



Published in final edited form as:

Am J Drug Alcohol Abuse. 2022 November 02; 48(6): 684–694. doi:10.1080/00952990.2022.2083967.

Kratom use as more than a “self-treatment”

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Abstract

Background: *Mitragyna speciosa* (kratom) is increasingly used in the United States for its pharmacological effects. Kratom’s relative novelty makes for a dynamic situation, such that use motivations are not firmly established and may be changing. Investigators and clinicians require frequent updates on kratom trends.

Objectives: To assess the current state of kratom-use initiation, sourcing, motivations, preference, conceptualizations, and perceived stigma, using survey responses from current and former users.

Methods: Between April-May 2021 we recontacted 289 respondents who reported lifetime kratom use (on an unrelated survey) to answer kratom-specific questions.

Results: The sample (N=129) was majority female (51.9%) and white (71.9%). Most (69.0%) reported first trying kratom after 2015. Mean age of use initiation (29.9 years) was older than for other substances, including opioids. Kratom ranked as a preferred substance by 48.5%. The strongest drug association with past-year kratom use was vaped nicotine ($OR=3.31, 95\% CI 1.23–8.88$). Use was less likely among those prescribed buprenorphine in the past year ($OR=0.03, CI 0.01–0.28$). Past-month cannabis use ($OR=4.18, CI 1.80–9.72$) had the strongest association with past-month kratom use. Over 40 use motivations were endorsed, many (but not all) supporting the “self-treatment” narrative of kratom use, including use as an opioid, alcohol, or stimulant substitute. Treatment shortfalls were associated with decisions to try kratom.

Conclusions: Kratom use motivations are diversifying, with multiple factors driving use. As sales continue to increase, the public-health, clinical, and policy responses to kratom should be

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Disclosure statement

In the past 3 years, KED has served as a consultant for Beckley-Canopy Therapeutics, Canopy Corporation, and Grünenthal, Inc. AGR is a scientific advisor to ETHA Natural Botanicals and Neon Mind Biosciences. All other authors report no financial disclosures.

grounded in rigorous bench-to-bedside scientific research. Comprehensive study of kratom is currently lacking.

Keywords

Kratom; *Mitragyna speciosa*; novel drugs; survey; polydrug use

Introduction

The botanical *Mitragyna speciosa*, referred to as “kratom”, is indigenous to Malaysia and Thailand, where it has been traditionally used for its pharmacological effects. In the US, kratom use noticeably increased beginning in 2007 with use seemingly rare before 2015 (1–6). Use has since expanded dramatically and dynamically, such that investigators and clinicians who want to understand it – its user demographics and motivations, in particular – are obliged to seek updated information regularly. Such information needs to be gathered from a variety of sources, as kratom products in the US are largely unregulated and unstandardized. In surveys, use is often attributed to “self-treatment” of chronic pain, fatigue, mental health (e.g., anxiety, depression), and/or substance use disorder (SUD) symptoms, or goals of improving energy and mood (3,7–10). These motivations are consonant with findings from smaller surveys conducted in Malaysia or Thailand (Singh et al. 2016; Singh et al. 2019 (11–14). Use motivations with public health relevance amidst the broader opioid and polydrug crisis is the use of kratom to reduce, substitute for, or abstain from licit or illicit opioids (3,5,8,9), and possibly alcohol or amphetamine-type stimulants (13–18). These self-reported motivations are consistent with findings from social-media analyses (16,19–21).

However, existing surveys are limited by assessment of broad use motivations and insufficient information regarding temporal order of kratom-use initiation relative to other substances. Prior surveys have not asked whether decisions to try kratom were influenced directly by shortfalls in existing medical treatment, such as difficulties accessing evidence-based SUD intervention, chronic pain management, or mental health care. Lastly, surveys have focused primarily on current kratom use and not discontinuation. This small cross-sectional survey was designed to expand information related to kratom use in the US and gather formative data needed for the development of subsequent studies.

Methods

Data-Collection procedures

We recontacted respondents between April-May 2021 who had reported lifetime kratom use in a larger, unrelated online survey of substance use that was conducted between September 2020-March 2021 (see Smith et al., 2021c). All respondents were recruited using Amazon Mechanical Turk (mTurk), a platform for research crowdsourcing (22–29). Eligible respondents were people 18 who resided in the US (verified by IP addresses), passed all data quality checks, and reported 1 lifetime use of kratom. A total of 289 respondents were identified from the initial survey for recontact; 283 were able to be electronically notified; 134 participated during our 4-week data collection period. Five cases were removed due to

unverifiable IP addresses, making the final sample 129/289 (44.6%). Our kratom recontact survey was cross-sectional (not a follow-up) comprised of a convenience sample and was undertaken to collect pilot data (meaning we were not striving for a 100% recontact rate). We attribute our recontact rate to our study goals, our short collection window, and mTurk, where users do not remain consistently active and can deactivate accounts. Although the recontact sample included more college graduates than all who reported lifetime kratom use on the parent survey, other demographics and health measures were similar; no differences reached statistical significance. Respondents were compensated \$7.25. This study was approved by the National Institutes of Health Institutional Review Board (NIH IRB). Because of the minimal-risk nature of the study, signed informed consent was not obtained; rather, eligible participants read a study preamble online prior to beginning the survey and consented by selecting the option “Consent to begin questionnaire,” which directed them to the survey. Those who chose not to consent to participate could select “Exit questionnaire.”

