



Published in final edited form as:

Int J Drug Policy. 2022 March ; 101: 103527. doi:10.1016/j.drugpo.2021.103527.

Perceived and misperceived norms about khat and/or cannabis use among adults in southwest Uganda

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Abstract

Background: Studies from high-income contexts have found evidence that norms about substance use are misperceived. The accuracy of perceived norms about khat and cannabis use in Uganda have not previously been described.

Methods: We conducted a population-based study targeting all resident adults across eight villages in southwestern Uganda. Personal khat and/or cannabis use frequency was based on self-report. We measured perceived norms about substance use by eliciting individuals' perceptions about how often most other adult men and most other adult women in their villages used these substances. We compared perceived norms to aggregated village rates of use to assess the extent to which norms were misperceived. We used multivariable Poisson regression to estimate correlates of misperceived norms.

Results: Among 1626 participants (91% response rate), only 29 men (4%) and 9 women (1%) reported any lifetime use of khat and/or cannabis. However, 695 participants (43%) did not think lifetime abstinence was the norm among men in their villages, and 256 participants (16%) did not think lifetime abstinence was the norm among women. Moreover, 219 participants (13%) incorrectly believed most men in their village regularly used khat and/or cannabis (4 times per week). Misperceived norms were present across subgroups and were correlated with larger social networks, symptoms of depression, loneliness, and younger age.

Conclusion: In this study of all adults across 8 villages in rural Uganda, many participants misperceived norms about khat and/or cannabis use. Providing accurate information about prevailing norms in the local population may help prevent initiation of khat and/or cannabis use among adults in this context.

Keywords

social norms; descriptive norms; peer norms; social networks; substance use; marijuana; drugs; sub-Saharan Africa

INTRODUCTION

The global burden of substance use disorders is rising in low- and middle-income countries (Whiteford et al., 2013), and is estimated to increase by 130% in sub-Saharan Africa by 2050 (Charlson, Diminic, Lund, Degenhardt & Whiteford, 2014). The availability of treatment and support to address drug use, however, is limited, especially in sub-Saharan Africa and in rural areas (Jaguga & Kwobah, 2020; UN Office on Drugs and Crime, 2018). Additionally, pervasive stigma associated with mental health and substance use contributes to great suffering and further undermines treatment seeking for drug use and mental disorders in this context (McCann, Renzaho, Mugavin & Lubman, 2018; Rasmussen et al., 2019; Sorsdahl, Stein & Myers, 2012). Thus, interventions that prevent substance use initiation are needed in places like Uganda, where resources for mental health and behavioral health systems are scarce.

Emerging literature from sub-Saharan Africa suggests that adults tend to overestimate the prevalence of health risk behaviors among peers and misperceive most others to engage in health risk behaviors when in reality most do not (Carey et al., 2011; Eggers et al., 2017; Ganz, Neville & Ward, 2017; Ganz, Neville, Kassanje & Ward, 2020; Hill et al., 2018; Perkins et al., 2021, 2019; Perkins, Nyakato, Kakuhikire, Mbabazi, et al., 2018). These studies also find that these misperceived norms may affect personal health and health risk behavior. This growing body of evidence builds on previously published studies from high-income countries consistently finding that youth and young adults often misperceive most peers to engage in harmful substance use when in reality they do not (Perkins, 2014), and that these misperceptions influence both substance use intentions and use behaviors (Blevins et al., 2018; D'Amico & McCarthy, 2006; Elliott & Carey, 2012; Olds et al., 2005; Perkins & Perkins, 2021). Moreover, many studies have found that correcting misperceptions about peer norms by providing accurate information about local norms reduces both continuing risk behavior and risk behavior uptake (Bewick et al., 2013; DeJong et al., 2006; Dempsey, McAlaney, & Bewick, 2018; McAlaney et al., 2011; Miller & Prentice, 2016; Perkins & Perkins, 2018; Prentice, 2018). No studies, however, have assessed perceived norms about drug use among adults in sub-Saharan Africa nor compared perceived norms to population rates of actual use.

