Changes in Alcohol Use and Changes in Sexual Risk Behavior across Four Samples of STI Clinic Patients

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BACKGROUND

- Patients attending STI clinics demonstrate high levels of risky sexual behavior (1, 2), are likely to experience multiple STIs (3-6), and are at increased risk of HIV relative to the general population (2, 7).
- Patients at STI clinics have higher levels of problematic alcohol use than those in the general population or those in other medical settings (8-10).
- Research suggests that alcohol use contributes to sexual risk behavior (11-18).
- However, few longitudinal studies have focused specifically on STI clinic patients or examined whether intraindividual changes in alcohol use over time are associated with changes in sexual risk behavior.

The Current Study

- To address gaps in the literature, we used parallel process latent growth modeling (PPLGM) to explore how *changes over time* in alcohol use relate to *changes over time* in sexual risk behavior among STI clinic patients.
- A major innovation of the current research is the use of integrative data analysis (IDA), a technique for pooling multiple, independent datasets (19-23), which allows for the creation of large, diverse samples with sufficient statistical power to test complex models.

Hypotheses

1. Initial levels of alcohol use would be positively associated with the initial numbers of sexual partners and unprotected sex events.
2. Changes over time in alcohol use would be positively associated with changes over time in numbers of sexual partners and unprotected sex events.

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METHOD

Participants

- Participants (*N* = 3,761, 59% male, 72% Black) were patients at publicly-funded, urban STI clinics in the Midwest and Northeast who were recruited into four separate randomized controlled trials (RCTs) to evaluate sexual risk reduction interventions utilizing an information-motivation-behavioral skills (IMB; 24, 25) framework.
    - HIP-R and HIP-R2: Rochester, NY
    - ITK and ACHIEVE: Milwaukee, WI
    - All participants reported sexual risk behavior
    - ACHIEVE recruited hazardous drinkers
- Collectively, the four studies assessed alcohol use and sexual risk behavior over a 1-year span through 13,203 total individual observations.

Measures

- Demographic control variables included sex, age, race, sexual orientation, and socioeconomic status.
- Intervention condition was included as a control variable (0 = control conditions/less active comparisons, 1 = most active intervention condition).
- A composite, integrated measure of alcohol use was created across studies. Core indicators of alcohol use assessed across studies included frequency of alcohol use, engagement in heavy episodic drinking, and drinks per drinking day. Supplementary indicators included peak alcohol consumption, drinks per week, and frequency of intoxication.
- Participants reported the number of different partners they had sex with during the past 3 months (HIP-R, HIP-R2, and ACHIEVE) or past 1 month (ITK).
- Participants reported the number of times they had engaged in vaginal or anal sex without a condom over the past 3 months (HIP-R, HIP-R2, and ACHIEVE) or past 1 month (ITK).

Data Analysis

- To combine measures when some items or response options varied across studies, we used moderated non-linear factor analysis (MNLFA; 26).
- We fit individual LGMs to alcohol use, number of sexual partners, and unprotected sex data over one year to describe the pattern of change over time.
- Following the choice of a best-fitting model, we fit multigroup quadratic LGMs with study as the

grouping variable to examine study differences in changes.

- To understand the associations between changes in alcohol use and changes in sexual risk behavior over time, we used PPLGM, which allows for the examination of correlations between developmental parameters (intercepts and slopes) for multiple constructs (28). Individual LGMs were combined to look at associations between changes in alcohol use and changes in (1) number of sexual partners and (2) changes in unprotected sex over time. PPLGMs included correlations between all growth factors.
- We tested for study differences in the associations between growth factors using the Wald test. To increase parsimony and power, we constrained covariances between growth parameters across studies when doing so did not significantly undermine model fit.
- Model fit was assessed using traditional fit indices.