Sample characteristics: We assessed age, sex/gender, race/ethnicity (White, US minority), education, past-year employment, and past-year annual household income. Respondents also indicated whether they considered themselves to be “in recovery” from any SUD, including alcohol use disorder (AUD).

Lifetime, past-year, and past-month use patterns and drug preference: We assessed lifetime substance use, age of use initiation, and past-year or past-month use. For substances selected, a list was autopopulated for participants to select their top five preferred substances ever used and rank-order them from most (1) to least (5) preferred, based on all-around satisfaction.

Kratom sourcing was assessed by asking respondents to select any response option for vendors from whom they had ever purchased kratom. Changes in purchasing and strain types purchased were also assessed.

Motivations for kratom use were assessed with the item: “Please select from the below list the *most important factors* that influence or motivate your current kratom use (if you still use) or past kratom use (if you no longer use). In other words, what are your most important reasons for your using kratom during times when you used it?” Participants could select all they believed applicable and rate, using a visual analog scale (0–100), perceived effectiveness of kratom for each indication.

Conceptualizations of kratom were assessed with the item: “The list below has terms that people could use to describe kratom or many other substances. Please select the terms that you would use to describe or conceptualize kratom. These can reflect both positive and negative aspects of kratom. There is no correct answer.” Participants could select multiple options. Respondents were then asked whether these conceptualizations had changed since they had first heard about kratom.

Openness about kratom use (a reflection of freedom from stigma) was assessed by asking respondents about their openness regarding kratom use and included a separate item regarding comfort discussing kratom with a medical practitioner.

Healthcare treatment experiences that informed decisions to use kratom were evaluated by first asking respondents to select healthcare-related settings (e.g., emergency department, general practitioners) where they had experienced what they perceived to be “discrimination, stigma, or unfair treatment”. We then asked respondents to report difficulties obtaining adequate treatment for issues relating to: mental health; acute or chronic pain; general physical health, and SUDs. Those who reported difficulties were asked whether this influenced their decision to try kratom.

Data analysis

Descriptive data (means or proportions) are presented for the entire sample. Characteristics and drug use related to past-year and past-month kratom use (versus discontinuation of use) were compared. Past-year and past-month substance use with significant bivariate associations (see supplementary materials for results of bivariate analyses) with past-year or past-month kratom use were included along with relevant respondent characteristics in two logistic regressions—one examining predictors of having used kratom in the past year, the second examining predictors of having used kratom in the past month. All data handling and analyses were conducted using *R*. Alpha was set at 0.05, two-tailed.

Results

Sample:

Table 1 shows respondent characteristics. The sample was 51.9% female, 71.9% White, and had a mean age of 34.8 years; 38.1% reported past-year income at or above the US median household income (\$55,000->\$64,999); 25.6% were in “recovery” from an SUD/AUD.

Use initiation and product sources: As displayed in Table 1, 10.9% reported having tried kratom between 2000–2010; 75.5% reported first use at or after 2015. Most reported purchasing at more than one location during times of regular use, primarily at “smoke shops” or stores selling cannabidiol or vaping paraphernalia. Over half had purchased from US-based online vendors; 23.3% reported having purchased at a gas station, and 29.5% from an herbal/vitamin shop or high-end natural products store. Few reported purchasing from Asian-based vendors. Approximately 47% reported that during times of regular use they would occasionally change vendors. “Strains” purchased included green (65.1%), red (57.4%), and white (38.0%).

Motivations for kratom use: As shown in Table 2, nearly all endorsed multiple motivations. Interestingly, the most frequently endorsed (66.7%) was an item developed based on our prior social-media findings (Smith et al., 2021a): “Just to feel less crappy in general and improve quality of life,” with kratom rated as 74.2/100 effective in achieving this. Our conceptualization of this piloted response option is an that of an indicator of broad motivation that might be common to many psychoactive substances, namely, to feel less bad and to strive for enhanced quality of life. This was phrased to be widely understandable and interpretable by respondents, though without expectation as to how it would be interacted with by respondents. Also highly endorsed were self-treating anxiety (53.5%), addressing feelings of sleepiness or low energy (50.4%), short-term pain relief (49.6%), recreation

and relaxation (48.8%), boosting energy and/or endurance (48.1%), reducing social anxiety (46.5%), self-treating depressive symptoms (41.8%) or chronic pain (35.7%). One-third reported that “kratom is safer than other substances.” Average effectiveness ratings ranged from 66.6/100 for self-treating depressive symptoms to 90.4/100 for perceived comparative safety.

