HHS Public Access

Association of perceived partner non-monogamy with prevalent and incident sexual concurrency

Diana M Sanchez[1], **Victor J Schoenbach**[1], **S Marie Harvey**[2], **Jocelyn T Warren**[2], **Adaora A Adimora**[1,3], **Charles Poole**[1], **Peter A Leone**[1,3], and **Christopher R Agnew**[4]

[1]Department of Epidemiology, UNC Gillings School of Global Public Health, Chapel Hill, North Carolina, USA

[2]College of Public Health and Human Sciences, Oregon State University, Corvallis, Oregon, USA

[3]University of North Carolina School of Medicine, Chapel Hill, North Carolina, USA

[4]Department of Psychological Sciences, Purdue University, West Lafayette, Indiana, USA

Abstract

Objectives—Concurrency is suggested as an important factor in sexually transmitted infection transmission and acquisition, though little is known regarding factors that may predict concurrency initiation. We examined the association between perception of a partner's non-monogamy (PPNM) and simultaneous or subsequent concurrency among at-risk heterosexual young adults in the Los Angeles area.

Methods—We used Poisson regression models to estimate the relationship between PPNM and incident concurrency among 536 participants participating in a cohort study, interviewed at 4-month periods during 1 year. Concurrency was defined as an overlap in reported sexual partnership dates; PPNM was defined as believing a partner was also having sex with someone else.

Results—Participants (51% female; 30% non-Hispanic white, 28% non-Hispanic black, 27% Hispanic/Latino) had a mean age of 23 years and lifetime median of nine sex partners. At each interview (baseline, 4-month, 8-month and 12-month), 4-month concurrency prevalence was, respectively, 38.8%, 27.4%, 23.1% and 24.5%. Four-month concurrency incidence at 4, 8 and 12 months was 8.5%, 10.6% and 17.8%, respectively. Participants with recent PPNM were more likely to initiate concurrency (crude 4-month RR=4.6; 95% CI 3.0, 7.0; adjusted 4-month RR=4.0, 95% CI 2.6 to 6.1).

Conclusions—Recent PPNM was associated with incident concurrency. Among young adults, onset of concurrency may be stimulated, relatively quickly, by the PPNM. Programmes which promote relationship communication skills and explicit monogamy expectations may help reduce concurrency.

INTRODUCTION

Concurrent sexual partnerships have been suggested as a significant contributing factor in sexually transmitted infection (STI)/HIV transmission and acquisition, more common among young adults and racial/ethnic minorities.[1–8] In a study of adolescent sexually transmitted disease (STD) clinic attendees aged 14–19 years, having concurrent sexual partnerships within the past 6 months was common (31%) and associated with having chlamydia and gonorrhoea.[9] Using nationally representative data, Adimora *et al* estimated that about 11% of men[8] and about 6% of women[10] were concurrent in the past year; concurrency was associated with racial/ethnic minority status, age under 30 years, early age at first intercourse and substance use. Javanbahkt *et al* found that concurrency was common among African American, Hispanic and Asian women, and associated with risk of human papillomavirus (HPV) infection.[11]

Specific motivations for concurrency are thought to be associated with varying degrees of STI/HIV risk.[12 13] In a qualitative study, Gorbach *et al*[12] identified six distinct concurrent partnership types with regard to underlying motivations: reciprocal, reactive, compensatory, transitional, separational and experimental. These different types are associated with different STI/HIV risk profiles, network configurations and STI/HIV risk.[12 13] In our study, we seek to explore reactive concurrency. As described by Gorbach *et al*, reactive concurrent partnerships are possibly motivated by the desire to establish fairness in the relationship and jealousy; they are often deliberately casual in nature, and as a result, are associated with higher risk.[12]

Cross-sectional survey data suggest an association between involvement in sexual concurrency and having a non-monogamous partner. In a study of young adults, Gorbach *et al*[12] found that 26% of partnerships had one or both partners involved in concurrent sexual relationships with others. Adimora *et al* found that men and women reporting a non-monogamous partner in the past year had odds of concurrency, 13 and 23 the odds, respectively, of those who reported only monogamous partners.[8 10] However, limitations in previous research have made it difficult to identify whether the association of concurrency with partner non-monogamy reflects situations in which one partner's concurrency arises in response to the other's.

