)

12-year-olds correctly identified an Adderall product if they reported having seen it. Among youth who said they had seen Adderall (21%), only 10% (2/21) reported use. These findings are of importance as they indicate that most youth have never seen these medications, or used them. Perhaps of more importance is the rate of identification among youth who currently use Adderall. Of the 2.8% who reported using Adderall, only 71% correctly identified it, which means that 29% of current users did not identify the medication. Finally, it should be noted that 78.1% of youth overall neither reported seeing nor using Adderall.

Our finding that medication identification among 10–18 year-olds in general is quite poor is significant because history taking relies heavily on self-report for epidemiological studies––especially for drug use studies. Very few studies have measured the accuracy of identification of common OTC and prescription medications, especially among youth. The Food and Drug Administration (FDA) requires drug manufacturers to monitor and collect information on adverse events (AE) and serious adverse events (SAE) from persons in the community. This safety data helps inform prescribing information and policy decisions. If youth do not know the prescription drugs they take regularly, they cannot link adverse events with the drug taken. Additionally, if youth do not know the drug names, they cannot accurately define their drug history.

Showing the youth pictures of the exact name and dosage of specific formulations (in Book II) after they had already answered questions about brand knowledge (Book I) allowed us to focus youths' attention on whether they had taken the drug. We feel this helped determine the use of the drugs more accurately. More studies of drug use histories among youth and adults should provide pictures of drugs to ensure accurate classification and characterization. Even parents who are important reporters for our youngest age group may be more reliable when pictures are used to elicit drug use information.

Beyond the accuracy of reporting, it is also noteworthy that 63% of the youth believed that stimulant use was a moderate or a very big problem among their peers; this belief was significantly more likely among youth who had seen a stimulant. Given the size and diversity of this sample, this is an important finding that has yet to be reported in the literature. The finding may reflect that youth who use stimulants, and have seen stimulants, are also more likely to feel strongly that stimulants are causing problems. This could be an important opportunity for a peer-led intervention.

5 | CONCLUSIONS

Our study has uncovered a needed tool in the armamentarium of eliciting drug use histories. An elicitation tool is especially important as different studies of youth are ongoing and new ones are being launched each year. The findings from this paper suggest that investigators show pictures to facilitate the assessment of drug use by reminding youth of the pills that they take, given that many look alike. Not using images could result in underestimates of the prevalence of drug use. Given these results, future research should prioritize a formal test-retest reliability/validity study to determine the best way to elicit accurate drug use histories from youth.

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CONFLICTS OF INTEREST

None.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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