A minority reported using kratom as a long-term substitute for opioids (16.3%), but rated kratom’s effectiveness for this highly (74.6/100). Likewise, 15.5% reported using kratom to relieve withdrawal from prescribed opioids and rated this effective (74.2/100); 24.8% reported kratom was moderately effective (66.7/100) as a short-term opioid substitute (including heroin) and 19.4% reported using kratom to relieve withdrawal from nonprescribed opioids and heroin with high perceived effectiveness (72.2/100). Additionally, 18.6% reported using kratom as a short-term alcohol substitute with moderate effectiveness (66.3/100); 7.8% used as a long-term alcohol substitute with higher effectiveness (75.8/100); and 6.2% used to relieve alcohol withdrawal (72.1/100). Fewer reported using kratom as a substitute for psychostimulants (short-term, 10.1%; long-term, 3.1%), but with high (72.4/100) and moderate (66.7/100) perceived effectiveness, respectively.

Substance-use patterns: Lifetime use prevalence (displayed in Table 3) ranged from 3.9% (nonmedical androgenic anabolic steroids) to 100.0% (alcohol). Mean age of kratom initiation was 29.9 (range 16–60; mode and median both 30), older than age of initiation for most other substances. The oldest mean ages of initiation were for substances that, like kratom, are comparatively novel (tianeptine-based products, 32.6; medically prescribed cannabis 32.0; and cannabidiol, 30.0). Most opioids (buprenorphine an exception) were initiated at *younger* ages on average compared to kratom: 24.8 for nonmedical prescription opioids (range 13–40, median 19, mode 17) and 19.9 for heroin (range 15–49, median 23, mode 20).

Past-year and past-month use and preferred substances: Shown in Table 3, 64.3% reported past-year kratom use and 45.7% past-month use. Substances used in the past year included alcohol (93.8%), nonmedical cannabis (72.1%), cannabidiol (54.3%), and electronic cigarettes (52.7%). Nearly a quarter reported use of psychedelics and benzodiazepines. For opioids, 31.8% reported past-year use of nonmedical prescription opioids; rates were lower for heroin (9.3%), nonmedical buprenorphine (7.0%), fentanyl (4.7%), and nonmedical methadone (2.3%). Among the most preferred drugs, the highest ranked were nonmedical cannabis (60.8%), caffeine (51.5%), kratom (48.5%), alcohol (42.3%), combustible tobacco (33.1%), prescribed opioids (26.2%), and psychedelics (25.4%). Among those who ranked kratom among their top five ($n = 63$), 6.9% ranked it as their number one preferred substance, whereas 9.2%, 10.8%, 11.5%, and 10.0% ranked it as their second, third, fourth, or fifth most preferred substance, respectively.

Associations with past-year and past-month kratom use: Table 4 shows results of two regression models examining factors associated with past-year and past-month kratom use. Past-year use was less likely in people who had been prescribed buprenorphine in the past year (OR = 0.03, CI 0.01–0.28, $p < .01$), more likely among people who vaped nicotine (OR = 3.31, CI 1.23–8.88, $p = 0.02$), and more likely among people employed full-time

versus other employment categories (part-time, OR = 0.28, CI 0.08–1.00; unemployed, OR = 0.25, CI 0.07–0.92; students, OR = 0.04, CI 0.01–0.29). The only variables significantly ($p < .001$) associated with past-month use were having achieved a high-school education versus college (OR = 3.67, CI 1.47–9.18), and past-month cannabidiol use (OR = 4.18, CI 1.80–9.72).

Conceptualizations of kratom: Common conceptualizations (Table 5) were that kratom “should be legal” (65.1%), is “helpful, medicinal, or therapeutic” (61.2%), “relaxing” (51.9%), and a “combination of stimulating and sedating” (48.1%); 43.4% reported that kratom is “not nearly as strong as opioids” and that it is “stimulating.” Only 14.0% reported that kratom “is an opioid.” Just over 40% believed that kratom is targeted by the US Food and Drug Administration or government and is stigmatized. Nearly 5.0% reported that kratom is “an increasing problem or burden for me,” and “probably should be made illegal”. Conceptualizations of kratom had changed for 27.1% and were split between changes for the worse (8.5%) and for the better (10.1%).

Openness about kratom use: Shown in Table 5, 45.7% reported being completely open about their use (another quarter reported that disclosure came on a case-by-case basis). With respect to healthcare providers, 46.5% reported that they would be “pretty or very comfortable” disclosing (27.9%).

Healthcare treatment experiences that informed decisions to use kratom:

Experiences of discrimination, stigma, or unfair treatment within a healthcare setting were reported by a range of 7.8% (buprenorphine/methadone providers) to 34.2% (emergency departments/urgent care); 17.1% reported this for their family doctor or general practitioner. For mental health care, 51.2% reported difficulties obtaining adequate treatment; for pain treatment, 46.5% reported difficulties; for general physical health, 41.9% reported difficulties, and for SUD/AUD treatment, 20.9% reported difficulties. Among those who experienced treatment difficulties, these were reported as having influenced their decisions to use kratom as follows: mental health (48.5%); acute/chronic pain (73.3%); general health (51.9%); SUD/AUD treatment (59.3%).