Elucidating the motivations for initiating concurrency may provide valuable information for crafting STI/HIV prevention messages, particularly for high-risk groups. The objective of this analysis was to present longitudinal data on the contribution of perceived partner non-monogamy (PPNM) (sometimes called 'perceived partner concurrency') in motivating concurrency among a racially and ethnically diverse sample of young adults. Since each of the partners of a participant with multiple simultaneous partnerships is a 'concurrent

partner', we use the term 'non-monogamous partner' to characterise a partner who is perceived to have at least one other partner, in addition to the index participant.

METHODS

Participants

We examined data from 536 individuals enrolled in the Project on Partner Dynamics (POPD), a longitudinal study of young adult heterosexual men and women in the Los Angeles area. POPD's primary objective was to examine heterosexual relationship dynamics, and sexual risk perceptions, intentions and behaviours. Between 2006 and 2008, participants were recruited directly from community locations, including STD clinics, family planning clinics and community organisations, and indirectly through print and online advertisements. Eligibility criteria included age (18–30 years), reporting sex without a condom in the previous 3 months and having—or reporting that a sex partner had—at least one of the following risk factors: (1) more than one sex partner in the previous year; (2) history of STI treatment in the previous 2 years; (3) sex with a partner who had an STI in the previous year or who was HIV+ or (4) history of injection drug use. Exclusion criteria included HIV infection (self-reported), current pregnancy, not speaking English or Spanish or expecting to move outside the study area within a year. Eligible participants completed up to four interviews during 1 year.

Design

Computer-assisted and interviewer-assisted surveys were conducted in the participant's preferred language (English or Spanish) using Questionnaire Development System software, with interviewers matched to the participant based on birth sex and in most cases, race/ethnicity, in an effort to reduce participant discomfort and possibly inaccurate responses. Participants were asked about their sexual partnerships during a recall period defined as the past 4 months (at baseline) or the time (median of 4 months) since the previous interview. For each partner, identified by initials or nickname, the participant was asked about the following for the recall period: date of first sex (month, day and year of vaginal or anal sex; ascertained only for newly reported partners), date of last sex (month, day and year; vaginal or anal), frequency of sex (vaginal or anal), whether the participant thought that the partner had other partners during their relationship (ie, PPNM) and alcohol or other drug use before or during sex.

Missing data, exclusions and logic checks

For each partnership, we identified missing, out-of-range and seemingly erroneous dates. In cases where the date of first or last sex was missing, or date of last sex came before date of first sex, we set first and last sex dates in that recall period to be equal to each other unless the frequency of sex was 0, in which case we excluded the partnership. In cases where reported dates of first or last sex came after the interview date: if the problem was an apparent error in reported year, we corrected the year; otherwise, we excluded partnerships if frequency of sex was 0, and, if the frequency of sex was greater than 0, we set the date of last sex to the first day in the recall period (ie, the day after the previous interview). Additionally, we excluded eight partnerships which were not ongoing at the baseline

interview but were subsequently reinitiated during the course of the study, because of uncertainty about whether the partnership was indeed active between the first and last intercourse dates available.

Definitions of prevalent and incident concurrency

For each recall period, prevalent concurrency was defined as the presence of an overlap in reported dates of first and last intercourse for two or more partnerships. Unless start and end dates unambiguously implied overlap, partnerships were considered serially monogamous. Concurrency was classified as incident if the participant was not concurrent (ie, no prevalent concurrency) during the previous recall period. Concurrency was coded using both a computer program and by manual review to ensure classification accuracy.

Definition of PPNM

We hypothesised that perception of a partner's involvement in another sexual relationship (PPNM) may motivate the participant to initiate concurrency, such as in cases of reactive concurrency.[12] Among POPD's sample of young adults with high relationship turnover, we hypothesised that concurrency in response to PPNM would likely occur relatively quickly. For each reported partnership during each recall period (ie, relating to the preceding 4 months) PPNM was coded dichotomously using information from the question, 'Which of the following best describes your relationship with (partner)?' A response, 'I am certain (partner) has had sex with others while involved with me' or 'I believe he/she probably has had sex with other people while involved with me' was coded as PPNM. Because of uncertainty about reporting accuracy, PPNM information was not collected for partnerships reported as terminated. Thus, at the participant level, PPNM data were missing for participants who had no active partnerships at the time of the interview.

