



Original article

Pediatric Subspecialist Alcohol Screening Rates and Concerns About Alcohol and Cannabis Use Among Their Adolescent Patients

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ABSTRACT

Purpose: Pediatric specialty care provides an opportunity to screen for and address patient substance use; however, little is known about providers' screening rates, their opinions regarding substance use harms, or the potential marijuana to be used as a medication.

Methods: We surveyed national convenience samples of pediatric endocrinologists (N = 142) and rheumatologists (N = 83) and used descriptive statistics and multivariate logistic regression to examine alcohol screening rates, barriers, and for medical use of marijuana, differences between subspecialist concerns.

Results: In all, 36.4% of providers reported screening adolescent patients annually or more, and a majority expressed concerns about impacts on disease management (80.0%/80.0%) and symptom management (69.3%/53.3%) from alcohol and marijuana, respectively. Nearly equal proportions disagreed (30.2%), were neutral (34.7%), or agreed (35.1%) that some patients would benefit from medical marijuana, although majorities were not comfortable recommending marijuana (62.7%) and did not believe marijuana is standardized enough to be used as medication (57.8%).

Discussion: Fewer than half of the subspecialists in our study routinely screen their adolescent patients for substance use, although many have concerns regarding the impacts of alcohol and marijuana use on their patients. Education and training on best practice could help to increase screening rates. There is agreement that marijuana is not standardized enough to be used as a medication. There is also a broad range of opinions regarding the pharmaceutical potential of marijuana and concerns about the impact of marijuana on underlying chronic medical conditions, which should be considered as marijuana policy continues to evolve.

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IMPLICATIONS AND CONTRIBUTION

This study examined substance use screening rates, barriers, and differences between pediatric subspecialist concerns regarding medical marijuana. Fewer than half of providers screen routinely, although a majority are concerned about the impact of substance use on disease management. Few providers agree that marijuana is standardized enough to be a medication.

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The American Academy of Pediatrics (AAP) recommends that screening for alcohol and other drug use be incorporated into routine healthcare for adolescents to address the enormous and preventable morbidity associated with substance use by this age group [1,2]. Youth with chronic medical conditions (YCMC) are

Table 1
Provider characteristics and perceived legality of marijuana by alcohol screening frequency

Provider characteristics	Overall sample		Screening frequency		p value		
			Annually or more	Less than annually			
	N	%	N	%			
Total N, %	225	100.0%	82	36.4%	143	63.6%	
Provider Characteristics							
Gender							.391
Male	71	31.6%	23	28.0%	48	33.6%	
Female	154	68.4%	59	72.0%	95	66.4%	
Specialty Type							.519
Endocrinology	142	63.1%	54	65.9%	88	61.5%	
Rheumatology	83	36.9%	28	34.1%	55	38.5%	
Years practiced							.071
<10 years	111	49.3%	38	46.3%	73	51.0%	
11–15 years	37	16.4%	20	24.4%	17	11.9%	
16–20 years	29	12.9%	11	13.4%	18	12.6%	
>20 years	48	21.3%	13	15.9%	35	24.5%	
Perceived legal status of							
Marijuana							.293
Marijuana is legalized for medical use	94	41.8%	38	46.3%	56	39.2%	
Marijuana is legalized for recreational use	21	9.3%	4	4.9%	17	11.9%	.098

Column percentages are shown.

Assessed with chi-square tests or two-sided Fisher's tests.

vulnerable to unique harms resulting from the impact of alcohol use on the underlying disease, medication interactions, and disease management [3–5]. Furthermore, YCMC may use marijuana as a means to alleviate symptoms of their condition or other medical or mental health problems [6,7].

Many YCMCs have longstanding trusted relationships with their subspecialty providers and consider them to be experts on their health [8], making these settings ideal for conversations about alcohol and marijuana. Very little has been published regarding substance use screening by pediatric subspecialists. A study done in 2000 found that only 4% of adolescents in treatment for rheumatic conditions were screened for alcohol use, although this number increased to more than 30% after an educational intervention with providers [9]. In a study that surveyed adolescents, 70% of YCMC reported having been asked about alcohol use by someone on their medical team [10]. To our knowledge, pediatric subspecialist self-reported rates of substance use screening, which are more directly comparable to self-reported rates by primary care providers, have not been reported.