In East Africa, substance use includes chewing khat (a plant native to Ethiopia that acts as a stimulant) and smoking cannabis (Beckerleg, 2010). Khat use has been associated with dental, cardiovascular, gastrointestinal, hepatological, and neurocognitive problems and

psychotic symptoms (al'Absi et al., 2013; Al-Habori, 2005; Colzato et al., 2011; Ongeru et al., 2019) while extensive cannabis use has been negatively associated with cannabis use disorder, brain development, mental illness, professional performance, lifetime achievement, lifetime satisfaction, memory, and motor coordination (Volkow et al., 2014). Reports about drug use in Uganda and more broadly in sub-Saharan Africa do not indicate the extent of khat and cannabis use in the general adult population (Degenhardt et al., 2011; Odenwald et al., 2021). However, studies find harmful substance use in specific sub-populations such as adolescents (Abbo et al., 2016), psychiatric patients (Awuzu et al., 2014), young people living in informal settlements (Ssekamatte et al., 2020), and occupational groups at high risk for HIV (Kuteesa et al., 2019). Additionally, a qualitative study of khat traders, government officials, health workers, the police, and NGO workers in western Uganda found that people believed khat use had become widespread across Uganda (Beckerleg, 2010). Another qualitative study in Uganda highlighted reports that people who currently inject drugs reported using non-injecting drugs first (e.g., smoking cannabis) (Baluku & Wamala, 2019).

Extensive debates about regulation and law enforcement in reaction to substance use concerns have a long history in Africa (Carrier & Klantschnig, 2020). In addition, news outlets and other media sources often highlight Uganda's current challenges with drug use (Abet, 2021; Kagenda, 2014; Kasirye, 2019; Nantume, 2020). Media reports focused on risk behaviors and substance use availability often portray risk behaviors to be more common than they are in reality (Davis et al., 2019; Elmore et al., 2017; Perkins & Perkins, 2018). This kind of exaggerated emphasis or purposeful sensationalism by news media, social media outlets, and government officials may also occur in East Africa, and potentially contribute to perceptions that harmful substance use is much more common than is true.

In this study, we use the term "perceived norms" to refer to individuals' beliefs about how most persons within a social referent group behave; we use the term "misperceived norms" to refer to these beliefs when incorrect. Assessing the extent of misperceived norms about khat and cannabis use among the general adult population, and any correlates of misperception, could inform the design of proactive messaging to prevent initiation of use among those who do not consume these drugs and reduce frequency of use among those who currently consume khat and/or cannabis. Thus, in this study, we analyzed data from adults across eight villages in a rural region of southwest Uganda to assess the accuracy and correlates of perceived norms about khat and cannabis use among men and women. This analysis was enabled by the population-based study design, which uniquely permits direct comparisons of perceived norms of use against actual population rates of use.

METHODS

Study setting

Study investigators chose a bounded study setting in a rural part of Rwampara District in southwest Uganda due to its tractable population size and geographic terrain, the local leaders' welcoming of the study team, the relatively low presence of non-governmental organizations, and the similarity to rural contexts across Uganda and sub-Saharan Africa in general. Specifically, 75% of people in Uganda (and the majority in many other sub-Saharan

African countries) live in outlying rural areas that are similar to this context where the local economy features agricultural and small-scale trading and enterprise, access to electricity and piped clean water is rare, and household food and water insecurity are common (Mushavi et al., 2020; Perkins, Nyakato, Kakuhikire, Tsai, et al., 2018; Tsai et al., 2016; Uganda Bureau of Statistics, 2018). The sociodemographic characteristics of the study context are also similar to national sociodemographic characteristics. For example, the adult population contains a large portion of persons who are aged 18–30 years, most adults are married, and most adults have never enrolled in or never completed secondary education (Uganda Bureau of Statistics, 2021; Uganda Bureau of Statistics, 2018; World Bank Group, 2021). In contrast, the proportion of people who are Muslim in these villages is less than the national prevalence. The chosen study setting is about 260 km southwest of Kampala, the largest city in Uganda, and about 20 km from the closest commercial hub, Mbarara Town, which had an estimated population of 195,013 in 2014 (Uganda Bureau of Statistics, 2014). It contains eight small villages, which when grouped together are referred to as a parish. A parish is a local governance subunit, which in rural areas in Uganda often contain several villages.

Study population

The cross-sectional data used for the present study were collected as part of a population-based network study targeting all permanent residents aged 18 years and older across these eight villages (Takada et al., 2019). The parent study was designed to measure the prevalence of numerous health-related outcomes, typical local norms for a variety of behaviors and attitudes, and existing social connections between all adults within the parish. During the parent study data collection period, the parish contained a total of 1795 permanent resident adults who were eligible for study participation. Parishes in western Uganda had a median of 1985 persons aged 18+ years (interquartile range [IQR]: 1627–2367 persons) in 2014 (Uganda Bureau of Statistics, 2021).

