Syndemic Factors and Viral Load Nonsuppression in People With HIV in Uganda: Latent Class Analysis

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BACKGROUND

- Viral load nonsuppression (VLNS) remains a major challenge among people with HIV in Uganda despite high ART coverage.
- Alcohol use, psychological distress, and condom non-use may compromise viral suppression, but their combined effect is understudied.
- A syndemic framework was used to examine the combined effects of alcohol use, psychological distress, and condom non-use on viral load nonsuppression.

METHODS

Data source: Uganda Population-based HIV Impact Assessment (UPHIA) 2020–2021.

Sample: People with HIV on ART with complete exposure data (N = 1,105), aged 15–64 years.

Exposures: Alcohol use, psychological distress, and condom non-use at last sex in the past 12 months

Outcome: Viral load nonsuppression (>1,000 copies/mL)

Covariates: age, sex, marital status, education, wealth, residence, region

Analysis:

- Latent class analysis (LCA) identified two subgroups with distinct risk profiles
- Survey-weighted logistic regression examined associations of individual exposures and latent classes with VLNS
- Interaction terms assessed whether associations between syndemic class membership and VLNS differed across sociodemographic and geographic subgroups

Harmful alcohol use and psychological distress were independently associated with higher odds of VLNS among people with HIV on ART in Uganda.

The higher-risk syndemic class, combining harmful alcohol use, psychological distress, and condom non-use at last sex in the past 12 months, was associated with more than twice the odds of VLNS.

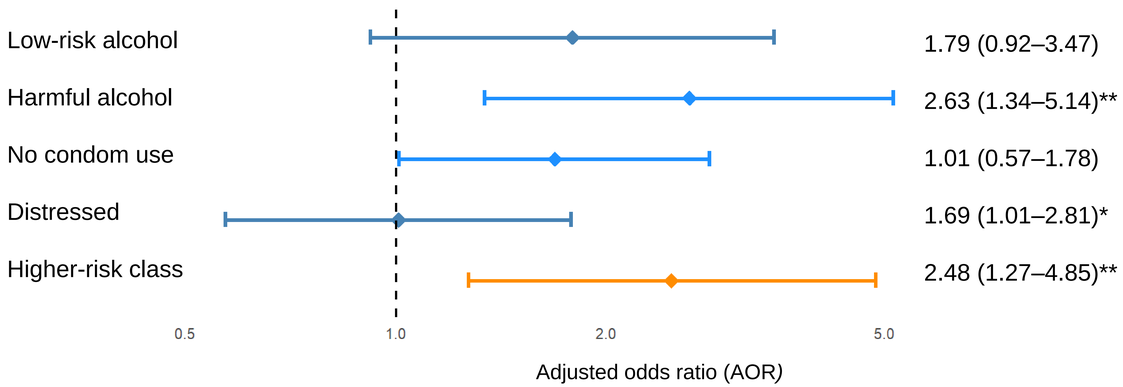
RESULTS

Latent Class Profiles

Class	Harmful alcohol use	No condom use	Psychological distress	Participants assigned	VLNS prevalence
Higher Risk	0.86	0.69	0.41	11.8%	13.9%
Lower Risk	0.00	0.55	0.30	88.2%	6.6%

Exposure values reflect selected conditional probabilities within each class; VLNS prevalence is measured separately.

Adjusted Associations of Individual and Syndemic Risk Factors with VLNS



Points = AORs, lines = 95% confidence intervals; *Significance: **p < 0.01, *p < 0.05

Key findings

- Harmful alcohol use (**), psychological distress (*), and membership in the higher-risk syndemic class (**) were associated with increased odds of VLNS
- Low-risk alcohol use and no condom use were not significant in adjusted models.
- The syndemic effect (higher-risk class) had a stronger association with VLNS than any individual exposure except harmful alcohol use.
- The association between syndemic class membership and VLNS was consistent across sociodemographic subgroups, with no statistically significant interactions; estimates in subgroups with small sample sizes were sometimes imprecise.

CONCLUSIONS

Alcohol use, psychological distress, and sexual risk behaviors jointly increase the odds of viral load non-suppression among PWH in Uganda. Associations were consistent across sociodemographic subgroups, highlighting the need for integrated HIV services addressing mental health, substance use, and sexual health, particularly for people with co-occurring risks.

ACKNOWLEDGMENTS

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PLAIN LANGUAGE SUMMARY

People with HIV on treatment in Uganda who drink heavily or experience psychological distress are more likely to have unsuppressed viral loads. Those with multiple co-occurring risks, including heavy drinking, psychological distress, and risky sexual behaviors such as not using condoms, face more than twice the risk compared to those without these co-occurring risks, highlighting the need for integrated support services.