We coded PPNM as present or absent for each participant-recall period, rather than in relation to specific partners, because concurrency that arises in response to PPNM need not necessarily involve the partner who was believed to be non-monogamous. In our statistical analyses, we examined the relationships of concurrency with PPNM from the same recall period ('recent PPNM'; 0–4 months ago) and with PPNM from the preceding recall period ('distant PPNM'; 4–8 months ago).

Statistical analyses

Concurrency prevalence and incidence proportions, with 95% CIs, were estimated for the recall periods preceding the baseline (prevalence only), 4-month, 8-month and 12-month interviews. Participants who were coded as concurrent during a recall period were excluded from the concurrency incidence analyses for the immediately following recall period. Associations between concurrency and PPNM were estimated with Poisson regression using generalised estimating equations with a robust variance estimator to account for multiple recall periods per participant. In longitudinal data, even when outcomes are common, several papers have demonstrated that modified Poisson regression with robust variance estimators can produce efficient and valid estimates of the risk ratio in cases where the cluster size is large.[14][15]

A directed acyclic graph, informed by a literature review, was used to identify confounders included in final models: birth sex, race/ethnicity, age at sexual debut, lifetime number of sex partners at baseline and alcohol or other drug use during sex for the recall period for which PPNM was reported. All statistical modelling was conducted in SAS (V.9.4) (SAS Institutes, Cary, North Carolina, USA).

The POPD study was approved by Institutional Review Boards (IRBs) at Oregon State University, Purdue University and California State University Los Angeles; the present analysis was approved by the University of North Carolina Chapel Hill IRB (approval number 11-0692).

RESULTS

Demographic characteristics

A total of 536 individuals participated in the baseline interview (figure 1). Participation at follow-up was 435 (81%), 377 (70%) and 330 (62%), respectively, at the 4-month, 8-month and 12-month interviews, for a total of 1678 recall periods for analysis. In a separate attrition analysis, loss to follow-up was not associated with key study variables or demographic characteristics. Participants were balanced between men and women; about two-thirds were aged 18–24 years (table 1). Participants reported a total of 1792 unique sexual partnerships throughout the study. Of these, most were described as either 'just friends' (34.2%), 'dating casually' (24.3%) or 'dating exclusively' (26.5%).

Prevalence and incidence of concurrency

Across the 1678 recall periods among participants, there were 498 periods with prevalent concurrency; in 92 of these periods, the participant had no concurrency in the preceding recall period and was therefore an incident case. A total of 271 participants (50.6%) were concurrent during one or more periods, including 117 women (43.2%) and 154 men (56.8%). Participants who were concurrent in any recall period, versus no recall periods, were at baseline more likely to: be male (50.6% vs 43.2%); report greater lifetime number of sex partners (mean 19 vs 11) and report alcohol or other drug use during sex (82.3% vs 66.7%).

At the baseline, 4-month, 8-month and 12-month interviews, 291 (54.3%), 175 (41.9%), 131 (36.2%) and 131 (34.0%) participants, respectively, reported having had more than one sexual partner (irrespective of overlap) during the preceding 4-month recall period. Most of these participants (71%, 68%, 66% and 79%, respectively) were involved in concurrent partnerships (table 2). Male participants had a higher prevalence of ever being concurrent throughout the study compared with female (men 59%; women 43%). Many concurrent participants—59 (28.4%), 53 (44.9%), 29 (33.3%) and 24 (28.6%)—had multiple ongoing partnerships at the time of interview itself. Among participants without overlapping partnerships during the recall periods preceding the baseline, 4-month and 8-month interviews, concurrency incidence during the following recall period was, respectively, 8.5%, 10.6% and 17.8% (table 2).

PPNM and concurrency

At baseline, 4-month, 8-month and 12-month interviews, respectively, 46.3%, 22.0%, 22.0% and 19.2% of participants reported PPNM for at least one partner during the preceding 4-month recall period. A total of 0, 49, 44 and 41 participants, respectively, had no ongoing partnerships and therefore did not have PPNM data.