Data collection procedure

Prior to starting study activities, the study team held several community sensitization meetings in collaboration with local leaders to inform residents about the study and elicit feedback about the study design (Kakuhikire et al., 2021). The parent study included a census enumerating all residents aged 18 years and older across these villages. From 2016 to 2018, using the census that was continuously updated by the study team, research assistants searched for and approached each eligible adult to invite them to participate in the study. After completing study screening, each eligible adult was asked to provide written informed consent (or a thumbprint with witness confirmation) before participating in the study interview. The introduction, informed consent process, and interview typically took place at the participants' homes.

Research assistants administered the interview survey to participants in the local language, Runyankore, using a computer assisted tool. Interviews lasted about an hour and covered health and well-being topics as well as social network ties between people. The survey questions had been piloted and translated (English-Runyankore) in an iterative process.

Ethical approval was granted by the Partners Human Research Committee at Massachusetts General Hospital, and the Research Ethics Committee at Mbarara University of Science and Technology. Clearance was also obtained from the Uganda National Council of Science and Technology and the Research Secretariat in the Office of the President of the Republic of Uganda. The Vanderbilt Human Research Protections Program approved secondary data analyses.

Measures

Based on our knowledge of the local context, we anticipated any lifetime use of khat and any lifetime use of cannabis to be rare in the study population. For this reason, a single combined question was used in the survey to elicit use. Participants were first asked if they had ever chewed khat and/or smoked cannabis during their lifetime. If yes, then they were asked when their last use had occurred (within the past year, 1–5 years prior to interview, more than 5 years prior, or never). If participants reported past-year use, then they received a follow-up question querying frequency of use (once a month or less, 2–4 times per month, 2–3 times per week, or 4 times per week). Lifetime abstinence was defined as reporting never having chewed khat and/or smoked cannabis in one's lifetime. Occasional use was defined as having chewed khat and/or smoked cannabis within the past year but < 4 times per week. Frequent use was defined as having chewed khat and/or smoked cannabis 4 times per week.

Prior studies have assessed perceived norms by adapting questions about self-reported behavior to elicit perceptions about the behaviors engaged in by most others within a social referent group (Perkins et al., 2019; Perkins, Nyakato, Kakuhikire, Mbabazi, et al., 2018; Perkins, Perkins, Jurinsky & Craig, 2019; Rasmussen et al., 2019; Tsai et al., 2017). Following this precedent, we created two questions adapted from the personal consumption questions: participants were asked how often during the past 12 months most adult men in their village chewed khat and/or smoked cannabis and how often during the past 12 months most adult women in their village chewed khat and/or smoked cannabis. We specified most other men and women in the village as the respective social referent groups (Shibutani, 1955) for two reasons. First, pilot testing suggested that participants easily comprehended these descriptions and identified with these local population groups. Additionally, choosing the social referent groups to consist of the same persons as the targeted study population meant that we could directly compare the aggregated rates of personal substance use among participants in these social referent groups to participants' perceptions about substance use norms for these same groups. This comparison technique allowed us to assess whether or not individuals misperceived local substance use norms (Perkins et al., 2019; Perkins, Nyakato, Kakuhikire, Mbabazi, et al., 2018).

Response categories for the perception question paralleled the response categories for the personal behavior question (never in their lives, never in the past 12 months, once a month or less, 2–4 times per month, 2–3 times per week, or 4 times per week) and included a 'do not know' option. Comparing these responses to *a priori* evidence that any use would not be the norm among most men and most women in this context (confirmed by aggregates of self-reported use in this study), we created an additional binary variable. Participants who

thought that most other men in their villages had used khat and/or cannabis in the past or use khat and/or cannabis currently were classified as participants who misperceived the norm. They did not believe, contrary to fact, that lifetime abstinence was the norm. In contrast, participants who thought that most other men in their village had never used khat and/or cannabis in their lives were classified as accurately perceiving the norm. They believed correctly that lifetime abstinence was the norm. Participants who reported that they ‘do not know’ the norm represented a separate group excluded from this variable. A parallel binary variable was created based on responses about perceived khat and/or cannabis use among women.