Discussion

By addressing gaps in prior online kratom surveys and asking novel pilot questions, this survey was able to obtain key information about kratom use, use motivations, drug preference, and conceptualizations of kratom. Most respondents reported first trying kratom in 2015 or after, but with no signal of decline subsequent to 2015, which appears in keeping with proliferation and diversification of kratom products. Purchase of kratom products seemed to remain confined to local specialty shops, convenience stores, and US-based (but not Asian-based) online retailers (3,5,9,19).

Motivations for and conceptualizations of kratom use: is kratom a different animal?

Our findings highlight the diversity of reasons for trying kratom and serve as a reminder that such motivations may not differ meaningfully from use motivations that could be

found for many substances, from coffee to cannabis to alcohol to antidepressants. Prior work has sometimes bifurcated kratom survey respondents into subpopulations who are self-treating symptoms of mental and/or physical health conditions *or* who are, alternatively, using kratom as a form of medication for OUD (7,9). Here we found evidence that such distinctions make sense, but we also found evidence in keeping with some social media data (16,19,21) that the impetus to use kratom likely involves multiple motivations, and that motivations are not mutually exclusive within any broad “primary use motivation” subgroup. In some respects, kratom use motivations may be nonspecific (e.g., to increase energy), but highly specific in others (e.g., to relieve withdrawal symptoms for prescribed methadone). This breadth, and even non-specificity, is reflected by the use motivation that was most highly endorsed (using “just to feel less crappy in general and improve quality of life”). This and other motivation response choices were developed based on prior survey findings as well as analyses of Reddit data (16,19). The central takeaway from those social-media findings was that kratom is often, at least initially, used in what is perceived to be a pragmatic way to meet daily obligations, not necessarily as a way to avoid them. Thus, while we found many specific use motivations in keeping with a self-treatment narrative, evidence was found for a basic inclination to use predicated on “feeling less bad” or “feeling better,” generally, which is not unique to kratom. The actual meaning of this item is in largely unknowable using survey methods and requires qualitative investigation. An open question is the extent to which kratom is unusual in ultimately serving as an aid, not a hindrance, to meeting daily obligations while improving quality-of-life. That this broad quality-of-life motivation was endorsed by the greatest proportion of respondents suggests that while some are using kratom to achieve a euphoric high, kratom use may not be best (and certainly cannot be exclusively) characterized that way. This finding is also similar to one from a study of regular kratom users in Malaysia, indicating that kratom is used broadly for “coping” across cultures (11).

Our findings suggest that kratom may not be functionally dissimilar from some substances that are used in culturally normative ways for improving quality-of-life (for recreation, relaxation, increasing energy, and decreasing anxiety) along with substances used in ways that are often viewed as immoral or maladaptive (to achieve euphoria, to avoid withdrawal symptoms). One limitation of our list of use motivations was that it mostly reflected positive reinforcement, rather than use motivations that characterized seeking to *avoid* unwanted effects, such as kratom withdrawal (negative reinforcement). Although some respondents reported using kratom to relieve withdrawal from other substances, or as an opioid, alcohol, or stimulant substitute, we did not include the response option “taking more kratom to relieve *kratom* withdrawal.” However, such (negative reinforcement) motivations were included as DSM-5 SUD symptoms that could be selected from our checklist (e.g., kratom use to avoid withdrawal symptoms; need to use more kratom in larger amounts in order to feel the same effect). In separate analyses, these withdrawal indicators were selected by 28.7% and 33.3% of the sample, respectively, along with other indicators based on negative reinforcement (the focus of a separate report; 30). On balance, in this sample, use appears to have been motivated more by positive, versus negative, reinforcement.

Intentions for use matter in developing an understanding of kratom use

The diversity of motivations endorsed suggest that kratom use among people in the US should not necessarily be approached as a wholly novel phenomenon, as some commentators initially tended to approach it. Scientists trying to understand kratom use in the US have had to evolve their thinking as the motivations for use have expanded beyond self-treatment (16,21). Researchers should apply the understanding that has been developed in studying other psychoactive substances, some of which are similar to kratom's: specifically, that kratom is inherently variable in its formulations and effects, and that motivations for its use cover a large swath that overlaps considerably with motivations for use of substances that are more established in the US. What might ultimately differentiate kratom from many illicit substances may be its theoretically lower abuse potential (30), yet to be determined in humans, and its seeming ability, based on self-report, to produce effects that are largely concordant with everyday life (e.g., meeting one's roles and obligations and enhancement of quality of life without adverse effects or disordered use (9,16).

