



# The Intersection of Alcohol Use, Gender Based Violence and HIV: Empirical Findings among Disadvantaged Service-Seeking Youth in Kampala, Uganda

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Accepted: 6 May 2021 / Published online: 14 May 2021

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## Abstract

The SAVA syndemic is frequently used to describe the co-occurrence of HIV, gender-based violence (GBV), and substance use. In this study we determine the extent to which the typologies of the SAVA syndemic can be described and utilized for intervention strategies among youth living in the slums of Kampala, Uganda. We analyzed the “Kampala Youth Survey 2014,” a cross-sectional survey conducted in the spring of 2014, consisting of a convenience sample ( $N = 1134$ ) of urban youth (12–18 years of age). Descriptive statistics were computed for hypothesized risk factors and demographic variables among the 8 typologies of GBV, HIV, and alcohol use. Multinomial logistic regression was conducted to determine statistically significant correlates with each typology. The overall prevalence of GBV was 31.7%, whereas the overall prevalence of alcohol use in the past 12 months was 31.2%. HIV-Positive youth comprised 10.5% of the total sample. Females comprised the majority of the typology with no SAVA components compared to males (55% vs. 45%, respectively), as well as the SAVA syndemic typology (GBV + HIV + ALC +) (58% vs. 42%, respectively). Engaging in commercial sex work (36%), witnessing parental abuse (61%), and depression/suicidality (81%) were all highly prevalent among youth in the SAVA syndemic typology (GBV, HIV, and alcohol use). Sex work and observing parental abuse were associated with the SAVA syndemic typology in the multivariable model. In our study, alcohol rarely coexisted without GBV among the typologies. Therefore, prevention efforts including structural interventions may be particularly warranted in vulnerable populations to address alcohol use, which may directly or indirectly impact GBV and HIV.

**Keywords** Youth violence · Gender-based violence · Sexual violence · Substance use · Alcohol use · Youth risk behaviors · HIV/AIDS

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## Introduction

Sub-Saharan Africa is considered to have the largest burden of HIV/AIDS globally [1]. The HIV crisis is further complicated by co-occurring substance use and gender-based violence (GBV), commonly referred to as the Substance Abuse, Violence, and HIV/AIDS (SAVA) syndemic [2, 3]. A syndemic, as defined by Singer in 1994, is a “set of closely intertwined and mutual enhancing epidemics”. For context, another definition of syndemics often used in public health is “two or more afflictions, interacting synergistically, contributing to excess burden of disease in a population” and there are other definitions as well [2, 4]. The emphasis on the co-occurring or interacting factors are important because each exacerbates the conditions of the other health concerns. More specifically, in the case of the SAVA syndemic, GBV is a risk factor for, and a possible outcome, of both HIV and alcohol use [5] and the same can be said of alcohol use, the primary focus of interest in this paper. GBV typically comprises different types of violence directed at women and girls or directed at men and boys, including intimate partner violence (IPV) [5, 6] which is defined as physical, emotional, or sexual violence against a partner.

Many studies have evaluated the intersecting pathways which connect GBV, HIV, and substance use [2, 3, 5]. For example, the prevalence of IPV is nearly twice as high when substance use is involved. The relationship between IPV and HIV is bidirectional and includes the reduced ability to negotiate condom use, sexual coercion and sexual violence [7]. IPV can also be a consequence of revealing HIV status or presence of another sexually transmitted infection (STI) to a partner. Additionally, women and girls who use substances may have a higher risk of experiencing GBV and subsequently acquiring HIV [5].

Multiple risk factors have been associated with increased risk for experiencing the SAVA syndemic, including engaging in commercial sex work [5], depression [8], and being an orphan [8]. Commercial sex work is consistently linked to high rates of violence, HIV infection, and substance use [5, 9–12]. Additionally, there is a hypothesized bidirectional relationship between depression and the SAVA syndemic components [13–17]. Lastly, orphanhood is strongly associated with alcohol use and substance abuse more broadly [18, 19]. Through a lack of parental oversight, orphans may engage in risky sexual behaviors, potentially leading to HIV infection [20, 21]. Orphans are also more susceptible to GBV and violence in general [22]. In addition to orphanhood, adverse childhood experiences and exposure to violence increase the likelihood of experiencing violence later in adolescence and adulthood [23].