Participants with PPNM were more likely to have overlapping partnerships during the same recall period (ie, 'recent PPNM'; prevalence ratio (PR)=2.7, 95% CI 2.1 to 3.4 unadjusted; PR=2.5, 95% CI 2.0 to 3.1 adjusted). The corresponding concurrency incidence ratios Risk Ratios (RR), were 4.6 (3.0 to 7.0) unadjusted and 4.0 (2.6 to 6.1) adjusted. In adjusted models: male sex (PR=1.7; 95% CI 1.3 to 2.2), Hispanic race/ethnicity (PR=1.6, 95% CI 1.2 to 2.2), >10 lifetime sex partners at baseline (PR=1.6; 95% CI 1.2 to 2.4) and alcohol or other drug use with sex partners during the recall period (PR=1.8; 95% CI 1.4 to 2.4) were associated with prevalence; male sex (RR=1.7; 95% CI 1.1 to 2.6), Hispanic race/ethnicity (RR=1.8, 95% CI 1.1 to 3.1) and alcohol and other drug use during the same recall period (RR=2.1, 95% CI 1.2 to 3.5) were also associated with incident concurrency.

Participants with PPNM were also more likely to report concurrency during the subsequent recall period (ie, 'distant PPNM'; PR=1.9; 95% CI 1.5 to 2.4 for concurrency prevalence; RR=1.4; 95% CI 0.9 to 2.3 for concurrency incidence; table 3). The corresponding adjusted ratios were 1.6 (95% CI 1.3 to 2.0) for concurrency prevalence and 1.2 (95% CI 0.6 to 2.3) for concurrency incidence. In adjusted models: male sex (PR=1.8; 95% CI 1.4 to 2.4) and >10 lifetime sex partners at baseline (PR=1.8; 95% CI 1.2 to 2.7) were also associated with concurrency prevalence; male sex (RR=2.0; 95% CI 1.2 to 3.4) was associated with concurrency incidence.

Of the 92 recall periods (involving 90 participants) with incident concurrency, 43 (46.7%) had either distant or recent PPNM.

DISCUSSION

In this paper, we present concurrency estimates from a longitudinal study of high-risk heterosexual young adults. Our estimates are consistent with the proposition that PPNM is an important motivational factor for concurrency in this sample. This association may include cases of reactive concurrency, thought to be a high-risk form of concurrency motivated by jealousy and/or the desire to establish equity.[12] The longitudinal design of POPD offered several advantages, including relatively short recall periods, which likely improved recall accuracy; the opportunity to analyse both concurrency prevalence and incidence and the ability to estimate associations between PPNM and concurrency during the same recall period and after a 4-month lag.

Many participants engaged in concurrency, defined as overlap in dates of first and last sex with different partners. Our 4-month prevalence estimates, which ranged from 23% to 39%, are similar to those in other studies among young adults and adolescents.[9 16] Additionally, even when calculated over a relatively short period, 4-month concurrency incidence was quite high in our sample, ranging from 9% to 18%. As concurrency has been shown to be

associated with individual and population-level STI risk,[517] these estimates are consistent with the high-risk status of our population.

PPNM was associated with both prevalent and incident concurrency. Those recently perceiving a partner to be non-monogamous were more than four times as likely as those who did not to initiate concurrency during the same 4-month period. Associations with PPNM have been previously observed,[101218–20] although these studies could not determine a temporal relationship. By looking specifically at incident concurrency, we were able to investigate whether PPNM preceded concurrency. Comparing dates of partnership for participants with recent PPNM and incident concurrency, we found that for 22 participants (67%), concurrency possibly or likely began after the partnership with PPNM. Further, since the association was much stronger for incident concurrency with recent PPNM than distant PPNM, an effect of PPNM on incident concurrency may operate in a short time frame. However, since data were not obtained about the specific reasons for initiating a concurrent partnership, whether PPNM itself was the motivation could not be inferred with certainty. For example, rather than reflect reactive concurrency, the PPNM may reflect a mutual non-monogamy agreement (reciprocal concurrency).[12] To further explore the relationship between PPNM and concurrency, future research should address partnership-specific motivations for initiating relationships, and examine this association in other populations.

As many as 12% of participants did not have PPNM data at an interview because all of their partnerships during the recall period had terminated. We explored the potential impact of the missing PPNM data by conducting a sensitivity analysis that treated participants with no PPNM data for this reason as positive for PPNM and then as negative for PPNM. Because participants having only terminated partnerships were not likely to have concurrent partnerships, both sensitivity analysis scenarios yielded results similar to the original estimates. Though PPNM data were not obtained for any terminated partnerships, since PPNM was a composite measure across all partnerships for each participant, this lack of PPNM information could only understate a participant's PPNM.