Five name generator questions elicited the names of other adult parish residents with whom a participant directly interacted in relation to social time, food exchange, financial discussions, health discussions, and emotional support (Marsden, 1990; Perkins et al., 2015; Takada et al., 2019). Another question elicited the names of any spouses. All responses represented out-going personal network ties. They were collapsed across the six name generator questions (Marin & Hampton, 2007). Information was also available about incoming personal network ties because all the eligible nominations were also eligible study participants due to the sociocentric network design of the study, which targets everyone within a specific boundary (Marsden, 1990). Thus, a variable representing the number of unique direct ties to a participant was created regardless of direction (i.e., personal network size (Marsden, 2002)). The count excluded the few network ties to people who did not participate in the study. Additionally, data self-reported by participants within a participant’s personal network were linked to the index participant. Thus, we created a binary variable indicating whether or not the participant had at least one personal network tie to someone in these villages who reported using khat and/or cannabis at some point in their lifetime.

Demographic variables included age, sex, and religion. Socioeconomic variables included primary school completion and household asset wealth quintile (Smith et al., 2020). Social integration variables included marital status, personal network size, and a 3-item loneliness scale ranging from 0–9, which assessed a participant’s subjective experiences of connectedness (Hughes et al., 2004). Health variables included HIV status, positive symptom screen for depression (measured using a locally adapted version of the Hopkins Symptom Checklist (Ashaba et al., 2018), and any alcohol consumption in the past 12 months. We also included a variable indicating ‘any childhood experience of living with an adult who consumed alcohol excessively or misused drugs.’

Statistical analysis

We tabulated perceptions of khat and/or cannabis use norms across demographic, socioeconomic, social, and health categories. We then fitted two multivariable Poisson regression models with cluster-correlated robust estimates of variance to adjust for clustering at the village level. The two separate outcomes were misperceiving the norm about use among men (vs. accurately perceiving the norm among men) and misperceiving the norm about use among women (vs. accurately perceiving the norm). With a binary dependent variable, the modified Poisson regression yields estimated incidence rate ratios that can be interpreted straightforwardly as relative risk ratios (Zou, 2004). We conducted two

sensitivity analyses. First, we re-fit the models excluding the 38 participants who reported any khat and/or cannabis use. Second, we categorized participants who reported that they 'did not know' the norm as part of the 'misperceiving the norm' category for the two outcome variables. We then re-fit the regression models using these alternative outcome variables. We did so in light of previous findings from this literature showing that 'do not know' responses can be interpreted as misperceiving the norm (Perkins, Nyakato, Kakuhikire, Mbabazi, et al., 2018).

RESULTS

Of the 1795 eligible adult residents, 1626 participated in the survey (>91% response rate) with between 57 and 117 men and 70 and 139 women per village. Mean age was 40 years (standard deviation = 17). Most participants identified as Protestant (1130 [70%]) or Catholic (385 [24%]), most participants (975 [60%]) had completed primary school or more, and most (993 [61%]) were married/cohabiting. The median personal network size was 8 (interquartile range [IQR] = 5–11). The median number of network ties that were excluded from the personal network because they represented ties to study-eligible people who did not participate in the study was 0 (IQR = 0–1).

In terms of personal use, 29 (4%) men reported chewing khat/smoking cannabis at least once in their lifetime. Of these 29 men, 14 reported use more than 5 years ago, 9 reported use 1 to 5 years ago, and 6 reported use in the last 12 months. Four reported occasional use and two (<1%) reported frequent use. Among women, 9 (1%) reported chewing khat/smoking cannabis at least once in their lifetime. Of these 9 women, 3 reported use more than 5 years ago, 3 reported use 1 to 5 years ago, and 3 reported use in the last 12 months. Two reported occasional use and one (<1%) reported frequent use.

Overall, more than 90% of men in every village and more than 95% of women in every village reported personal lifetime abstinence from khat and/or cannabis. Additionally, 1367 (84%) participants did not have any personal network ties to someone who reported any lifetime consumption of khat and/or cannabis.

Accuracy of perceived norms about khat and cannabis use

In terms of perceptions about khat and/or cannabis use among men in one's village, 554 (34%) misperceived the norm. Specifically, 219 (13%) participants incorrectly believed most adult men in their villages chewed khat/smoked cannabis frequently, 170 (10%) incorrectly believed most men chewed khat/smoked cannabis occasionally, and 165 (10%) incorrectly believed most men had chewed khat/smoked cannabis at least once in the past, but had done so more than a year ago. An additional 141 participants (9%) reported they did not know the frequency of use among men in their villages.

In terms of perceptions about the khat and/or cannabis use among women in one's village, 142 (9%) misperceived the norm. Specifically, 16 (1%) participants incorrectly believed most adult women in their villages chewed khat/smoked cannabis frequently, 19 (1%) incorrectly believed most women chewed khat/smoked cannabis occasionally, and 107 (7%) incorrectly believed most women had chewed khat/smoked cannabis at least once in the past,

but had done so more than a year ago. An additional 114 (7%) reported they did not know the frequency of use among women in their villages.