In Uganda, one of the countries likely highly affected by the SAVA syndemic, there is an estimated 1.5 million people

who are living with HIV/AIDS [24]. The HIV prevalence is higher among youth in Uganda [24]. Our research finds that among youth living in the slums of Kampala (ages 14–24), the HIV prevalence is 13% [12]. Among youth in the slums of Kampala, alcohol use has been reported as high as 34%, with an estimated 9% of youth initiating alcohol use prior to age 13 [25]. Reported instances of physical violence victimization (36%), physical violence perpetration (19%), and rape are also high among youth in these slums [25].

Youth living in the slums face many additional adversities that impact their health and contribute to their overall vulnerability to violence, such as food scarcity, poverty, and abuse and neglect [25, 26]. While there is a substantial literature on the syndemic of alcohol use, violence, and HIV in the United States, there are no studies to our knowledge that examine this syndemic among youth living in the slums of Kampala, Uganda. These youth face unique adversities which warrant investigation into the correlates and predictors of this syndemic among this population. The goal of this project was to specifically quantify the extent to which the patterns of the SAVA syndemic can be described among youth vulnerable to all of the SAVA components. Additionally, this study sought to determine correlates of the SAVA syndemic, to be utilized for future research and intervention planning.

## Methods

The current study is based on the “Kampala Youth Survey 2014”, a cross-sectional survey conducted in March and April of 2014 to quantify and examine high-risk behaviors and exposures, with a focus on alcohol use, sexual behaviors and HIV, in a convenience sample of urban youth, 12–18 years of age, living in the slums or on the streets of Kampala, Uganda, who were participating in Uganda Youth Development Link (UYDEL) drop-in centers for disadvantaged street and slum youth [27].

## Participants

Each social worker/peer educator received training on the study methodology each of the survey questions, as well as their translation into Luganda (local language), and how to recruit potential participants among attendants at their specific drop-in center.

Study participants were recruited through convenience sampling of the youth at each of six drop-in centers and the neighborhoods surrounding the UYDEL drop-in centers, primarily through word-of-mouth. Face-to-face interviews were conducted by social workers and peer educators employed by UYDEL with previous experience working with youth within the targeted drop-in centers and communities. Over

the two-week survey collection period, 1628 youth were approached for participating in the survey. Among these youth, 131 declined, yielding a participation rate of 92%. A total of 1497 surveys were collected, including 43 pilot cases. Three hundred and twenty (320) surveys were lost due to technical issues with the offline server, yielding 1134 completed surveys for the final analytic sample of youth between the ages of 12 and 18 years (44% boys, 56% girls). Participants were informed about the study and read the consent forms (or had it read to them) which provided information to help the person decide whether to participate in the research study. All participants provided verbal consent to participate in the study. Participation was limited to youth ages 12–18 years who presented in-person on the day of the field visit. There were no other exclusion criteria. Recruited youth received a small snack as incentive for participating in the survey. Institutional Review Board (IRB) approvals were obtained from the Georgia State University Institutional Review Board and the Uganda National Council for Science and Technology to conduct this study in Kampala.

### Training the UYDEL Staff

Interviewers received a one-day training, conducted by the GSU research team. All research staff were trained on the study protocol, recruitment procedures and survey administration. Additionally, Collaborative Institutional Training Initiative (CITI) certified staff were trained in the operation of the tablet computers that were used for data collection. They were also trained in monitoring the progress of data collection, collecting consent forms and ensuring tablets were charged and data uploaded. As part of the training, UYDEL interviewers pilot tested the tablets and the survey instrument with youth who were available at the training facility site. Staff were then debriefed on any issues that arose during the administrative process.

The Kampala Youth Survey 2014 was administered to the participants on Google Nexus 7 tablets using Qualtrics survey software. The use of tablets as an mHealth technology allowed for easier administration of the survey and streamlined data collection. Each interviewer was also assigned a tablet with a unique identifier to be used over the course of the survey administration. During training, interviewers were instructed to read the survey questions exactly as they appeared on the tablet screen, after obtaining consent from the participants. The tablets were programmed to notify the interviewers of any missed questions and they also processed skip patterns automatically for more accurate data collection.