We conducted a survey of subspecialty pediatricians working in endocrinology and rheumatology to understand substance use-related screening frequency, barriers, and beliefs and to investigate concerns regarding the health impact of alcohol and marijuana use on their patients and their opinions regarding the potential for marijuana to be used as a medication. We hypothesized that substance use screening is underutilized in pediatric subspecialty care relative to concerns providers have regarding the impact of alcohol and marijuana (whether used “medically” or “recreationally”) on YCMC. We also hypothesized that attitudes regarding marijuana might be different between these groups of subspecialists, given that “medical marijuana” may be proposed as a therapeutic intervention for patients with rheumatological conditions but not for patients with diabetes. While

this convenience sample is by no means representative of pediatric subspecialties, these professional groups represent distinct pediatric onset chronic illness areas for which use of both alcohol and marijuana raises concerns; hence, their views may elucidate thematic areas of concern that merit future broader investigation.

Methods

Participants

We recruited a national sample of 225 pediatric subspecialty providers from endocrinology (N = 142) and rheumatology clinics (N = 83) through an online survey that was promoted through electronic outreach (emails to professional society email lists and electronic newsletter announcements) made available through two professional organizations: The Childhood Arthritis and Rheumatology Research Alliance (CARRA) and the Pediatric Endocrinology Society (PES). Response rates were 13.4% (142/1,063) for Endocrinologists, 20.4% (82/406) Rheumatologists and 15.3% (225/1,469) overall.

In order to determine eligibility, providers were asked whether they treat adolescent patients (ages 14–17 years) in their subspecialty clinics on a regular basis. Data collection occurred from November 17, 2015 to January 25, 2016, for pediatric rheumatologists and April 26, 2016 to June 30, 2016, for pediatric endocrinologists, and anonymous surveys were implemented in the REDCap platform [11]. Respondents included subspecialty providers from 37 states. Participation was voluntary, with effort recognized through the provision of a small token donation to one of three child health charities (participants were invited to select a preferred charity) for each survey completed. This project was conducted with an exemption from the Boston Children's Hospital institutional review board (IRB).

Survey measures

We adopted measures that had been used for surveys with pediatric primary care providers [12].

Screening frequency. Providers reported on the frequency with which they screen adolescent patients for alcohol use, in their practice; responses were collapsed into “annually or more” or “at every health care visit” versus “sometimes (less than annually)”, “almost never,” or “never.” We used alcohol screening as a marker for substance use screening in general as our previous experience has found that healthcare providers are more likely to screen for alcohol use than other drug use. Asking about alcohol screening allowed us to simplify and reduce the number of survey questions to promote better respondent interpretation.

Screening barriers. Providers were asked how often they encounter each of the following: “insufficient time to administer a screen during the appointment;” “insufficient time to respond to screen results;” “do not know how to respond to screen results;” and “insufficient support services (e.g., social worker).” Responses were collapsed into “never” or “sometimes” versus “often” or “always.”

Screening beliefs. Providers rated the following statements about screening beliefs on a five-point agreement scale (from “strongly disagree” to “strongly agree”): “Screening is within my clinical

Table 2
Provider characteristics, alcohol screening frequency, and perceived legality of marijuana by subspecialty