Overall, 38–66% of participants per sociodemographic subgroup did not know that lifetime abstinence was the khat and/or cannabis use norm among men (i.e., they either misperceived the norm or reported not knowing the norm) and 11–50% did not know that lifetime abstinence was the khat and/or cannabis use norm among women (Table 1). For example, 46% of participants aged 18–29 years did not think that lifetime abstinence from khat and/or cannabis was the norm among men, and 16% in this age group did not think that lifetime abstinence was the norm among women.

Correlates of misperceived norms about khat and cannabis use

In the multivariable Poisson regression models, having symptoms indicative of depression was associated with misperceiving the men's norm for khat and/or cannabis use (adjusted relative risk [aRR]= 1.26; 95% confidence interval (CI): 1.07–1.49; P=0.006) and with misperceiving the women's norm for khat and/or cannabis use (aRR=1.56; 95% CI: 1.11–2.19; P=0.011). While larger personal network size was also associated with misperceiving both norms (Table 2), having a personal network tie who reported personally chewing khat and/or smoking cannabis at least once in their lifetime was not associated with misperceiving the norms. Participants who had a childhood experience of living with an adult who consumed alcohol excessively or misused drugs were less likely to misperceive both the men's norm (aRR= 0.85; 95% CI: 0.73–0.99; P=0.041) and the women's norm (aRR = 0.61; 95% CI: 0.47–0.80; P<0.001). Loneliness was positively associated with misperceiving the men's norm (aRR=1.09; 95% CI: 1.06–1.12; P<0.001) while age was negatively associated with misperceiving the men's norm. The only other variable associated with misperceiving the women's norm was household wealth quintile, with the poorest households less likely to misperceive the norm than the least poor households. Sensitivity analyses indicated that patterns did not substantively change when participants who reported consuming khat and/or cannabis in their lifetime were excluded from the models (Supplemental Table 1) or when respondents who reported not knowing the norms were included in the models (Supplemental Table 2).

DISCUSSION

This study on the accuracy of perceived norms about khat and cannabis use among adults in rural Uganda offers two key findings. First, although lifetime abstinence was actually the norm among both men and women across eight villages, almost one-quarter of all adults incorrectly believed that *most* men in their village currently used khat and/or cannabis. Moreover, 13% of adults misperceived the norm among men as using at least one of these substances 4 or more times per week. Overestimation of use also existed about women's typical use. These findings build on prior findings of misperceived substance use norms among adolescents and young adults within educational contexts in high-income countries (Perkins & Perkins, 2018; Perkins, Perkins, Jurinsky & Craig, 2019) and of overestimated alcohol use norms in sub-Saharan Africa (Carey et al., 2011; Perkins et al., 2021).

This information fills a gap in knowledge about both actual use rates and perceived use rates in the general population. While it is possible that actual use was under-reported, collecting objective biomarker indicators of use (e.g., 9-tetrahydrocannabinolic acid (Boykan et al., 2019)) would be unlikely to shift our estimates of population use rates to such a degree as to establish that occasional or frequent use was actually the village norm among men and among women. Lifetime personal use would have to have been under-reported by a factor of 5 to 10 across different villages in this study for any frequency of lifetime use to be the actual population norm. While possible, we believe this degree of under-reporting would be unlikely. In terms of perceived norm assessment, studies on other topics from this context have found that many individuals misperceive local norms even when other types of perception responses are elicited (e.g., asking them to indicate a more narrow categorical option representing the population rate of behavior or a specific percentage) (Perkins, Nyakato, Kakuhikire, Mbabazi, et al., 2018; Tsai et al., 2017). Additionally, even if most individuals had been thinking about personal network norms instead of village norms when answering the perception questions, these participants would still be classified as misperceiving khat and/or cannabis use norms because few direct ties in their personal networks reported any lifetime khat and/or cannabis consumption.

The United Nation's Sustainable Development Goals includes substance use prevention as a priority. Goal 3.5 is to "strengthen the prevention and treatment of substance abuse, including narcotic drug abuse and harmful use of alcohol (World Health Organization, 2016)." Although current rates of use are low in this study, rates of substance use are projected to increase in sub-Saharan Africa generally (Charlson et al., 2014). This increase will further strain the already stretched health systems and contribute to reduced economic wellbeing and other health issues. Reducing misperceptions about typical substance use patterns among relevant peer groups by disseminating information about accurate local norms such as 'Most men aged 18–30 in this village never chew khat/smoke cannabis' could be part of a proactive prevention intervention in this context (Miller & Prentice, 2016; Perkins, 2003). Individuals with corrected perceptions may be both less likely to initiate use and more likely to speak up and discourage initiation of use by others.