## Measures

### Outcome- Typologies of Gender-Based Violence, HIV, and Alcohol Use

Participants were classified into 8 mutually exclusive categories, corresponding to all possible combinations of GBV, HIV, and alcohol use when each variable was dichotomized. These eight categories included the referent category (no GBV, no HIV, and no alcohol), the GBV only category (GBV, no HIV, and no alcohol), the alcohol only category (no GBV, no HIV, and alcohol), the HIV only category (no GBV, HIV, and no alcohol), the GBV and alcohol category without HIV, the GBV and HIV category without alcohol, the alcohol and HIV category without GBV, and the SAVA syndemic category (GBV, HIV, and alcohol).

GBV was operationalized to include both perpetrators and victims of GBV. A participant was classified as experiencing or initiating GBV if answered “yes” to any of the following: “In the past year, did your boyfriend/girlfriend hit, slap, or hurt you?”; “In the past year, did you hit, slap, or hurt your boyfriend/girlfriend?”; “In the past year, did you force your boyfriend/girlfriend to have sex with you?”.

Youth were classified as consuming alcohol if they reported having at least one drink in the past year by answering “yes” to the following: “Have you had a drink of alcohol in the past year?” We chose to use this broader definition of alcohol use due to the ages of participants (12 to 18 years of age) since the legal drinking age in Uganda is 18. As such, we chose this broad measure of at least one drink in the past year to try and include as many youth as possible who may be classified as past-year drinkers.

HIV was operationalized, as the other measures, as self-reported, and a participant was classified as HIV-positive if answered “yes” to “Have you been told by a doctor/nurse or HIV counselor that you have HIV?”.

### Risk Factors

A variety of risk and protective factors were included in the model based on empirical evidence to assess the association with the 8 typologies. Commercial sex work was operationalized as “Are you currently engaged in commercial sex work?” Observing parental abuse among the youth’s parents was operationalized as “Did you ever see or hear your parents beating each other?”.

Depressive and suicidal behaviors were both assessed in the past year. If the participant answered “yes” to any of the following three questions, we categorized them as having suicidal and depressive symptoms: “In the past year, did you ever feel so sad or hopeless almost every day for two

weeks or more in a row that you stopped doing your usual activities?"; "In the past year, did you ever think of hurting yourself?"; "In the past year, did you ever think of killing yourself?" These questions were taken from the Youth Risk Behavior Surveillance System (YRBS) and previously validated in other adolescent populations [28].

Parental living status was assessed as a risk factor. Participants could report that either both parents were alive, one parent was alive, or no parents were alive. Age (categorized) and binary sex were also included in the model as control covariates.

## Statistical Analyses

Prevalence was computed for GBV, HIV, and alcohol use. Descriptive statistics were computed for risk and protective factors among the 8 typologies of GBV, HIV, and alcohol use. Multinomial logistic regression analyses were used to assess the association of the risk factors for the 8 typologies, with the absence of all three variables constructed as the referent category. Multinomial logistic regression analyses were also performed to assess the comparisons of each typology to the other typologies. All data analyses were performed using SAS 9.2 (Cary, NC).

## Hypotheses

We hypothesized a priori that there is an association between risk factors (commercial sex work, observing parental abuse among parents, depressive and suicidal behaviors) and protective factors (parental living status) with the 7 typologies compared to the referent group, or the absence of GBV, HIV, and alcohol use.

## Results

The overall prevalence of HIV was 10%, GBV was 31% and alcohol use was 37% (Table 1). Among the eight possible combinations of GBV, HIV, and alcohol use, the majority of youth were classified as the referent category, or not having experienced any GBV, HIV, or alcohol use, 50% (Table 2). A relatively large portion of youth were also in the alcohol only typology (13%), alcohol and GBV without HIV typology (13%), and gender-based violence without alcohol and HIV typology (13%). The typologies with the lowest proportions were the GBV and HIV without alcohol use typology (2%) and the HIV and alcohol use without GBV typology (2%).

