A Latent Class Analysis of Substance Use Patterns Among Canadian Women Living with HIV: Implications for Improving Health Equity by Addressing Social Determinants

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Poster No. CSP13.01

BACKGROUND

Substance use can have multiple health consequences for women living with HIV (WLWH), including lowering adherence to combination antiretroviral therapy (cART) and the likelihood of optimal treatment outcomes. **Study objective:** To analyze current substance use patterns among Canadian WLWH to determine the effects of substance use on cART adherence and identify social determinants of health covariates.

METHODS

The **Canadian HIV Women's Sexual and Reproductive Health Cohort Study (CHIWOS)** is a longitudinal community-based research study of 1,425 WLWH in BC, ON, and QC. Peer Research Associates (WLWH) administer a comprehensive, online questionnaire to participants at baseline and 18-months, collecting socio-demographic, behavioral, clinical, and health information including data on substance use and cART adherence.

In this analysis: Baseline questionnaire data were analyzed for participants enrolled between Aug 27, 2013 and May 1, 2015, with valid responses to all substance use indicators (n=1,363). Patterns of substance use were modeled using **latent class analysis (LCA)** with 7 indicators (current use vs. no use vs. abstainer) included in model. **Multinomial logistic regression** with class membership as the dependent variable identified independent covariates.

RESULTS

Table 1. Comparison of fit statistics for baseline models (N=1,363)

Number of latent classes	2	3	4	5	6
% Seeds asso. w/ best model	100/100	60/100	70/100	31/100	**28/100**
Log-likelihood	-3958.04	-3647	-3533.65	-3508.37	**-3489.03**
G-squared	1007.12	385.03	158.33	107.77	**69.1**
AIC	1065.12	473.03	276.33	255.77	**247.1**
BIC	1216.42	702.6	584.16	641.87	**711.45**
CAIC	1245.42	746.6	643.16	715.87	**800.45**
Adjusted BIC	1124.3	562.83	396.74	406.8	**428.74**

Table 2. Class membership and item-response probabilities for the six-class solution (N=1,363)

	Abstainers	Tobacco Users	Alcohol Users	Socially Acceptable Poly-substance Users	Illicit Poly-substance Users	Heavy Illicit Poly-substance Users
Class membership probabilities						
	26.34%	8.81%	31.92%	13.85%	9.81%	9.27%
Item response probabilities						
Alcohol						
No	0.01%	90.59%	0.01%	18.43%	12.67%	31.13%
Yes	0.03%	9.38%	99.98%	81.55%	87.30%	68.84%
Abstainer	99.97%	0.04%	0.01%	0.02%	0.03%	0.03%
Tobacco						
No	0.01%	0.08%	76.92%	34.57%	9.08%	3.07%
Yes	0.02%	99.88%	23.07%	65.41%	90.89%	96.89%
Abstainer	99.97%	0.04%	0.01%	0.02%	0.03%	0.03%
Cannabis						
No	0.02%	88.83%	99.50%	0.68%	39.22%	51.17%
Yes	0.01%	11.13%	0.49%	99.30%	60.74%	48.80%
Abstainer	99.97%	0.04%	0.01%	0.02%	0.03%	0.03%
Recreational (Cocaine/Ecstasy/MDMA/Acid/Mushrooms)						
No	0.03%	98.88%	99.88%	95.41%	61.19%	70.93%
Yes	0.00%	1.09%	0.11%	4.57%	38.78%	29.04%
Abstainer	99.97%	0.04%	0.01%	0.02%	0.03%	0.03%
Stimulants (Methamphetamine/Crack/Speed)						
No	0.03%	95.25%	98.42%	99.91%	43.44%	23.42%
Yes	0.01%	4.72%	1.57%	0.07%	56.53%	76.55%
Abstainer	99.97%	0.04%	0.01%	0.02%	0.03%	0.03%
Misused prescription (Benzodiazepines/Diluadid/Oxycotin/Ocycondone/Talwin & Ritalin/T3s & T4s)						
No	0.03%	99.96%	99.99%	98.28%	99.93%	61.43%
Yes	0.00%	0.01%	0.00%	1.69%	0.04%	38.54%
Abstainer	99.97%	0.04%	0.01%	0.02%	0.03%	0.03%
Opiates (Heroin/Speedballs/Morphine/Methadone)						
No	0.03%	97.24%	99.74%	99.95%	99.88%	22.08%
Yes	0.00%	2.72%	0.25%	0.03%	0.09%	77.89%
Abstainer	99.97%	0.04%	0.01%	0.02%	0.03%	0.03%

RESULTS (CONTINUED)

Table 3. Baseline characteristics and bivariable associations with latent classes