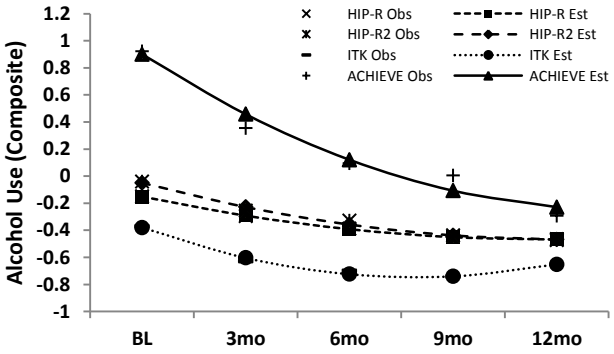
RESULTS

Sample Characteristics

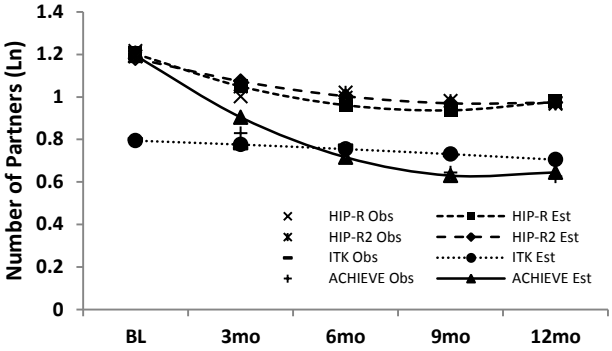
N	3761
Male	59%
Age	30.9 (10.3)
Black	73%
White	18%
Mixed	5%
Other	5%
Latino	7%
Sexual Minority	11%
Education ≤ High School	69%
Unemployed	54%
SES	0.0 (1.0)
Most Active Intervention	36%
3 Month Follow-Up	76%
6 Month Follow-Up	74%
9 Month Follow-Up	42%
12 Month Follow-Up	60%
Total Number of Assessments	3.5 (1.4)
Missing Assessments	41%

Latent Growth Models

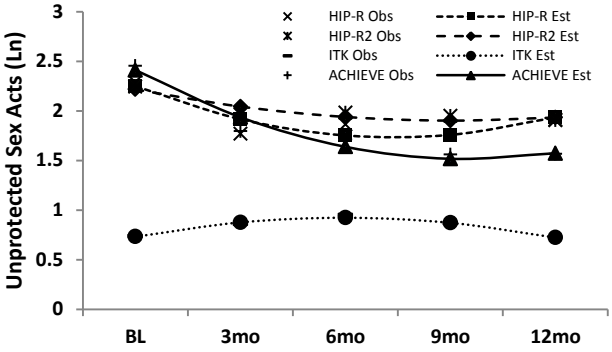
Changes in Alcohol Use Over 1 Year



Changes in Number of Partners Over 1 Year



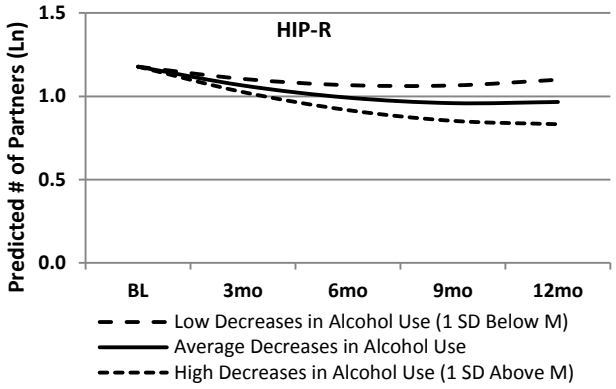
Changes in Unprotected Sex Over 1 Year



Parallel Process Models
Alcohol Use and Number of Partners

- The model fit the data well, $\chi^2(316) = 575.97$, $p < .001$; RMSEA = .03; CFI = .98; TLI = .97.
- There were positive correlations between initial levels of alcohol use and initial numbers of sexual partners in all studies, *r*s = .17-.18, *p*s < .001. Levels of alcohol use were also positively correlated with the number of sexual partners at all follow-up points in all studies, *r*s = .20-.40, *p*s < .001. This indicated that participants who drank more heavily also had more sexual partners.
- There were positive correlations between the slope of alcohol use and the slope of number of partners across time and study, *r*s = .21-.80, *p*s < .05. Thus, participants who reduced their drinking more over time also reduced their number of sexual partners more over time.
- Finally, there were positive residual correlations between alcohol use and number of sexual partners for each study (*r*s = .06-.34, *p*s < .05), indicating that when participants reported higher alcohol use than would be anticipated based on their personal alcohol use trajectory, they also reported a higher number of recent partners than would be anticipated based on their personal trajectory of number of partners.

