AMPHETAMINE USE, ART ADHERENCE, AND VIRAL LOAD

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Study Introduction

- Substance use has complex associations with HIV progression.

- Current Study: tested associations between several substances and HIV viral load while accounting for confounders relevant to both HIV disease progression and substance use

Background

- Substance use among PLWH is associated with increased HIV disease progression in part due to low Antiretroviral Therapy (ART) adherence.
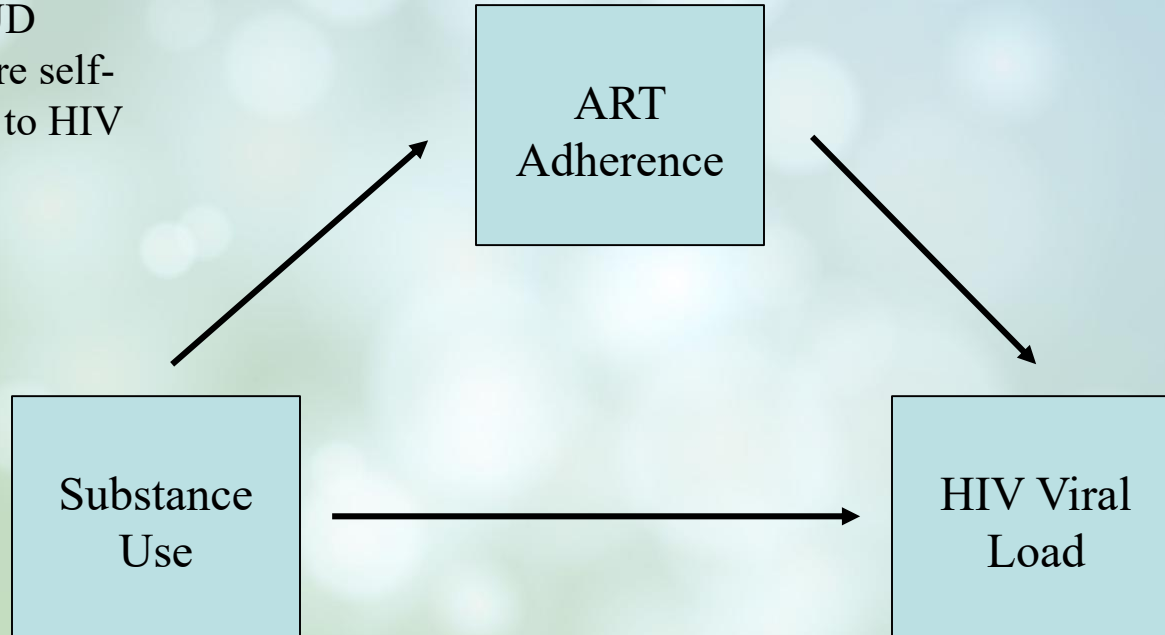
Background

- Previous research:
  - Results from specific substances are mixed.
  - The path through ART adherence is not confirmed.
  - Important confounders are not controlled.
  - Critical populations have not been tested.

Procedure

- Young adults from Atlanta metro area

- Participant driven snowball sampling

- Eligibility:
  - between the ages 18-36
  - documented HIV+ status
  - born male

Participants

- 385 sexual minority men and transgender women

  – All were born male

  – All identified as sexual minority men or transgender women

  – 90% identified as Black

  – 10% Hispanic/Latino

  – Average age of 29 years

Measures

- <u>Substance Use</u> via positive biomarkers: Alcohol (EtG) and a 12-panel urinalysis

- <u>Viral Load</u>: dried blood spots

- <u>ART adherence</u>: unannounced 30-day pill count

Measures

- <u>Demographics & Health:</u> CESD and lifetime SUD counseling.

- <u>HIV Care Self-efficacy</u>: HIV medication taking and ability to follow doctor instructions.

- <u>Access to HIV Care</u>: Ability to cope with significant HIV barriers to care.

Methods

- Multivariable linear regression models tested the role of specific drugs directly on HIV viral load and indirectly through their effects on ART adherence while controlling for key demographic and health characteristics.