For people who use kratom, it may be that perceived safety is what distinguishes it from illicit drugs. This is reflected in that one-third of respondents reported they believed kratom was not only safer but rated this higher than other motivations. A majority also conceptualized kratom as "helpful, therapeutic, or medicinal." These favorable conceptualizations, potentially influenced by vendors, online media, or motivated reasoning are offset by the fact that approximately one quarter conceptualized kratom as "addictive or habit forming." Our tentative overall read of these responses is that views of kratom by people who have tried it are diverse, but skew positive. This seems consistent with what we believe is a current, albeit provisional, plurality view among investigators who have studied kratom closely: that is, there is a possibility of greater therapeutic benefit with whole kratom leaves and select alkaloids with less risk when compared to traditional full opioid agonists (31,32). This is indirectly evidenced by arguably low rates of KUD (9) and low rates of unfavorable kratom conceptualizations (including among those who had discontinued use). Together, these preliminary findings provide further support for the idea that kratom, while *not* without risk for adverse effects (e.g., misuse, tolerance, withdrawal), is at least *perceived* by those who have taken it as having wide-ranging benefits. In light of mixed preclinical findings that translate imperfectly to human use, and in the absence of rigorous human research on kratom, self-report is our best, albeit imperfect, source of insight into real-world kratom use.

Keeping in mind the current context, which includes a dearth of controlled human research on kratom and an uncertain regulatory environment, we intend our discussion as neither endorsement nor indictment of kratom use. However, our motivation findings highlight the reality that intentions for use matter just as much as the underlying causes and pharmacology matter, adding the amount, frequency, and duration as contributors of variability. A strong preference for kratom compared to other substances, and the intention to *misuse* kratom, do not appear to be strong even if some people do use for recreation or to achieve euphoric feelings (5,6,8,16). Here, fewer respondents reported that they used kratom for euphoria or because they prefer the kratom high to those from other drugs. Juxtaposing this with the fact that 48.5% of respondents selected kratom as one of their top five

preferred substances, we conclude that kratom may be preferred to other substances, but not necessarily or primarily for hedonic reasons. Only 9 ranked kratom as their *most* preferred substance, perhaps indicating that kratom would not be selected for if the choice between it and another substance was discrete. While this study was not designed to assess human abuse potential for kratom, our results suggest that kratom is not overwhelmingly preferred to other substances, nor even regularly used among those who had ever tried it (evidenced by the respondents who had discontinued use). We leave unaddressed whether hedonic reasons for kratom use or kratom misuse implicate kratom itself and instead emphasize the need for more preclinical and (any) clinical research pertaining to kratom's *in vivo* pharmacology while investigation into real-world motivations of use continue.

Moving forward

Perhaps due to kratom's comparative novelty relative to other psychoactive substances in the US, the initial scientific urgency to understand what was motivating kratom use may have been advanced rapidly without adequate consideration of the broad factors that motivate many forms of substance use. With initial reports of kratom use associated with "self-treatment", it may be that the narratives around kratom took the only forms they could take, based on the initial questions developed and subsequently asked of those who had tried kratom. This may have resulted in an oversimplification of what drives kratom use. Given kratom's continued presence and advertising profile, it is time to consider more complex narratives and to acknowledge more groups may initiate use, including people who do *not* use for self-treatment but rather for enhancing wellness, fitness, and recreation, or simply for relaxation and pleasure (33). The dose-dependent stimulatory and analgesic effects associated with kratom make it marketable across multiple consumer populations and we expect sales to increase in coming years. Accordingly, questions pertaining to kratom use should be increasingly detailed and open-ended. They should also be developed specifically to help discern the subjective (beneficial and adverse) properties of kratom relative to other substances with the goal of moving toward critically needed longitudinal and human laboratory studies. Future work should also examine momentary use to determine whether proximal motivations and effects of use are consistent with responses based on recall, ideally including product assay to characterize alkaloid content of the unregulated products used. Presently "kratom use" reflects many different pharmacological experiences and remains a noteworthy scientific confound to address.

For now, the public health message on kratom remains a complicated one that recommends withholding any major policy changes pending the scientific investigations that are critical to inform them. It also recommends significantly heightened awareness of kratom by clinicians. Healthcare providers should be made aware of kratom and assess patients for use, particularly among those with comorbidities or for whom medications are being prescribed (34). Sensitivity to factors motivating kratom use should be considered a best practice when treating this population and steadfastly promoted in the clinical exchange so as to decrease stigma and maximize the likelihood for open dialogue (10). That many people using kratom are doing so, in part, to "self-treat" conditions that may be clinically addressable, makes quality medical engagement ever more urgent.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Funding

This work was supported in part by the National Institute on Drug Abuse Intramural Research Program of the NIH.

Funding Source:

Support was provided by the Intramural Research Program of the NIH NIDA.

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Table 1. Full sample demographic characteristics, year of kratom use initiation, and kratom sourcing (N=129).

	N	%	M	(SD)
Age	129		34.8	(±8.4)
Female	67	51.9%		
White	102	71.9%		
High School or college graduate	129	100.0%		
Employed part-time or full-time, or student	94	69.8%		
Income at or above US household median (\$55,000-\$>65,000)	49	38.1%		
Considers self "in recovery" from an Substance Use Disorder/Alcohol Use Disorder	33	25.6%		
Year first tried kratom				
2000–2010	14	10.9%		
2011–2012	10	7.8%		
2013–2014	7	5.4%		
2015–2016	27	21.0%		
2017–2018	38	29.5%		
2019–2020	33	25.0%		
Where kratom was purchased during the times of regular use				
Online US-based vendor	82	58.9%		
Other purchase location ("head" shop, smoke shop, kratom bar)	61	47.3%		
From a store selling multiple products (e.g., cannabidiol, vape) not otherwise classified	51	38.8%		
Gas station/convenience store	30	23.3%		
Herbal/vitamin shop/high-end natural products store	38	29.5%		
Friend or family	24	17.8%		
Online vendor directly based in Thailand/Malaysia that I previously used	9	7.0%		
"Strains" purchased during times of regular use				
Green	84	65.1%		
Red	74	57.4%		
White	49	38.0%		
I don't remember / I don't believe there are different strains	8	6.2%		

Table 2.