Females comprised most of the referent category ( $n = 553$ ) compared to males (55% vs. 45%, respectively) as well

as the SAVA syndemic typology (GBV + ALC + HIV +) (58% vs. 42%, respectively). Engaging in commercial sex work accounted for nearly 36% of the SAVA syndemic group, whereas those who engaged in commercial sex work only contributed 7% of the total sample of youth. Among those who engaged in commercial sex work, the majority (94%) were female. Observing parental abuse also had a higher prevalence across all combinations of GBV, HIV, and alcohol use compared to the referent group. Nearly half of youth classified in the referent group reported having both parents alive (46%), whereas a smaller percentage of youth classified in groups consisting of alcohol use reported having both parents alive (ranging from 11% to 33%). The majority of youth in the total sample reported experiencing at least one symptom of depression or suicidality (62%). The syndemic typology had almost double the proportion of youth who experienced depression and suicidality compared to the referent group (81% vs. 50%, respectively).

Multinomial logistic regression analyses of demographic characteristics and risk factor (i.e., age, commercial sex work, observing parental abuse, depression/suicidality, and parental living status) indicated that all were statistically significantly associated with self-reported SAVA with the exception of sex (Global Wald Test,  $p = 0.07$ ) (Table 2). Overall, depression and suicidality were mostly associated with classification in categories distinguished by GBV and alcohol use. For example, there was a strong association between depression and the combination of GBV and alcohol use without HIV (OR: 3.60; 95% CI: 1.95, 6.66). Engaging in commercial sex work was strongly associated with being classified in categories distinguished by alcohol use. Observing parental abuse was associated with various combinations of the syndemic, mostly categorized by GBV and alcohol use, as well as experiencing all three, alcohol, HIV, and GBV (AOR: 7.32; 95% CI: 3.09, 17.37). Youth whose parents were both alive experienced an overall protective effect against being classified in categories characterized by alcohol use. The strongest effects of age (17–18 years) were associated with groups characterized by GBV and alcohol use, as well as the combination of both without HIV. Additionally, the model estimated with all risk factors and no protective factors yielded the highest probabilities of belonging to categories characterized by alcohol use.

## Discussion

GBV, HIV, and alcohol use are all highly prevalent among youth living in the slums of Kampala, Uganda. Almost half of the youth in this study experienced at least one component of the SAVA syndemic. Perhaps of most importance, half of the HIV-positive youth experienced both GBV and alcohol use. As such, it is clear that even in this study of

**Table 1** The prevalence and characteristics of the 8 typologies of the gender-based violence, HIV, and alcohol use syndemic among youth living in the slums of Kampala ( $n = 1096$ )

Variable, $n$ (%)	HIV-981 (90%)				HIV + 115 (10%)			
	ALC-694 (63%)		ALC + 287 (26%)		ALC-60 (5%)		ALC + 55 (5%)	
	GBV-553 (50%)	GBV + 141 (13%)	GBV-141 (13%)	GBV + 146 (13%)	GBV-38 (4%) (2%)	GBV + 22 (2%)	GBV-19 (2%)	GBV + 36 (3%)
<b>Sex</b>								
Female, 614 (56%)	303 (49%)	85 (14%)	61 (10%)	98 (16%)	19 (3%)	18 (3%)	9 (1%)	21 (4%)
Male, 481 (44%)	249 (52%)	56 (12%)	80 (16%)	48 (10%)	19 (4%)	4 (1%)	10 (2%)	15 (3%)
<b>Age, <math>n</math> (%)</b>								
12–14, 219 (20%)	172 (79%)	13 (6%)	13 (6%)	4 (2%)	9 (4%)	4 (2%)	3 (1%)	1 (<1%)
15–16, 291 (27%)	153 (53%)	41 (14%)	36 (12%)	31 (11%)	14 (5%)	7 (2%)	2 (1%)	7 (2%)
17–18, 586 (54%)	228 (39%)	87 (15%)	92 (16%)	111 (19%)	15 (3%)	11 (2%)	14 (3%)	28 (5%)
<b>Sex work</b>								
Yes, 79 (7%)	3 (4%)	7 (9%)	6 (8%)	46 (58%)	0 (0%)	0 (0%)	4 (5%)	13 (16%)
No, 1013 (93%)	548 (54%)	133 (13%)	135 (13%)	99 (10%)	38 (4%)	22 (2%)	15 (1%)	23 (2%)
<b>Parents abused each other</b>								
Yes, 308 (28%)	109 (35%)	43 (14%)	44 (14%)	66 (22%)	10 (3%)	7 (2%)	7 (2%)	22 (7%)
No, 787 (72%)	443 (56%)	98 (12%)	97 (12%)	80 (10%)	28 (4%)	15 (2%)	12 (2%)	14 (2%)
<b>Parent status</b>								
0 parents alive, 241 (22%)	99 (41%)	33 (14%)	41 (17%)	42 (17%)	5 (2%)	3 (1%)	6 (2%)	12 (5%)
1 parent alive, 412 (38%)	197 (48%)	50 (12%)	53 (13%)	67 (16%)	11 (3%)	9 (2%)	11 (3%)	14 (3%)
2 parents alive, 443 (40%)	257 (58%)	58 (13%)	47 (11%)	37 (8%)	22 (5%)	10 (2%)	2 (<1%)	10 (2%)
<b>Depressive and/or suicidal behaviors</b>								
Yes, 673 (62%)	278 (41%)	102 (15%)	92 (14%)	124 (18%)	19 (3%)	17 (3%)	12 (2%)	29 (4%)
No, 422 (38%)	274 (65%)	39 (9%)	49 (12%)	22 (5%)	19 (5%)	5 (1%)	7 (2%)	7 (2%)