This study also identified people with probable depression, reported loneliness, larger social networks, and younger age as more likely to misperceive these norms. Correcting misperceived norms among those with probable depression might help prevent such persons from substance use given that substance use and depression often co-occur (Kiene et al., 2017; Swendsen & Merikangas, 2000). Moreover, individuals with poor mental health who misperceive health risk behaviors as common are more likely to engage in risk behavior themselves (Hill et al., 2018; Kenney et al., 2018; Pedersen et al., 2013).

Substance use prevention interventions in sub-Saharan Africa targeting youth and young adults are also needed (Saba et al., 2021). More than 13 million 15–19 year-olds in sub-Saharan Africa had used cannabis at least once in 2015 (Degenhardt et al., 2016). Including health-promoting norm messages about actual norms among young adults (ostensible role models) as part of adolescent prevention programs might help prevent initiation of use at early ages. Additionally, programs with young people in this context could elicit guided discussion about statistics such as 'most single men in your village have not chewed khat

nor smoked cannabis in the past 12 months or ever,’ or ‘more than 90% of men and women aged 18 to 30 who live in this parish do not use khat or cannabis.’ Selectively engaging participants as a targeted peer group about their norm misperceptions helps facilitate social reality testing and the cognitive process that leads to corrected misperceptions (Prentice, 2018; Prentice & Paluck, 2020).

The present results may be generalizable to many rural villages in East Africa and elsewhere in sub-Saharan Africa. The burden associated with substance use even when the substance use prevalence is low presents challenges for these regions with significant stigma and very limited health care infrastructure (Kamenderi et al., 2020). Moreover, even in contexts with greater access to substances or where rates of use are higher, people may still overestimate typical rates of use by most others in their social reference groups (Perkins, 2007; Perkins et al., 2005; Perkins et al., 1999). For example, even in Ethiopia where production and use of khat in the general population is much higher than in Uganda, lifetime use is not the norm at the national level (Cochrane & O’Regan, 2016; Haile & Lakew, 2015). Future research is needed to determine whether correcting misperceived norms about khat and/or cannabis use would influence khat and/or cannabis use initiation among adults in rural Uganda and similar contexts.

Conclusion

In this study of khat and/or cannabis use among all adults across eight villages in rural Uganda, many adults incorrectly believed that most of the men and women in their villages currently use khat and/or cannabis, with some individuals misperceiving most men to use these substances four or more times per week. Substance use in sub-Saharan Africa is expected to rise, and resources to address drug use and associated mental illness burdens are limited. Thus, interventions to prevent substance use are needed. Communicating accurate local norms about substance use (e.g., “cannabis use by single young men is infrequent and rare in your village”) may help reduce misperceived norms. Further research is warranted on whether correcting these norm misperceptions prevents initiation of use in this context.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

We thank the HopeNet cohort study participants, without whom this research would not be possible. We also thank members of the HopeNet study team for research assistance; in addition to the named study authors, HopeNet team members who contributed to data collection and/or study administration during all or any part of the study were as follows: Phionah Ahereza, Owen Alleluya, Dickson Beinomugisha, Patrick Gumisiriza, Clare Kamagara, Justus Kananura, Allen Kiconco, Patrick Lukwago Muleke, Rumbidzai Mushavi, Elijah Musinguzi, Elizabeth Namara, Immaculate Ninsiima, Moran Owembabazi, Mellon Tayebwa, and Dagmar Vo echovská. We also thank Roger Hofmann of West Portal Software Corporation (San Francisco, CA, USA), for developing and customizing the Computer Assisted Survey Information Collection Builder software program used to collect the survey and social network data.

Funding: This work was supported by Friends of a Healthy Uganda and U.S. National Institutes of Health (NIH) R01MH113494. JMP acknowledges salary support from NIH K01MH115811.

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Table 1.

Misperceptions of khat and/or cannabis use norms among men and women across all adults in eight villages in Rwampara District, southwest Uganda (N = 1626).