Factors reported as motivating kratom use (N = 129).

	N	%	M	(SD)
Just to feel less crappy in general and improve quality of life.	86	66.7	74.2	(±21.9)
Self-treat anxiety symptoms.	69	53.5	69.4	(±22.9)
Address occasional feelings of sleepiness or low energy.	65	50.4	78.0	(±21.2)
Relieve short-term pain (acute pain management)	64	49.6	71.9	(±22.1)
For recreation, fun, or to relax.	63	48.8	72.4	(±24.6)
Boost energy, stamina and/or endurance (for work, exercise).	62	48.1	77.1	(±21.8)
Reduce social anxiety.	60	46.5	75.8	(±17.4)
Self-treat depression symptoms.	54	41.8	66.6	(±22.7)
Self-treat long-term pain issues and symptoms (chronic pain management)	46	35.7	72.1	(±21.6)
Kratom is safer than other substances.	43	33.3	90.4	(±11.2)
To achieve a euphoric high.	39	30.2	70.9	(±22.3)
As a short-term substitute/replacement for opioids (prescription opioids, heroin).	32	24.8	66.7	(±27.1)
Couldn't get a hold of other, more preferred drugs.	31	24.0	75.4	(±24.4)
Self-treat headaches/migraines.	31	24.0	65.3	(±22.9)
Relieve withdrawal symptoms from nonprescribed opioids or heroin	25	19.4	72.2	(±25.1)
Self-treat chronic fatigue syndrome.	25	19.4	72.7	(±24.4)
As a short-term substitute/replacement for alcohol.	24	18.6	66.3	(±21.9)
Doctors won't prescribe you the drugs you need.	24	18.6	82.3	(±19.8)
Self-treat attention deficit/hyperactivity disorder symptoms.	24	18.6	61.6	(±24.4)
Self-treat post-traumatic stress symptoms.	23	17.8	61.9	(±28.3)
As a long-term substitute/replacement for opioids (prescription opioids, heroin).	21	16.3	74.6	(±24.9)
Relieve withdrawal symptoms from medically prescribed opioids	20	15.5	74.2	(±22.8)
To take as part of a self-designed "stack" of other drugs that help you feel good.	18	14.0	69.4	(±21.6)
Because you prefer the kratom "high" to "highs" you get from other drugs.	16	12.4	78.0	(±21.7)
To believe withdrawal symptoms from a variety of different drugs.	14	10.9	71.9	(±25.7)
As a short-term substitute/replacement for stimulants (meth, cocaine)	13	10.1	72.4	(±28.9)
Self-treat irritable bowel syndrome.	13	10.1	77.1	(±18.6)
As a long-term substitute/replacement for alcohol.	10	7.8	75.8	(±24.7)
Self-treat bipolar symptoms.	10	7.8	66.6	(±26.1)
Relieve alcohol withdrawal symptoms	8	6.2	72.1	(±29.7)
Relieve withdrawal symptoms for nonprescribed buprenorphine (Suboxone, Subutex)	7	5.4	90.4	(±15.3)
Relieve withdrawal symptoms from nonprescribed or prescribed methadone	6	4.7	63.6	(±6.2)
As a long-term substitute/replacement for buprenorphine (Suboxone, Subutex)	5	3.9	70.9	(±16.0)
As a long-term substitute/replacement for stimulants (meth, cocaine)	4	3.1	66.7	(±6.9)
Relieve withdrawal symptoms from "nootropics" or cognitive-enhancing supplements.	4	3.1	75.4	(±13.7)
Relieve withdrawal symptoms from prescribed buprenorphine (Suboxone, Subutex)	4	3.1	72.2	(±3.1)
As a short-term substitute/replacement for buprenorphine (Suboxone, Subutex)	3	2.3	72.7	(±14.0)
As a short-term substitute/replacement for methadone.	3	2.3	66.3	(±13.1)
As a long-term substitute/replacement for methadone.	3	2.3	82.3	(±4.5)

	N	%	M	(SD)
Difficulties obtaining buprenorphine (Suboxone, Subutex) or methadone.	3	2.3	61.6	(±8.5)

¹ Respondents were instructed to select all that applied; all but 1 respondent selected more than one use motivation.

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Lifetime use patterns, age of use initiation, past-year substance use, and substances that respondents endorsed as ranking among their top five most preferred substances (N = 129).

Table 3.