Provider screening frequency	Overall sample		Specialty type				p value
	N	%	Endocrinology		Rheumatology		
			N	%	N	%	
Total N, %	225	100%	142	63.1%	83	36.9%	
Provider Characteristics							
Gender							.153
Male	71	31.6%	40	28.2%	31	37.3%	
Female	154	68.4%	102	71.8%	52	62.7%	
Years practiced							.841
<10 years	111	49.3%	71	50.0%	40	48.2%	
11–15 years	37	16.4%	25	17.6%	12	14.5%	
16–20 years	29	12.9%	18	12.7%	11	13.3%	
>20 years	48	21.3%	28	19.7%	20	24.1%	
Alcohol screening frequency							.519
Less than annually	143	63.6%	88	62.0%	55	66.3%	
Annually or more	82	36.4%	54	38.0%	28	33.7%	
Perceived legal status of Marijuana							
Marijuana is legalized for medical use	94	41.8%	53	37.3%	41	49.4%	.076
Marijuana is legalized for recreational use	21	9.3%	13	9.2%	8	9.6%	.904

Column percentages are shown. Assessed with chi-square tests.

responsibilities; “Most adolescents answer screenings honestly;” “Adolescent patients are receptive to screenings on alcohol and other drug use.”

Alcohol- and marijuana-related concerns. Providers were asked about their level of concern regarding the impact of alcohol use, and separately marijuana use on: their patients’ abilities to

manage their disease, medication adherence, medication effectiveness, symptomology, the accuracy of diagnostic tests or labs used to monitor disease, the potential for interactions with medications. Responses were assessed using a four-point Likert scale (“not at all concerned” to “very concerned”), collapsed into three levels “not at all, or, a little concerned,” “moderately,” and “very concerned.”

Table 3
Screening barriers and provider beliefs by alcohol screening frequency

	Overall sample		Alcohol screening frequency ^a				Alcohol screening frequency					
	N	%	Annually or more		Less than annually		Unadjusted models ^b		Adjusted models ^{b,c}			
			N	%	N	%	OR	95% CI	AOR	95% CI		
Total N, %	225	100.0%	82	36.4%	143	63.6%						
Provider Screening Barriers												
Insufficient time to administer screen												
Often/Always	101	44.9%	28	34.1%	73	51.0%	0.50	0.28	0.87	0.54	0.31	0.96
Never/Sometimes	124	55.1%	54	65.9%	70	49.0%		Reference			Reference	
Insufficient time to respond to screen												
Often/Always	93	41.3%	27	32.9%	66	46.2%	0.57	0.33	1.01	0.62	0.35	1.11
Never/Sometimes	132	58.7%	55	67.1%	77	53.8%		Reference			Reference	
Don't know how to respond to screen												
Often/Always	56	24.9%	13	15.9%	43	30.1%	0.44	0.22	0.88	0.41	0.20	0.84
Never/Sometimes	169	75.1%	69	84.1%	100	69.9%		Reference			Reference	
Insufficient support services to respond to screen												
Often/Always	100	44.4%	27	32.9%	73	51.0%	0.47	0.27	0.83	0.47	0.26	0.84
Never/Sometimes	125	55.6%	55	67.1%	70	49.0%		Reference			Reference	
Provider Screening Beliefs												
Screening is within clinical responsibilities												
Agree/Strongly agree	172	76.4%	73	89.0%	99	69.2%	3.61	1.66	7.85	3.47	1.57	7.65
Neither agree nor disagree/Disagree/Strongly disagree	53	23.6%	9	11.0%	44	30.8%		Reference			Reference	
Most adolescents answer screenings honestly												
Agree/Strongly agree	58	25.8%	27	32.9%	31	21.7%	1.77	0.97	3.26	1.60	0.86	2.98
Neither agree nor disagree/Disagree/Strongly disagree	167	74.2%	55	67.1%	112	78.3%		Reference			Reference	
Adolescent patients are receptive to alcohol, drug screenings												
Agree/Strongly agree	86	38.2%	37	45.1%	49	34.3%	1.58	0.91	2.75	1.48	0.84	2.60
Neither agree nor disagree/Disagree/Strongly disagree	139	61.8%	45	54.9%	94	65.7%		Reference			Reference	

Bolded: p value < .05. Column percentage are shown.

^a Chi squared test (X² (1, N = 225)) in screening barriers or beliefs between those who screen more than annually and those who do otherwise.