	Amphetamine Use (*n*=68)	No Amphetamine Use (*n*=317)	*t*	X^2
	Mean (*SD*) / *n* (%)			
Viral Load	1.89 (2.09)	0.89 (1.63)	-3.37***	-
Adherence	0.65 (0.26)	0.75 (0.25)	2.43	-
Age	29.73 (3.66)	28.99 (3.83)	-1.38	-
Income	1.97 (1.19)	2.55 (1.59)	2.59***	-
Depressive symptoms	24.17 (13.09)	18.67 (12.13)	-3.20	-
HIV Self-efficacy	8.53 (1.88)	8.80 (1.51)	1.22	-
Access to HIV care	2.40 (1.05)	2.70 (1.04)	1.76	-
Substance use counseling	17 (25.0%)	75 (23.7%)	-	5.07*
Transgender	6 (8.8%)	29 (9.1%)	-	0.19
Race/Ethnicity				
Black	65 (95.6%)	280 (88.3%)	-	0.15
Hispanic/Latino	3 (4.4%)	37 (11.7%)		
Positive Biomarker Test				
Alcohol	14 (20.6%)	99 (31.2%)	-	0.24
Cannabis/THC	46 (67.6%)	242 (76.3%)	-	6.77**
Cocaine	19 (27.9%)	46 (14.5%)	-	19.50***

Note. N=385. Income is represented ordinally: (1) $0 - $10,000; (2) $11,000 - $20,000; (3) $21,000 - $30,000; (4) $31,000 - $40,000; (5) $41,000 - $50,000; (6) $51,000 - $60,000; (7) $61,000 or higher. Positive biomarker tests represent *n* (%) participants testing positive for alcohol and drug use via urinalysis. Amphetamine use is a combined index reflecting amphetamine and methamphetamine use. * $p \leq 0.05$; ** $p \leq 0.01$; ***$p \leq 0.001$

Alcohol Results

	B	B SE	95% CI		p
			LL	UL	
Direct Effects					
Alcohol use → ART Adherence (*a*)	-.026	.032	-.088	.038	.418
ART Adherence → Viral Load (*b*) *	**-.753**	**.349**	**-1.440**	**-.067**	**.011**
Alcohol use → Viral Load (*c'*)	-.159	.205	-.563	.244	.438
Covariates					
Age	-.028	.023	-.074	.018	.235
Race/Ethnicity	.103	.246	-.381	.588	.630
Income	-.014	.062	-.135	.108	.821
Depressive symptoms	-.003	.008	-.018	.013	.184
Trans	.054	.311	-.559	.666	.860
HIV care self-efficacy *	**-.150**	**.068**	**-.283**	**-.016**	**.021**
Access to HIV care	-.043	.096	-.146	.233	.330
Substance use counseling	.329	.256	-.174	.832	.100

	B	Boot SE	Boot 95% CI	
			LL	UL
Indirect Effect				
Alcohol use → ART Adherence → Viral Load	.019	.027	-.034	.079

Note: N= 385. Standardized results shown. alcohol use measured by EtG.; 95%CI = confidence interval; LL= lower limit; UL= upper limit. (*a*), (*b*), and (*c'*) label mediation pathways. * $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$ (significant effects bolded).

Cannabis Results

	B	B SE	95% CI		p
			LL	UL	
Direct Effects					
Cannabis use → ART Adherence (a) *	**-.053**	**.027**	**-.105**	**-.013**	**.037**
ART Adherence → Viral Load (b) **	**-.781**	**.334**	**-1.437**	**-.125**	**.010**
Cannabis use → Viral Load (c')	-.099	.173	-.439	.242	.570
Covariates					
Age	-.023	.022	-.066	.020	.233
Race/Ethnicity	.126	.233	-.446	.471	.789
Income	-.021	.059	-.137	.095	.711
Depressive symptoms	-.002	.008	-.017	.013	.814
Trans	.135	.302	-.459	.728	.655
HIV care self-efficacy *	**-.138**	**.064**	**-.263**	**-.015**	**.031**
Access to HIV care	-.039	.093	-.144	.222	.670
Substance use counseling	.397	.247	-.089	.884	.100