	Lifetime prevalence and age of substance use initiation			Past-year use			Past-month use		
	N	%	M (SD)	N	%	N	%	N	%
Kratom	129	100.0%	29.9 (±8.81)	83	64.3%	59	45.7%		
Alcohol	129	100.0%	15.0 (±3.28)	121	93.8%	104	80.6%		
Combustible tobacco	123	95.3%	15.9 (±4.47)	82	63.6%	63	48.8%		
Nonmedical cannabis	121	93.8%	16.8 (± 5.36)	93	72.1%	76	58.9%		
Electronic cigarettes	105	81.4%	25.9 (±7.89)	68	52.7%	49	38.0%		
Medically prescribed cannabis	103	79.8%	32.0 (±12.2)	14	10.9%	14	10.9%		
Cannabidiol/CBD	103	79.8%	30.0 (±9.14)	70	54.3%	54	41.9%		
Prescribed opioids	96	74.4%	20.4 (±6.42)	14	10.9%	7	5.4%		
Nonmedical benzodiazepines	96	74.4%	21.0 (±7.80)	35	27.1%	24	18.6%		
Nonmedical prescription opioids	91	70.5%	19.9 (±5.29)	41	31.8%	21	16.3%		
Psychedelics	86	66.7%	19.9 (±5.62)	29	22.5%	12	9.3%		
Powder cocaine	74	57.4%	20.4 (±4.76)	15	11.6%	3	2.3%		
Ecstasy	73	56.6%	20.3 (±5.54)	14	10.9%	3	2.3%		
Nonmedical prescription amphetamine	70	54.3%	21.3 (±7.31)	21	16.3%	11	8.5%		
Medically prescribed benzodiazepines	66	51.2%	22.0 (±6.15)	25	19.4%	20	15.5%		
Synthetic cannabinoids	53	41.1%	24.1 (±7.31)	1	0.8%	0	0.0%		
Nonprescribed antipsychotics	46	35.7%	23.3 (±10.3)	10	7.8%	6	4.7%		
Methamphetamine	44	34.1%	23.6 (±7.22)	10	7.8%	6	4.7%		
Heroin	35	27.1%	24.8 (±7.08)	12	9.3%	6	4.7%		
Crack cocaine	32	24.8%	21.8 (±6.55)	3	2.3%	1	0.8%		
Nonmedical buprenorphine	31	24.0%	26.7 (±8.10)	9	7.0%	4	3.1%		
Nonmedical prescription methadone	30	23.3%	26.1 (±6.71)	3	2.3%	1	0.8%		
Dimethyltryptamine	26	20.2%	24.3 (±6.49)	3	2.3%	0	0.0%		
Fentanyl	25	19.4%	27.8 (±6.68)	6	4.7%	3	2.3%		
Nonprescribed antidepressants	25	19.4%	19.2 (±5.69)	4	3.1%	1	0.8%		
Medically prescribed buprenorphine	14	10.9%	28.1 (±7.97)	6	4.7%	5	3.9%		

	Lifetime prevalence and age of substance use initiation			Past-year use			Past-month use		
	N	%	M (SD)	N	%	N	%	N	%
Medically prescribed methadone	12	9.3%	26.9 (\pm 4.56)	1	0.8%	1	0.8%	1	0.8%
Modafinil	12	9.3%	25.9 (\pm 6.28)	2	1.6%	1	0.8%	1	0.8%
Synthetic cathinones	12	7.0%	26.9 (\pm 6.30)	1	0.8%	0	0.0%	0	0.0%
Tianeptine	6	4.7%	32.6 (\pm 3.36)	3	2.3%	2	1.6%	2	1.6%
Nonmedical androgenic anabolic steroids	5	3.9%	26.3 (\pm 6.18)	0	0.0%	0	0.0%	0	0.0%
Most preferred substances									
Nonmedical cannabis				N	%				
Caffeine				79	60.8%				
Kratom				67	51.5%				
Alcohol				63	48.5%				
Combustible tobacco				55	42.3%				
Prescribed opioids				43	33.1%				
Psychedelics				34	26.2%				
Medically prescribed benzodiazepines				33	25.4%				
Nonmedical prescription opioids				26	20.0%				
Ecstasy				24	18.5%				
Nonmedical benzodiazepines				24	18.5%				
Cannabidiol/CBD				22	16.9%				
Electronic cigarettes				21	16.2%				
Nonmedical prescription amphetamine				21	16.2%				
Powder cocaine				21	16.2%				
Rx cannabis				20	15.4%				
Heroin				16	12.3%				
Street methamphetamine				13	10.0%				
Antidepressants				12	9.2%				
Crack cocaine				9	6.9%				
Dimethyltryptamine				4	3.1%				
Phenibut				4	3.1%				
Synthetic cathinones				4	3.1%				
				3	2.3%				

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	Lifetime prevalence and age of substance use initiation		Past-year use		Past-month use	
	N	%	N	%	N	%
Medically prescribed methadone			3			2.3%
Synthetic cannabinoids			2			1.5%
Fentanyl			2			1.5%
Nonmedical buprenorphine			1			0.8%
Nonmedical prescription methadone			1			0.8%
Tianeptine			1			0.8%
Modafinil			1			0.8%
Medically prescribed buprenorphine			0			0.0%

Table 4.