^b We assessed the association between the probability of screening “annually/more than annually/at every health care visit” (vs. “less than annually/almost never or never screen”) and the screening barriers or beliefs.

^c Adjusted models controlled for provider subspecialty and number of years in practice.

Table 4
Provider concerns related to alcohol or marijuana use impacting patients' disease

	Alcohol-related concerns		Marijuana-related concerns	
	N	%	N	%
Total N, %	225	100.0%	225	100.0%
Impact ability to manage disease				
Not at all/A little concerned	45	20.0%	45	20.0%
Moderately/Very concerned	180	80.0%	180	80.0%
Impact medication effectiveness				
Not at all/A little concerned	83	36.9%	134	59.6%
Moderately/Very concerned	142	63.1%	91	40.4%
Impact medication adherence				
Not at all/A little concerned	42	18.7%	32	14.2%
Moderately/Very concerned	183	81.3%	193	85.8%
Make patient symptoms worse				
Not at all/A little concerned	69	30.7%	105	46.7%
Moderately/Very concerned	156	69.3%	120	53.3%
Impact the accuracy of labs or tests				
Not at all/A little concerned	154	68.4%	167	74.2%
Moderately/Very concerned	71	31.6%	58	25.8%
Interact with medications				
Not at all/A little concerned	28	12.4%	103	45.8%
Moderately/Very concerned	197	87.6%	122	54.2%

Attitudes toward medical marijuana. Providers rated their responses to questions regarding using marijuana as a medication using a five-point Likert response scale (from “strongly disagree” to “strongly agree”): “Some patients would benefit from medical marijuana,” “I would feel comfortable recommending marijuana if medically appropriate,” “Marijuana is standardized enough to be used as a medication.”

Provider characteristics included gender (male/female), years in practice (<10 years/11–15/16–20/>20 years), clinical role (physician/other), and the average number of minutes spent with patients during visits.

Perception of marijuana policy. We asked participants about their perception as to whether medical marijuana and recreational marijuana were legal in their state of practice.

Statistical analyses

Data management and analysis were conducted using the SAS 9.4 (Cary, NC) statistical software. Characteristics of providers (gender, subspecialty, years of experience, perceived legal status of marijuana in their state) and screening barriers and beliefs were described (Tables 1–3, respectively) and were assessed with chi-square tests or two-sided Fisher's. For alcohol use screening, associations between provider belief, barrier, and concern with screening frequency were explored using multivariate logistic regression, adjusting for provider subspecialty and years of practice (Table 3). Provider concerns related to alcohol or marijuana use impacting patients' disease were summarized (Table 4). Provider characteristics and perceived legal status of marijuana were comparable between the two subspecialty groups.

Attitudes regarding medical marijuana use and concerns regarding marijuana's impact on underlying medical conditions were reported in the overall sample, as well as by provider subspecialty (Table 5). Bivariate associations between subspecialty and medical marijuana attitudes and marijuana concerns

were assessed with chi-square tests or two-sided Fisher's exacts tests (Table 5). Differences were explored in marijuana-related attitudes and concerns between the endocrinology and rheumatology providers using multivariate ordinal logistic regression (Table 5). We report on the odds ratio estimates for the unadjusted and adjusted models. Adjusted regressions were conditioned for provider gender and perceived marijuana legal status for medical and recreational use; these variables were identified through bivariate analyses as potential confounding factors (data not shown). The threshold for all significance testing was set at $\alpha = 0.05$.

Results

The sample (N = 225) comprised 63.1% pediatric endocrinologists and 36.9% pediatric rheumatologists. All of the respondents were physicians; half (49.3%) had been in practice less than 10 years, and 21.3% had over 20 years of practice; 68.4% were female (Tables 1 and 2). Approximately forty percent (41.8%) of providers reported that marijuana use for medical purposes was legal in their practice state, and 9.3% reported recreational use legality. There were no significant differences between the two subspecialty provider groups in sociodemographic characteristics or perceived marijuana legal status.