As many other studies, our study also relies on retrospectively recalled dates of first and last sex. Such reporting is subject to memory failure, imprecision and recall bias.[21–23] However, because of the relatively short recall period, we expect these problems to be less serious than in studies asking participants to report partnerships over the past year or even longer. Another variable where self-report may not map directly to behaviour is PPNM, where incongruities between perception of partner behaviour with partners' reported behaviour have been well documented.[161824–27] Data from dyadic studies suggest that the positive predictive value of PPNM is 46%–69%, that is, among those who perceive a partner to be non-monogamous, the perception is congruent with the partners' reported behaviour 46%[25] to 69%[16] of the time. The negative predictive value ranges from 73% to 82%, that is, among those who perceive their partners to be monogamous, the perception is congruent 73%[25] to 82%[16] of the time. However, even an incongruent perception that one's partner is non-monogamous has been found to be associated with concurrency[161828] and STI risk,[18] as perceptions drive behaviour.

Because young adults who perceive partner non-monogamy may be more likely to initiate risky sexual behaviour, perception of partner non-monogamy may be a clinically useful indicator of STI/HIV risk, whether or not the perception is accurate. The substantial inaccuracy of perceptions that a partner is non-monogamous raises the possibility that improving the accuracy of monogamy perceptions may lead to behaviour that, in turn, reduces STI risk. For example, correctly perceiving that a partner is monogamous may avoid the impulse for reactive concurrency, and correctly perceiving that a partner is non-monogamous may motivate termination of the partnership or greater use of condoms. Among young adults, a population for which explicit monogamy or non-monogamy expectations may be rare,[29] interventions which build relationship skills may improve communication and increase accuracy of perceived partner behaviour.

Conclusion

Overall, these data suggest that PPNM may motivate young adults to initiate concurrency, within a relatively narrow time window. Our findings highlight the importance of PPNM as a risk factor, and the possible benefit of relationship-level interventions dealing with partnership communication surrounding monogamy expectations.
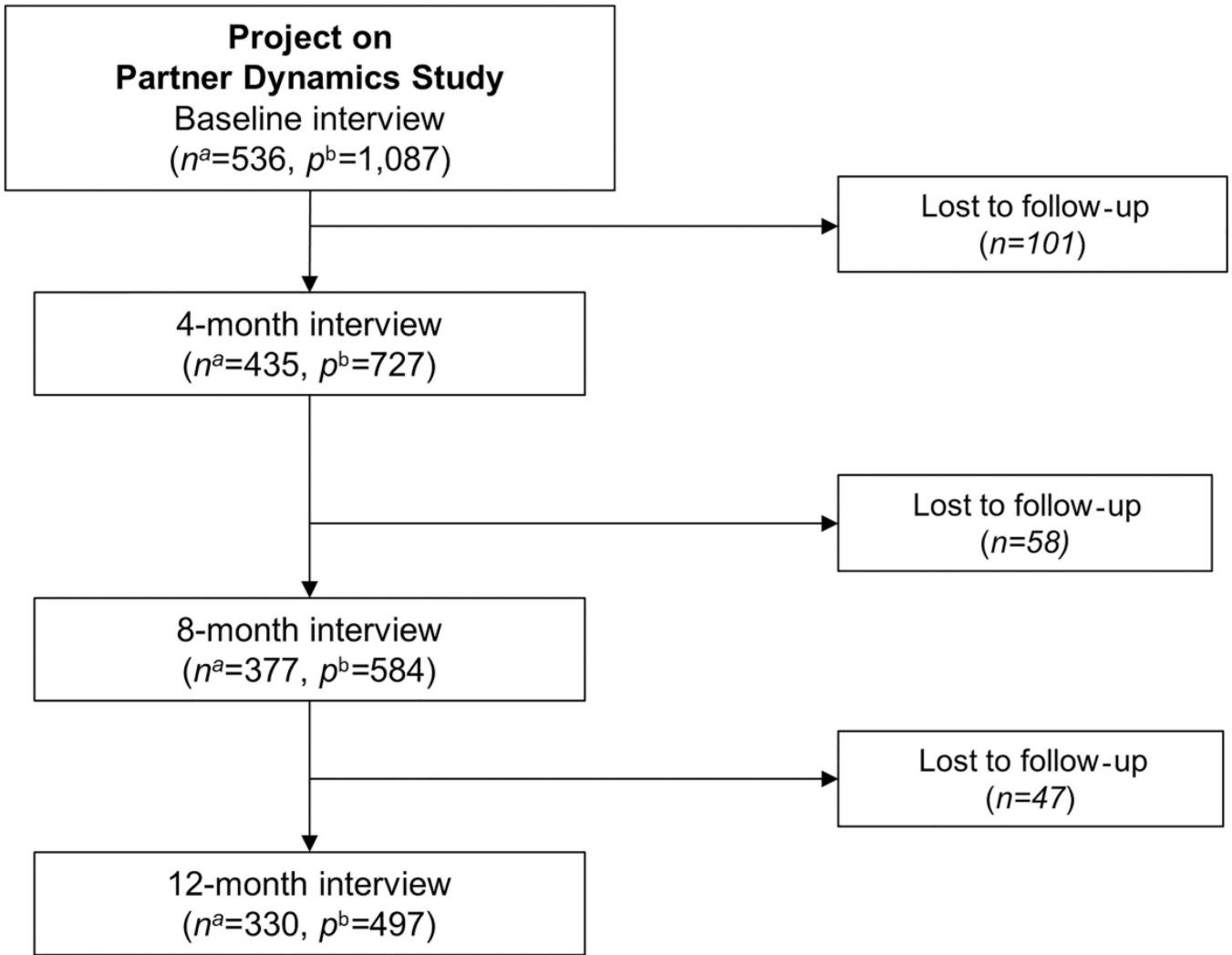
Acknowledgments