*Alc* alcohol use, *GBV* gender-based violence. Percentages show row percent across all typologies

youth 12 to 18 years of age, the intersection between HIV, GBV and alcohol is highly prevalent. Our study also shows that the SAVA typologies characterized by alcohol use were mostly associated with commercial sex work, observing parental abuse, and depression/suicidality in the multivariable models.

In the current study, commercial sex work was strongly associated with the SAVA syndemic typology, as well as typologies characterized by alcohol. This is particularly concerning due to the young age of study participants. The prevalence of commercial sex work (13%) and transactional sex work (39% among sexually active youth) has also been

**Table 2** Multinomial logistical regression analyses of the risk factors for each of the 8 SAVA typologies comprising gender-based violence, HIV, and alcohol use among youth living in the slums of Kampala (*n* = 1096)

	HIV–			HIV +			
	ALC–	ALC +		ALC–	ALC +		
	GBV +	GBV–	GBV +	GBV–	GBV +	GBV–	GBV +
	OR (95%CI)***	OR (95%CI)	OR (95%CI)	OR (95%CI)	OR (95%CI)	OR (95%CI)	OR (95%CI)
Sex							
Female vs. Male	0.87 (0.53, 1.43)	<b>0.63 (0.44, 0.91)</b>	0.81 (0.49, 1.32)	1.15 (0.64, 2.09)	2.19 (0.57, 8.44)	0.69 (0.29, 1.63)	<b>0.31 (0.11, 0.83)</b>
Age							
17–18 vs. 12–14 years	<b>8.46 (2.98, 24.03)</b>	<b>5.53 (3.03, 10.08)</b>	<b>14.84 (4.48, 49.15)</b>	1.02 (0.48, 2.19)	4.67 (0.57, 38.23)	<b>4.10 (1.16, 14.47)</b>	<b>11.57 (1.48, 90.54)</b>
Age							
15–16 vs. 12–14 years	<b>4.65 (1.54, 14.04)</b>	<b>3.06 (1.60, 5.86)</b>	<b>5.59 (1.58, 19.70)</b>	1.69 (0.79, 3.61)	1.81 (0.16, 20.34)	1.11 (0.24, 5.17)	4.58 (0.51, 41.27)
Sex work							
Yes vs. No	<b>4.17 (1.09, 16.00)</b>	<b>15.41 (5.95, 39.92)</b>	<b>20.13(7.33, 55.33)</b>	–	–	<b>30.09 (8.40, 107.71)</b>	<b>60.94 (15.52, 239.27)</b>
Parental abuse							
Yes vs. No	<b>2.54 (1.52, 4.23)</b>	<b>1.96 (1.33, 2.91)</b>	<b>3.01 (1.86, 4.88)</b>	1.42 (0.71, 2.81)	2.09 (0.58, 7.48)	<b>2.49 (1.10, 5.66)</b>	<b>7.32 (3.09, 17.37)</b>
Parental status							
2 alive vs. 0 alive	1.01 (0.51, 1.99)	<b>0.50 (0.31, 0.81)</b>	<b>0.46 (0.25, 0.87)</b>	1.68 (0.70, 4.04)	2.49 (0.29, 21.36)	<b>0.20 (0.06, 0.67)</b>	0.60 (0.20, 1.80)
Parental status							
1 alive vs. 0 alive	1.14 (0.57, 2.28)	0.84 (0.53, 1.32)	1.01 (0.57, 1.80)	1.27 (0.50, 3.19)	2.24 (0.24, 20.62)	0.89 (0.37, 2.17)	1.07 (0.39, 2.95)
Depressive and/or suicidal behaviors							
Yes vs. No	<b>2.97 (1.63, 5.41)</b>	<b>1.49 (1.02, 2.18)</b>	<b>3.60 (1.95, 6.60)</b>	1.12 (0.61, 2.06)	3.48 (0.73, 16.63)	1.16 (0.49, 2.74)	2.13 (0.76, 5.98)