Rates, barriers, and beliefs about screening

Overall, 36.4% of providers said that they screen adolescent patients for alcohol use annually or more often, consistent with AAP recommendations. Screening frequency did not differ by physician subspecialty, gender, or years in practice, nor did screening barriers or beliefs differ by gender or years of practice. Providers who felt that alcohol screening is within their responsibilities were more likely to screen annually (AOR 3.47, CI 1.57–7.65). Similar percentages of respondents reported insufficient time for screening (44.9%), insufficient time to respond to screen results (41.3%), and insufficient support resources for screening (44.4%) as barriers; not knowing how to respond to screen results was the least endorsed barrier (24.9%). After controlling for differences in provider specialty and years of practice, odds of routine alcohol screening (annually or more) were lower among providers who reported insufficient time to administer the screen (AOR .54, 95% CI 0.31–0.96), not knowing how to respond to screen results (AOR 0.41, 95% CI 0.20–0.84), and insufficient resources to respond to screen results (AOR 0.47, 95% CI 0.26–0.84) (Table 3).

A majority of providers (76.4%) agreed or strongly agreed that screening is part of their clinical responsibilities, though only 38.2% agreed or strongly agreed that adolescents are receptive to screening, and only 25.8% agreed or strongly agreed that most adolescents answer screening questions honestly (Table 3). Providers who agree or strongly agree that screening is within their clinical responsibilities were more than 3 times as likely to report routine screening (AOR 3.47, 95% CI: 1.57–7.65) (Table 3).

Concerns regarding the impact of alcohol and marijuana use on underlying disease

A majority of providers were moderately or very concerned about the impact of alcohol and separately marijuana use, respectively, on disease management (80.0%/80.0%), medication adherence (81.3%/85.8%), medication effectiveness (63.1%/40.4%),

Table 5
Association between pediatric subspecialty and marijuana-related attitudes and concerns

Comparing outcomes for endocrinology versus rheumatology providers	Overall sample		Specialty ^a				Rheumatology providers ^b					
			Endocrinology		Rheumatology		Unadjusted models ^c			Adjusted models ^{c,d}		
	N	%	N	%	N	%	OR	95% CI		AOR	95% CI	
Provider attitudes regarding medical marijuana ^e	225	100%	142	63.1%	83	36.9%						
Some patients would benefit from medical marijuana												
Strongly agree/Agree	79	35.1%	56	39.4%	23	27.7%	0.67	0.41	1.11	0.68	0.41	1.12
Neither agree nor disagree	78	34.7%	46	32.4%	32	38.6%						
Strongly disagree/Disagree	68	30.2%	40	28.2%	28	33.7%						
Comfortable recommending marijuana if medically appropriate ^e												
Strongly agree/Agree	32	14.2%	26	18.3%	6	7.2%	0.35^e	0.14	0.88	0.70	0.39	1.23
Neither agree nor disagree	52	23.1%	28	19.7%	24	28.9%						
Strongly disagree/Disagree	141	62.7%	88	62.0%	53	63.9%						
Marijuana is standardized enough to be used as medication												
Strongly agree/Agree	28	12.4%	21	14.8%	7	8.4%	0.56	0.33	0.98	0.53	0.30	0.93
Neither agree nor disagree	67	29.8%	46	32.4%	21	25.3%						
Strongly disagree/Disagree	130	57.8%	75	52.8%	55	66.3%						
Provider concerns related to marijuana use impacting patients' disease												
Impact ability to manage disease												
Very concerned	83	36.9%	67	47.2%	16	19.3%	0.27	0.16	0.46	0.27	0.16	0.47
Moderately concerned	97	43.1%	58	40.8%	39	47.0%						
Not at all/a little concerned	45	20.0%	17	12.0%	28	33.7%						
Impact medication effectiveness												
Very concerned	34	15.1%	29	20.4%	5	6.0%	0.42	0.24	0.74	0.44	0.25	0.78
Moderately concerned	57	25.3%	38	26.8%	19	22.9%						
Not at all/a little concerned	134	59.6%	75	52.8%	59	71.1%						
Impact medication adherence												
Very concerned	104	46.2%	81	57.0%	23	27.7%	0.30	0.18	0.52	0.32	0.19	0.55
Moderately concerned	89	39.6%	48	33.8%	41	49.4%						
Not at all/a little concerned	32	14.2%	13	9.2%	19	22.9%						
Make patient symptoms worse												
Very concerned	50	22.2%	45	31.7%	5	6.0%	0.23	0.13	0.40	0.24	0.13	0.41
Moderately concerned	70	31.1%	48	33.8%	22	26.5%						
Not at all/a little concerned	105	46.7%	49	34.5%	56	67.5%						
Impact the accuracy of labs or tests												
Very concerned	23	10.2%	18	12.7%	5	6.0%	0.74	0.40	1.39	0.79	0.42	1.50
Moderately concerned	35	15.6%	21	14.8%	14	16.9%						
Not at all/a little concerned	167	74.2%	103	72.5%	64	77.1%						
Interact with medications												
Very concerned	60	26.7%	39	27.5%	21	25.3%	1.11	0.67	1.84	1.15	0.69	1.91
Moderately concerned	62	27.6%	35	24.6%	27	32.5%						
Not at all/a little concerned	103	45.8%	68	47.9%	35	42.2%						