Results from logistic regression examining associations of past-year and past-month kratom use (N = 129).

	Model 1: Demographics and past-year substance use associated with past-year kratom use			Model 2: Demographics and past-month substance use associated with past-month kratom use		
	OR	95% CI	p	OR	95% CI	p
Age	1.00	[0.95, 1.06]	0.93	1.02	[0.97, 1.07]	0.45
Female (vs. male)	1.01	[0.38, 2.68]	0.99	0.72	[0.33, 1.61]	0.43
White (vs. US minority)	1.49	[0.48, 4.58]	0.49	1.20	[0.42, 3.37]	0.74
High school (vs. college graduate)	2.67	[0.93, 7.70]	0.07	3.67	[1.47, 9.18]	<.001
<i>Past-year Employment:</i>						
Part-time (vs. full-time)	0.28	[0.08, 1.00]	0.05	0.45	[0.15, 1.31]	0.14
Student (vs. full-time)	0.04	[0.01, 0.29]	<0.01	0.18	[0.02, 1.70]	0.13
Unemployed or other (vs. full-time)	0.25	[0.07, 0.92]	0.04	0.65	[0.22, 1.91]	0.44
Below US Federal poverty line (past-year annual income)	1.36	[0.39, 4.71]	0.62	0.44	[0.14, 1.37]	0.16
Past-year-e-cigarettes/vaping	3.31	[1.23, 8.88]	0.02			
Past-year buprenorphine	0.03	[0.01, 0.28]	<0.01	4.18	[1.80, 9.72]	<0.01
Past-month cannabinoid/CBD use						

Model 1: $\chi^2(10) = 26.7, p < .001, R^2 = 0.28$; Adj $R^2 = 0.19$; Model 2: $\chi^2(9) = 24.9, p < 0.01, R^2 = 0.24$; Adj $R^2 = 0.14$

Conceptualizations of kratom, openness about kratom use, and healthcare treatment experiences that informed decisions to use kratom (N = 129).

Table 5.

	N	%
Conceptualizations of kratom		
Should be legal	84	65.1%
Helpful, medicinal, therapeutic	79	61.2%
Relaxing	67	51.9%
A combination of stimulating and sedating	62	48.1%
Targeted by the Food and Drug Administration and/or the government	58	45.0%
Homeopathic or naturopathic	58	45.0%
Stigmatized	56	43.4%
Is not nearly as strong as opioids	56	43.4%
Stimulating	56	43.4%
A real benefit to my daily life	50	38.8%
Is not an opioid	49	38.0%
Targeted by Drug Enforcement Agency for criminalization	44	34.1%
Media panic	41	31.8%
Is not regulated across vendors who sell kratom	39	30.2%
Sedating	36	27.9%
Addictive or habit-forming	32	24.8%
Life-saving	31	24.0%
Energy shot	30	23.3%
Not very potent	24	18.6%
Inconsistent in its effects	24	18.6%
Too expensive	24	18.6%
Overhyped	20	15.5%
Potent	18	14.0%
Is an opioid	18	14.0%
Pre-workout	13	10.1%
Boring	10	7.8%
Sometimes adulterated with other products	10	7.8%

	N	%
Problematic or increasing problem or burden for me	6	4.7%
Probably should be made illegal	6	4.7%
Changes in conceptualizations about kratom since first learning about kratom		
Conceptualizations have become <i>more</i> favorable	13	10.1%
Conceptualizations have become <i>less</i> favorable	11	8.5%
Openness about kratom use		
Is completely out and open about kratom use.	59	45.7%
Would be pretty or very comfortable disclosing current or prior kratom use to healthcare providers	60	46.5%
Has experienced perceived discrimination, stigma, or unfair treatment when seeking medical help in the following:		
Emergency department or urgent care	44	34.2%
Private practice for mental or physical health, including pain	40	31.0%
Walk-in clinic/health department/community-based medical center for physical health/pain	26	20.2%
Family doctor or general practitioner	22	17.1%
Recovery-based, 12-step centers for substance use disorders (residential or outpatient) or 12-step meetings	16	12.4%
Outpatient or inpatient treatment for Substance Use Disorder(s)	12	9.3%
Community-based medical treatment center for mental health issues	11	8.5%
Medical doctors or clinics prescribing Suboxone/Subutex or methadone	10	7.8%
Treatment experiences difficulties that influenced kratom use		
Experienced difficulties obtaining adequate treatment for <i>mental health</i>	66	51.2%
Treatment difficulties influenced decision to use kratom	32	48.5%
Experienced difficulties obtaining adequate treatment for <i>acute or chronic pain</i>	60	46.5%
Treatment difficulties influenced decision to use kratom	44	73.3%
Experienced difficulties obtaining adequate treatment for <i>general physical health</i>	54	41.9%
Treatment difficulties influenced decision to use kratom	28	51.9%
Experienced difficulties obtaining adequate treatment for <i>Substance Use Disorder/Alcohol Use Disorder</i>	27	20.9%
Treatment difficulties influenced decision to use kratom	16	59.3%