	Study Population		Misperceived most men to have used or currently use khat and/or cannabis		Reported not knowing the norm about use among men		Misperceived most women to have used or currently use khat and/or cannabis		Reported not knowing the norm about use among women	
	N	(%)	n	(%)	n	(%)	n	(%)	n	(%)
Total	1626	(100%)	554	(34%)	141	(9%)	142	(9%)	114	(7%)
Sex										
Male	719	(44%)	248	(34%)	39	(5%)	72	(10%)	37	(5%)
Female	907	(56%)	306	(34%)	102	(11%)	70	(8%)	77	(8%)
Age										
18–29 years	533	(33%)	193	(36%)	54	(10%)	42	(8%)	43	(8%)
30–39 years	364	(23%)	131	(36%)	27	(7%)	30	(8%)	22	(6%)
40–49 years	292	(18%)	102	(35%)	25	(9%)	29	(10%)	18	(6%)
50+ years	413	(26%)	123	(30%)	31	(8%)	40	(10%)	27	(7%)
Religion										
Protestant	1130	(70%)	396	(35%)	100	(9%)	98	(9%)	75	(7%)
Catholic	385	(24%)	114	(30%)	30	(8%)	37	(10%)	28	(7%)
Muslim	19	(1%)	10	(53%)	2	(11%)	3	(16%)	2	(11%)
Born again Pentecostal	86	(5%)	32	(37%)	7	(8%)	3	(3%)	7	(8%)
Other	6	(0%)	2	(33%)	2	(33%)	1	(17%)	2	(33%)
Marital status										
Not married/ cohabiting	632	(39%)	203	(32%)	75	(12%)	53	(8%)	63	(10%)
Married/ cohabiting as if married	993	(61%)	351	(35%)	66	(7%)	89	(9%)	51	(5%)
Education										
None/ some primary	651	(40%)	215	(33%)	52	(8%)	56	(9%)	38	(6%)
Completed primary education or more	975	(60%)	339	(35%)	89	(9%)	86	(9%)	76	(8%)
Household asset wealth										
1st quintile (poorest)	326	(20%)	110	(34%)	27	(8%)	23	(7%)	17	(5%)
2nd quintile	324	(20%)	112	(35%)	24	(7%)	27	(8%)	21	(6%)

	Study Population		Misperceived most men to have used or currently use khat and/or cannabis		Reported not knowing the norm about use among men		Misperceived most women to have used or currently use khat and/or cannabis		Reported not knowing the norm about use among women	
	N	(%)	n	(%)	n	(%)	n	(%)	n	(%)
3rd quintile	324	(20%)	108	(33%)	27	(8%)	24	(7%)	23	(7%)
4th quintile	326	(20%)	104	(32%)	27	(8%)	29	(9%)	20	(6%)
5th quintile (least poor)	326	(20%)	120	(37%)	36	(11%)	39	(12%)	33	(10%)
Depression screening										
No indicators of depression	1295	(80%)	410	(32%)	113	(9%)	104	(8%)	92	(7%)
Probable depression	331	(20%)	144	(44%)	28	(8%)	38	(11%)	22	(7%)
Self-reported HIV serostatus										
HIV negative/unknown HIV status	1459	(90%)	488	(33%)	131	(9%)	128	(9%)	106	(7%)
HIV positive	167	(10%)	66	(40%)	10	(6%)	14	(8%)	8	(5%)
Had childhood exposure to adult who consumed alcohol excessively or who misused drugs										
No	698	(43%)	251	(36%)	79	(11%)	77	(11%)	57	(8%)
Yes	926	(57%)	303	(33%)	61	(7%)	65	(7%)	56	(6%)
Had consumed alcohol in past 12 months										
No	1133	(70%)	384	(34%)	115	(10%)	99	(9%)	95	(8%)
Yes	492	(30%)	170	(35%)	25	(5%)	43	(9%)	19	(4%)
Loneliness index										
0 (Least lonely)	999	(62%)	292	(29%)	87	(9%)	86	(9%)	69	(7%)
1-2	409	(25%)	173	(42%)	37	(9%)	33	(8%)	31	(8%)
3+	214	(13%)	88	(41%)	16	(7%)	22	(10%)	14	(7%)
Personal network size										
0-4 adults	342	(21%)	112	(33%)	39	(11%)	25	(7%)	32	(9%)
5-11 adults	912	(56%)	293	(32%)	77	(8%)	78	(9%)	62	(7%)
12+ adults	372	(23%)	149	(40%)	25	(7%)	39	(10%)	20	(5%)
Exposure to khat and/or cannabis use by men and women in personal network										
No direct ties to anyone who reported having ever used khat and/or cannabis in his or her lifetime	1367	(84%)	450	(33%)	124	(9%)	114	(8%)	97	(7%)