\*Referent outcome category GBV- HIV- Alc-, the absence of gender-based violence, no alcohol use, and HIV negative

\*\*Cells were suppressed for 0 counts for either having the factor or not having the factor

\*\*\*Odds Ratio and 95% Confidence Intervals

found to be very high in this population [12, 29]. Previous studies have also found that alcohol use is a significant driver of commercial sex work among these youth [12]. This association is likely bidirectional, with youth consuming alcohol being more likely to engage in sex work while youth who already engage in sex work may be more likely to use alcohol as a coping mechanism due to the significant stressors associated with sex work [30]. Future research should investigate the different pathways that youth become involved in sex work, as this may be a primary prevention point for the SAVA syndemic components. Additionally, addressing alcohol use and potentially using social media or mHealth strategies may present multiple opportunities to implement interventions aimed at preventing sex work in this population given previous research demonstrating a strong association between social media use and transactional sex [29].

Previous research has documented the high levels of alcohol use among this population, which is particularly concerning given the ages of youth in this study (12–18 years) [31–33]. The legal drinking age in Uganda is 18. Since the majority of youth in this study are underage, any drinking is considered illegal and of great concern, particularly due to the unintended consequences of underage drinking and adverse health effects experienced by heavy alcohol use.

The majority of youth in the SAVA syndemic typology reported depressive and suicidal behaviors. While this was not strongly correlated in the multivariable analysis, the prevalence of depressive and suicidal behaviors alone among this typology warrants further investigation. It's clear that depression and suicidality have a bidirectional association with the SAVA syndemic components in the literature [13–17]. This is an urgent mental health issue and is also consistent across other research studies [34]. Previous

research has shown that social support did not impact the association between SAVA syndemic and depression, which suggests that the impact of the SAVA syndemic on depression is likely a unique and strong effect [35]. However, screening and treating for depression may positively impact resilience for these youth and may ultimately impact risk for experiencing the SAVA syndemic [36].

Additionally, it should be noted that the current sample had a high prevalence of all risk factors. Most of these variables, parental abuse, commercial sex work, and depressive and suicidal behaviors, are potentially modifiable risk factors and may warrant investigation into reducing these risks. Future studies should investigate the temporal relationship of the variables in the syndemic, as well as the temporal relationship among the risk and protective factors for the syndemic.

### Limitations

While this study is the first study to document the syndemic of GBV, alcohol use, and HIV among youth living in the slums of Kampala, Uganda, there are several limitations that should be noted. Limitations include the convenience sample of youth, a lack of comprehensive measures, and a cross-sectional study design, as opposed to a prospective longitudinal study. Due to the sample consisting of youth who attend the UYDEL centers, the sample may not be generalizable to other populations. Without a longitudinal sample, temporal relationships of variables cannot be assessed, and therefore, causality cannot be obtained. Also, depressive and suicidal behaviors were only assessed using previously validated questions from other adolescent populations, and these questions were not previously validated for the current population. More research is needed to develop culturally appropriate questions that measure depression and suicidal behavior among these youth.