Variables	Total n (%)	Abstainers	Tobacco Users	Alcohol Users	Socially Acceptable Poly-substance Users	Illicit Poly-substance Users	Heavy Illicit Poly-substance Users	p-value
Age at interview (years)								
< median (43)	676 (50)	194 (54)	50 (42)	200 (46)	91 (48)	65 (49)	76 (60)	0.020
>= median (43)	687 (50)	165 (46)	70 (58)	235 (54)	98 (52)	69 (51)	51 (40)	
Time since diagnosis (years)								
< median (10.8)	691 (51)	196 (55)	54 (45)	226 (52)	77 (41)	67 (50)	70 (56)	0.031
>= median (10.8)	672 (49)	163 (45)	66 (55)	209 (48)	111 (59)	66 (50)	56 (44)	
Sexual orientation (DK/PNTA: N=3)								
Heterosexual	1191 (87)	327 (91)	107 (89)	410 (94)	155 (83)	103 (77)	89 (70)	<0.001
LGBTQ	169 (13)	31 (9)	13 (11)	25 (6)	32 (17)	30 (23)	38 (30)	
Ethnicity								
Caucasian	565 (41)	93 (26)	63 (52)	168 (39)	113 (60)	70 (52)	59 (46)	
Indigenous	297 (22)	42 (12)	41 (34)	55 (13)	53 (28)	49 (37)	56 (45)	<0.001
African/Carribean/Black Canadian	403 (30)	201 (56)	6 (5)	178 (41)	10 (5)	5 (4)	3 (3)	
Other	98 (7)	23 (6)	11 (9)	34 (8)	13 (7)	10 (7)	8 (6)	
Household annual income (CAD) (DK/PNTA: N=40)								
<$20,000	860 (65)	221 (64)	92 (77)	221 (52)	120 (65)	103 (77)	103 (86)	<0.001
>=$20,000	463 (35)	125 (36)	26 (22)	201 (48)	64 (35)	30 (23)	17 (14)	
Any violence as an adult (DK/PNTA: N=94)								
Yes	1017 (80)	208 (62)	104 (87)	311 (78)	163 (91)	119 (94)	111 (99)	<0.001
No	252 (20)	126 (38)	11 (9)	90 (22)	17 (9)	7 (6)	<5	
Current sex worker (DK/PNTA: N=99)								
Yes	77 (6)	<5	6 (5)	7 (2)	8 (5)	17 (14)	39 (35)	<0.001
No	1187 (94)	329 (99)	109 (91)	399 (98)	169 (95)	107 (66)	74 (65)	
Adherence (Never/Not Currently on cART: N=236)								
>= 95% (adherent)	827 (73)	229 (79)	89 (74)	276 (76)	111 (68)	67 (63)	55 (58)	<0.001
<95% (non-adherent)	300 (27)	62 (21)	21 (17)	85 (24)	52 (32)	40 (37)	40 (42)	
Resilience scale (DK/PNTA: N=5)								
>= median (64)	711 (52)	215 (61)	59 (49)	257 (59)	89 (47)	56 (42)	46 (44)	<0.001
< median (64)	647 (48)	140 (39)	61 (51)	177 (41)	100 (53)	78 (58)	91 (66)	

Table 4. Multinomial logistic regression with 'abstainers' as the reference class (n=1005)

Variables	Tobacco Users	Alcohol Users	Socially Acceptable Poly-substance Users	Illicit Poly-substance Users	Heavy Illicit Poly-substance Users
	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)
Sexual orientation					
LGBTQ (VS. Heterosexual)	0.78 (0.34, 1.77)	**0.42 (0.20, 0.87)**	1.22 (0.61, 2.45)	1.4 (0.66, 2.97)	2.08 (0.97, 4.44)
Ethnicity					
Indigenous (VS. Caucasian)	1.18 (0.61, 2.31)	0.79 (0.42, 1.48)	0.93 (0.49, 1.75)	1.16 (0.59, 2.30)	1.38 (0.67, 2.82)
ACB (VS. Caucasian)	**0.03 (0.01, 0.08)**	**0.42 (0.28, 0.63)**	**0.03 (0.01, 0.06)**	**0.02 (0.01, 0.06)**	**0.02 (0.00, 0.08)**
Other (VS. Caucasian)	0.66 (0.26, 1.67)	0.92 (0.45, 1.90)	0.45 (0.19, 1.09)	0.49 (0.18, 1.33)	0.59 (0.20, 1.73)
Household annual income (CAD)					
<$20,000 (VS. >=$20,000)	**2.28 (1.27, 4.09)**	0.62 (0.44, 0.88)	1.08 (0.67, 1.74)	1.78 (0.99, 3.20)	**3.60 (1.70, 7.63)**
Any violence as an adult					
Yes (VS. No)	**3.40 (1.72, 6.70)**	**2.25 (1.34, 3.78)**	**3.60 (1.93, 6.71)**	**6.22 (3.22, 12.02)**	**6.32 (3.15, 12.68)**
Adherence					
<95% (VS. >= 95%)	1.27 (0.66, 2.45)	1.41 (0.92, 2.18)	**2.23 (1.29, 3.86)**	**2.50 (1.35, 4.62)**	**2.78 (1.45, 5.34)**
Resilience scale					
< median (64) (VS. >= 64)	1.16 (0.69, 1.94)	0.84 (0.59, 1.20)	1.26 (0.79, 2.01)	1.22 (0.71, 2.08)	**2.08 (1.13, 3.83)**

Note: Age at interview and time since diagnosis were not selected in the model. Estimates excluding the null are in bold.

CONCLUSIONS

Findings indicate heterogeneity in substance use patterns among WLWH. Latent classes with increasing numbers of drugs used were associated with lower cART adherence and increased societal marginalization. To improve adherence and associated benefits, programs must ally with WLWH to transform the social systems and conditions that threaten their health and everyday lives.

ACKNOWLEDGMENTS

We gratefully acknowledge all of the women living with HIV who participate in CHIWOS; the national team of Peer Research Associates, Co-investigators, and Collaborators; the national Steering Committee, provincial Community Advisory Boards, and Aboriginal Advisory Board; the BC Centre for Excellence in HIV/AIDS for data support and analysis; and all the partnering organizations (75+) who support study recruitment and operations.

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