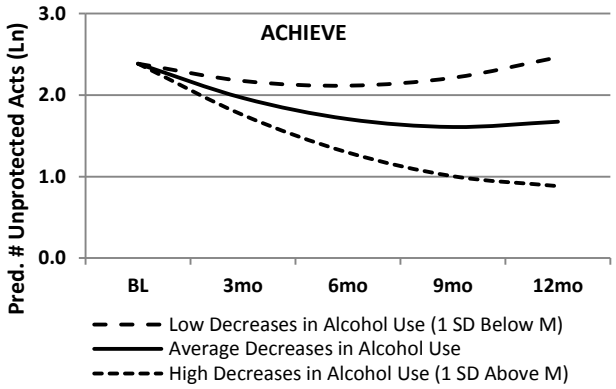
Predicted Number of Sexual Partners Based on Alcohol Use



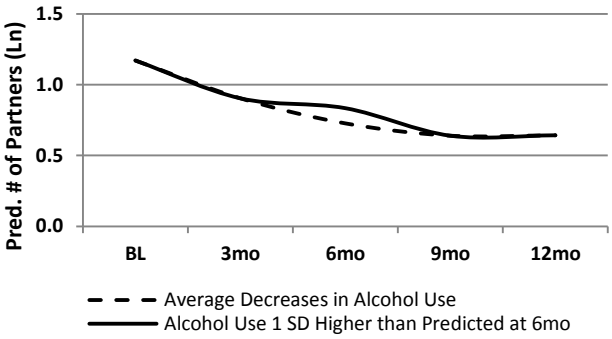
Alcohol Use and Unprotected Sex

- The model fit the data well, $\chi^2(317) = 535.74$, $p < .001$; RMSEA = .03; CFI = .98; TLI = .98.
- There were positive correlations between initial alcohol use and initial unprotected sex acts in all studies, *r*s = .06-.27, *p*s < .001-.05. Additionally, levels of alcohol use were positively correlated with the number of unprotected sex acts at most follow-up points in three studies, *r*s = .08-.17, *p*s < .05 for HIP-R and HIP-R2, *r*s = .25-.43, *p*s < .001 for ACHIEVE. Thus, participants who drank more heavily reported more acts of unprotected sex.
- There were positive correlations between the slope of alcohol use and the slope of unprotected sex across time in ACHIEVE, *r*s = .24-.57, *p* < .01. Thus, in a study recruiting hazardous drinkers, participants who reduced their drinking more over time also reduced their unprotected sex more over time.
- Finally, there were positive residual correlations between alcohol use and unprotected sex in the HIP-R2 and ACHIEVE (*r*s = .08-.28, *p*s < .001), indicating that when participants reported higher alcohol use than would be anticipated based on their personal alcohol use trajectory, they also reported more unprotected sex than would be anticipated based on their unprotected sex trajectory.

Predicted Number of Unprotected Sex Acts Based on Alcohol Use



Predicted Number of Partners Based on a Deviation from the Average Predicted Alcohol Use Trajectory in ACHIEVE



DISCUSSION

Implications and Future Research

- It is advisable to provide screening and brief treatment for alcohol use disorders in the STI setting.
- Given that changes in alcohol use relate to changes in number of sexual partners across four studies of clinic patients, specifically targeting alcohol use in sexual risk reduction interventions may be called for. Although we cannot be certain that the association between alcohol use and sexual risk behavior is causal, the other health consequences of heavy alcohol use alone (32) make it a valuable target.
- Future research should test whether measurement alone can cue reductions in alcohol use (9).
- Future research might aim to identify subpopulations of patients who maintain high levels of alcohol use over time, because these patients may need more intensive intervention.
- Future research should explore associations between changes in drug use and changes in sexual risk, as well as interactions between alcohol use and drug use.
- Finally, research should attempt to determine the causal relationship between alcohol use and sexual risk and explore possible mechanisms for the association.

Limitations

- Differences across trials in alcohol use measures necessitated some simplification of items, and studies lacked common measures of some constructs.
- We cannot draw causal inferences from this research.
- The quadratic patterns of change in the current study are challenging to interpret and add complexity to our analyses.
- Practical considerations meant that we pooled data from only two urban areas; future work should include data from other public clinics.

Conclusions

- Reductions in alcohol use over time are associated with reductions in the number of sexual partners over time across four samples of patients from urban, publicly-funded STI clinics.
- Additionally, for patients recruited specifically based on their hazardous drinking, reductions in alcohol use are related to reductions in unprotected sex.
- HIV risk reduction interventions may be strengthened by addressing alcohol use.
- Our combined use of parallel process latent growth modeling, a method for exploring how changes in one construct relate to changes in another construct, and integrative data analysis, a technique for combining multiple, independent datasets, contributes additional support to the association between alcohol use and sexual risk behavior among STI clinic patients.

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