Bolded: p value < .05.

Column percentage are shown.

^a % by subspecialty assessed with Chi squared test (X^2 (1, $N = 225$)).

^b We assessed the association between subspecialty (rheumatologists vs. endocrinologists) and having a higher level of agreement for each marijuana-related attitude.

^c Proportional odds model ordinal regression analyses assessed the association between provider subspecialty (endocrinologists as a reference group) and the higher levels of the marijuana-related attitudes or concerns.

^d Adjusted models controlled for provider gender, perceived marijuana legal status for medical and recreational use.

^e The unadjusted model OR for "Comfortable recommending marijuana if medically appropriate" was based on the partial proportional odds model due to the violation of the proportional odds assumption for the model.

and making chronic disease symptoms worse (69.3%/53.3%) (Table 4).

Provider attitudes regarding medical marijuana

Nearly equal proportions disagreed (30.2%), were neutral (34.7%), and agreed (35.1%) that some patients would benefit from medical marijuana. The majority of respondents would not be comfortable recommending marijuana if “medically appropriate” (62.7%) (with female providers significantly less comfortable than male providers) and did not believe marijuana is standardized enough to be used as a medication (57.8%) (Table 5).

After adjusting for provider characteristics and perceived legality of marijuana use in their state, provider groups differed in their reported level of concern related to marijuana use. Pediatric rheumatologists were less likely to agree that marijuana is standardized enough to be a medication (AOR 0.53, 95% CI: 0.30–0.93) and also less concerned about the potential for marijuana to negatively impact: patients’ abilities to manage their disease (AOR 0.27, 95% CI: 0.16–0.47), medication effectiveness (AOR 0.44, 95% CI: 0.25–0.78), medication adherence (AOR 0.32, 95% CI: 0.19–0.55), and disease symptoms (AOR 0.24, 95% CI: 0.13–0.41) (Table 5).

Discussion

Compared to previous samples of primary care physicians in which self-reported annual screening rates were over 85% [10,13], we found low rates of substance use screening among subspecialty physicians, even though the majority agreed that screening falls within their clinical responsibilities. Reports of insufficient time, skill, and support were relatively common and were inversely associated with alcohol screening annually or more frequently. In our study, screening rates were higher than those reported based on a chart review from a pediatric rheumatology clinic [9] but lower than rates reported by adolescent patients presenting for subspecialty pediatric care at a large tertiary care center in Boston [10]. The variant research designs and use of a national sample rather than a single institution may contribute to these differences.