	B	Boot SE	Boot 95% CI	
			LL	UL
Indirect Effect				
Cannabis use → ART Adherence → Viral Load	.041	.030	-.004	.114

Note: N= 385. Standardized results shown. 95%CI = confidence interval; LL= lower limit; UL= upper limit. (a), (b), and (c') label mediation pathways. * $p \leq 0.05$; ** $p \leq 0.01$; ***$p \leq 0.001$ (significant effects bolded)

Cocaine Results

	B	B SE	95% CI		p
			LL	UL	
Direct Effects					
Cocaine use → ART adherence (a)	-.065	.040	-.144	.014	.100
Adherence → Viral Load (b) *	**-.799**	**.333**	**-1.453**	**-.145**	**.016**
Cocaine use → Viral Load (c´)	-.343	.259	-.851	.166	.186
Covariates					
Age	-.023	.022	-.066	.020	.288
Race/Ethnicity	-.006	.233	-.464	.452	.971
Income	-.027	.059	-.143	.089	.650
Depressive symptoms	-.002	.008	-.017	.013	.766
Trans	.136	.301	-.455	.728	.651
HIV care self-efficacy *	**-.135**	**.064**	**-.260**	**-.019**	**.034**
Access to HIV care	-.048	.093	-.135	.230	.609
Substance use counseling *	**.389**	**.246**	**.044**	**.095**	**.873**

	B	Boot SE	Boot 95% CI	
			LL	UL
Indirect Effect				
Cocaine use → ART Adherence → Viral Load	.052	.042	-.018	.146

Note: N= 385. Standardized results shown. 95%CI = confidence interval; LL= lower limit; UL= upper limit. (a), (b), and (c´) label mediation pathways. * $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$ (significant effects bolded).

Amphetamines Results

	B	B SE	95% CI		p
			LL	UL	
Direct Effects					
Amphetamine use → ART adherence (a) **	**-.103**	**.044**	**-.189**	**-.017**	**.010**
ART adherence → Viral Load (b) *	**-.662**	**.332**	**-1.314**	**-.100**	**.032**
Amphetamine use → Viral Load (c') **	**.708**	**.284**	**.151**	**1.265**	**.010**
Covariates					
Age	-.030	.022	-.073	.013	.107
Race/Ethnicity	.209	.231	-.434	.476	.928
Income	-.001	.058	-.116	.114	.771
Depressive symptoms	-.003	.008	-.018	.015	.600
Trans	.182	.299	-.408	.771	.540
HIV care self-efficacy *	**-.148**	**.063**	**-.273**	**-.024**	**.019**
Access to HIV care	-.034	.092	-.146	.215	.708
Substance use counseling	.390	.245	-.090	.871	.111

	B	Boot SE	Boot 95% CI		
			LL	UL	
Indirect Effect					
Amphetamine use → ART Adherence → Viral Load	**.079**	**.054**	**.061**	**.210**	

Note: N= 385. Standardized results shown. 95% CI = confidence interval; LL= lower limit; UL= upper limit. (*a*), (*b*), and (*c'*) label mediation pathways. * $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$ (significant effects bolded).

Overall Results

- Higher **ART adherence** and greater **HIV care self-efficacy** were consistently associated with lower HIV viral load.

- **Alcohol** and **Cocaine:** not associated with ART adherence or HIV viral load.

- **Cannabis use:** negatively associated with ART adherence but not viral load.

- **Amphetamines:** only substance to demonstrate significant direct effects on HIV viral load and demonstrated effects on HIV viral load through ART adherence.

Limitations

- Controlling for multiple substances

- Inferred directionality

- Combined index of Amphetamine and Methamphetamine

- Alternative substance use

Conclusion

- Amphetamine use plays a unique role on viral load directly and through ART adherence.

- Future interventions should be tailored to specify substance use in the context of HIV care.

Thank you

- For any comments or questions email:
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