In this study, we only relied on a self-reported measure of HIV which is likely an underestimate in this population. We highly recommend that future studies should corroborate findings with HIV testing. Future studies should also indicate the potential source or transmission pathway of HIV, since a proportion of the youth in our study may have had HIV since birth due to the vertical transmission of the virus. The potential source of HIV could aid in constructing the conceptual framework of the SAVA syndemic among the youth and better identify intervention strategies. Additionally, for simplicity and because of small cell sizes, we opted to examine the typologies for violence perpetration and victimization combined. Our previous research demonstrate that there is substantial overlap between victimization and perpetration, even among these youth [25]. However, studies with larger samples may want to differentiate specific types of violence as well as perpetration and victimization.

Additionally, alcohol use was operationalized as having one or more drinks in the past year, which is a broad measure of alcohol use. However, it should be noted that these youth are primarily underage, considering the legal drinking age in Uganda is 18. Future studies should also incorporate a more specific definition of alcohol use, including examining these typologies of violence and HIV with alcohol use frequency measures or problem drinking.

### Conclusions

Our findings show that alcohol use among these youth usually coexisted with GBV among the SAVA typologies. This finding is corroborated by previous research indicating that alcohol use and GBV are both risk factors for HIV [5]; yet, they are often not addressed in HIV prevention programming. The fact that alcohol use is often overlooked in research on the SAVA syndemic, or in research of GBV and HIV, needs to be remediated. This oversight may be due in large part to the original conceptualization of the syndemic which typically refers to substance use, specifically injection drug use [2]. As such, it may be time to consider the term AVID (alcohol, violence and infectious diseases), already in use by the World Health Organization and the United Nations Development Program in their work to integrate GBV, HIV prevention, treatment and care into national alcohol policies, which was discussed at the second Africa regional consultative meeting in Gaborone, Botswana in 2016. We could not find any academic literature using this term, even though it more adequately reflects the components of the syndemic noted in regions where injection or other drug use is less of a factor in HIV transmission. It may also be time to emphasize infectious diseases to include other sexually transmitted infections and infectious diseases more broadly, including the novel coronavirus. With respect to coronavirus, research has already linked the virus to increases in alcohol use [37, 38] and gender-based violence in several regions of the world [39, 40]. Clearly, future research is needed to conceptualize and assess the syndemic more broadly and the health factors that are not only likely to co-occur, but in combination, will exacerbate health outcomes. As such we recommend that researchers incorporate measures of alcohol use, infectious disease and GBV when appropriate. We also recommend that screening across all three health concerns be conducted to more proactively address the integration in both prevention and treatment.

Finally, given the high prevalence of the SAVA syndemic and its components among these youth, community-level interventions may be warranted to address the structural drivers including social norms around violence, safe sex practices, and alcohol use. Research has shown that previous campaigns incorporating these elements have been

successful at reducing GBV and HIV (Gilbert et al., 2015). Addressing alcohol use among these minors may also be conceptualized as a structural driver in the SAVA syndemic. Therefore, structural interventions that seek to delay and reduce alcohol use may be particularly beneficial. While not assessed in the current study, alcohol companies have targeted youth across sub-Saharan Africa [41], including South Africa [42], Uganda [43], and Botswana [44] and thereby increased alcohol use and vulnerability to GBV and HIV among youth in low-resource settings. Therefore, addressing alcohol marketing, availability, pricing and implementing alcohol counter-marketing campaigns may be beneficial strategies for the most vulnerable youth [41] and have a range of other positive health impacts in addition to reductions in GBV and HIV transmissions.

**Author Contributions** All authors contributed to the writing and editing of the manuscript. Monica H. Swahn contributed to the conceptualization of the manuscript and project, the design, and the data collection. Rachel Culbreth and Katherine E. Masyn conducted the analyses. Laura F. Salazar and Jennifer Wagman contributed to writing and editing the manuscript. Rogers Kasirye contributed to editing the manuscript and data collection for the project.

**Funding** Research reported in this manuscript was supported by the National Institute on Alcohol Abuse and Alcoholism of the National Institutes of Health under Award Number R21AA22065 (to Dr. Swahn).

## Declarations

**Conflict of interest** The authors declare that they have no conflicts of interest.

**Ethical Approval** This study was performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

**Animal Rights** This research involved human participants and was approved by both the Georgia State Institutional Review Board and the Uganda National Council on Science and Technology.

**Informed Consent** Verbal informed consent was obtained for all participants. The authors have no relevant financial or non-financial interests to disclose.

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