We found that respondents were skeptical about adolescents’ receptivity to screening and willingness to disclose substance use. This may account for low rates of screening even in the context of providers’ high rates of concern about the impact of both alcohol and marijuana on the underlying disease. Previous research using formal screening tools has documented low rates of disclosure in primary care settings [14]. Nonetheless, research has found that youth with chronic medical conditions are concerned about the impact of alcohol on their health, willing to disclose information about their substance use, and curious to learn more about the potential consequences of substance use [5,15]. Moreover, youth with chronic medical conditions, including type 1 diabetes and rheumatological diseases, consider subspecialty care to be their medical home and place value on being asked about and discussing substance use with their specialty care providers [16]. A future study exploring pediatric subspecialist concerns about disclosure rates could be useful and guide the development of educational materials.

We have previously reported that youth who report having been asked about whether they use alcohol were more likely to have also received advice or counseling regarding alcohol [10],

thus failure to screen in subspecialty care may represent a missed opportunity. Accurate information from a healthcare provider may take particular importance as parents of children with chronic medical conditions may not be aware of the unique vulnerabilities of their children [17].

The American Academy of Pediatrics opposes the use of marijuana as a medication for children because of concerns that exposure may harm the developing brain [18]. A majority of our respondents agreed with or were neutral to the idea that medical marijuana could be helpful to some patients, although they also expressed significant concerns: majorities believe that marijuana is not standardized enough to be used as a medication, would not be comfortable recommending marijuana as a medication, and expressed high levels of concern about the impact of marijuana on underlying disease state and disease management. Our findings were similar to a survey in Colorado, which found that family physicians were very concerned about the health risks of marijuana, and very few agreed marijuana is appropriate to use as a medication [19].

Our findings reveal intriguing heterogeneities across subspecialties. It is likely that rheumatologists are more regularly asked about marijuana as a pain medication, and compared to pediatric endocrinologists, they were more likely to judge marijuana as insufficiently standardized for use as a medication. On the other hand, pediatric endocrinologists who manage adolescent patients with diabetes had very high levels of concern regarding the impact of marijuana on a patient’s ability to adequately perform self-care, which could result in life-threatening injury [20]. Thus, it appears that the more our respondents were invested in these topics, the greater level of concern they had about marijuana.

Limitations

Our survey recruited nationally from two subspecialties however results should not be generalized beyond these specialties. Survey results are subject to recall and reporting bias, including social desirability bias. Furthermore, the survey methodology did not allow for clarification of respondent’s interpretation of the questions. We did not ask participants whether they had observed negative outcomes related to alcohol or marijuana use in their patients and thus cannot comment on whether any concerns were theoretical or derived from actual experience. Our questions about medical marijuana did not distinguish between delta-9-tetrahydrocannabinol (THC) and cannabidiol (CBD) products, nor did we distinguish between inhaled or ingested products. Both THC and CBD may be referred to under the umbrella of “medical marijuana,” and we do not know whether our survey participants were responding to concerns about one, the other, or both. We did not ask about indications for medical marijuana use, and it is possible that respondents who agreed with the statement that marijuana may be effective for some patients may have been considering the use of CBD products as an antiepileptic medication for which there is an established pharmaceutical product with a pediatric indication. If this is the case, even fewer physicians may agree that THC, which has no established pediatric indication, may be an effective medication for some patients. A future study could explore medical providers’ opinions about THC and CBD separately and determine whether concerns are theoretical or have been observed. While all of our respondents provide care for children and adolescents, we did not explore concerns regarding the

known impact of marijuana on the developing brain, which may have elicited even more concerns regarding the use of marijuana as a medication.

Conclusion

Self-reported rates of screening by pediatric subspecialists are low compared to primary care pediatricians, although concerns about the consequences of alcohol and marijuana use are high. Educational strategies and training opportunities could increase these rates. Unease regarding the use of marijuana as a medication extends beyond marijuana's negative impact on the developing brain and reflects worries about essential features of chronic disease management. Given the limited research base for the use of marijuana as a medication, particularly in children, these findings should be considered as a part of comprehensive policy development and clinical guidelines regarding medical marijuana.

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