	Study Population	Misperceived most men to have used or currently use khat and/or cannabis	Reported not knowing the norm about use among men	Misperceived most women to have used or currently use khat and/or cannabis	Reported not knowing the norm about use among women
	N (%)	n (%)	n (%)	n (%)	n (%)
At least one direct tie to someone having used khat and/or cannabis in his or her lifetime	259 (16%)	104 (40%)	17 (7%)	28 (11%)	17 (7%)

Note: Misperceiving the norm was defined as misperceiving most men / most women in one's own village to have used or currently use khat and/or cannabis even though personal lifetime abstinence was reported by most men and most women in all villages.

Table 2.

Modified Poisson regression models estimating associations between misperceiving the norm about khat and/or cannabis use and sociodemographic factors among all adults (excluding participants who reported that they did not know the norms) across eight villages in Rwampara District, southwest Uganda.

	Misperceived the norm about khat and/or cannabis use among men (n = 1459)		Misperceived the norm about khat and/or cannabis use among women (n = 1483)			
	aRR	(95% CI)	p-value	aRR	(95% CI)	p-value
Sex (women vs. men)	1.02	(0.82 – 1.27)	0.858	0.75	(0.54 – 1.05)	0.094
Age	0.99	(0.99 – 1.00)	<0.001	1.00	(0.99 – 1.01)	0.819
Religion						
Protestant	REF			REF		
Catholic	0.83	(0.65 – 1.06)	0.140	1.14	(0.63 – 2.07)	0.671
Muslim	1.49	(1.00 – 2.21)	0.048	1.96	(0.58 – 6.66)	0.282
Other	0.99	(0.58 – 1.69)	0.960	0.50	(0.11 – 2.22)	0.361
Married/cohabiting vs. other	1.06	(0.89 – 1.26)	0.510	0.95	(0.59 – 1.52)	0.822
Completed primary education vs. did not	0.99	(0.83 – 1.18)	0.916	0.94	(0.65 – 1.37)	0.765
Household asset wealth						
1st quintile (poorest)	0.87	(0.70 – 1.08)	0.208	0.61	(0.40 – 0.94)	0.026
2nd quintile	0.89	(0.72 – 1.09)	0.259	0.74	(0.36 – 1.50)	0.402
3rd quintile	0.85	(0.64 – 1.12)	0.256	0.62	(0.33 – 1.17)	0.141
4th quintile	0.82	(0.67 – 0.99)	0.037	0.69	(0.43 – 1.10)	0.118
5th quintile (least poor)	REF			REF		
Symptoms indicate probable depression (vs. not)	1.26	(1.07 – 1.49)	0.006	1.56	(1.11 – 2.19)	0.011
Self-reported HIV serostatus						
HIV negative/unknown HIV status	REF			REF		
HIV positive	1.09	(0.84 – 1.43)	0.503	0.87	(0.53 – 1.42)	0.569
Had childhood exposure to adult who consumed alcohol excessively or who misused drugs vs. did not	0.85	(0.73 – 0.99)	0.041	0.61	(0.47 – 0.80)	<0.001
Has consumed alcohol in past 12 months vs. had not	1.00	(0.90 – 1.12)	0.962	0.84	(0.55 – 1.30)	0.445
Loneliness	1.09	(1.06 – 1.12)	<0.001	1.05	(0.97 – 1.14)	0.218
Personal network size	1.03	(1.02 – 1.03)	<0.001	1.04	(1.02 – 1.07)	0.001

	Misperceived the norm about khat and/or cannabis use among men (n = 1459)		Misperceived the norm about khat and/or cannabis use among women (n = 1483)			
	aRR	(95% CI)	p-value	aRR	(95% CI)	p-value
Exposure to khat and/or cannabis use by men and women in personal network						
No direct ties to anyone who reported having ever used khat and/or cannabis in his or her lifetime	REF			REF		
At least one direct tie to someone having used khat and/or cannabis in his or her lifetime	1.09	(0.91 – 1.31)	0.346	1.13	(0.73 – 1.74)	0.595

Notes: aRR = Adjusted relative risk ratio. CI = Confidence Interval. The model used cluster-correlated robust standard errors to account for clustering of observations within villages. Misperceiving the norm was defined as misperceiving most men / most women in one's own village to have used or currently use khat and/or cannabis even though personal lifetime abstinence was reported by most men and most women in all villages.