REFERENCES

1. Potterat JJ, Zimmerman-Rogers H, Muth SQ, et al. Chlamydia transmission: concurrency, reproduction number, and the epidemic trajectory. Am J Epidemiol. 1999; 150:1331–1339. [PubMed: 10604776]

2. Koumans EH, Farley TA, Gibson JJ, et al. Characteristics of persons with syphilis in areas of persisting syphilis in the United States. Sex Transm Dis. 2001; 28:497–503. [PubMed: 11518865]

3. Doherty IA, Minnis A, Auerswald CL, et al. Concurrent partnerships among adolescents in a Latino community: the Mission District of San Francisco, California. Sex Transm Dis. 2007; 34:437–443. [PubMed: 17195772]

4. Watts CH, May RE. The influence of concurrent partnerships on the dynamics of HIV/AIDS. Math Biosci. 1992; 108:89–104. [PubMed: 1551000]

5. Morris M, Kretzschmar M. Concurrent partnerships and the spread of HIV. AIDS. 1997; 11:641–648. [PubMed: 9108946]

6. Rosenberg MD, Gurvey JE, Adler NE, et al. Concurrent sex partners and risk for sexually transmitted diseases among adolescents. Sex Transm Dis. 1999; 26:208–212. [PubMed: 10225587]

7. Adimora A, Schoenbach VJ, Taylor EM, et al. Concurrent partnerships, nonmonogamous partners, and substance use among women in the United States. Am J Public Health. 2011; 101:128–136. [PubMed: 20724694]

8. Adimora AA, Schoenbach VJ, Doherty IA. Concurrent sexual partnerships among men in the United States. Am J Public Health. 2007; 97:2230–2237. [PubMed: 17971556]

9. Rosenberg MD, Gurvey JE, Adler NE, et al. Concurrent sex partners and risk for sexually transmitted infections among adolescents. Sex Transm Dis. 1999; 26:208–212. [PubMed: 10225587]

10. Adimora AA, Schoenbach VJ, Taylor EM, et al. Concurrent partnerships, nonmonogamous partners, and substance use among women in the United States. Am J Public Health. 2011; 101:128–136. [PubMed: 20724694]

11. Javanbakht M, Gorbach PM, Amani B, et al. Concurrency, sex partner risk, and high-risk human papillomavirus infection among African American, Asian, and Hispanic women. Sex Transm Dis. 2010; 37:68–74. [PubMed: 19823110]

12. Gorbach PM, Stoner BP, Aral SO, et al. "It Takes a Village" Understanding concurrent sexual partnerships in Seattle, Washington. Sex Transm Dis. 2002; 29:453–462. [PubMed: 12172529]

13. Kretzschmar M, White RG, Carael M. Concurrency is more complex than it seems. AIDS. 2010; 24:313–315. [PubMed: 19898215]

14. Zou GY, Donner A. Extension of the modified Poisson regression model to prospective studies with correlated binary data. Stat Methods Med Res. 2013; 22:661–670. [PubMed: 22072596]

15. Greenland S. Model-based estimation of relative risks and other epidemiologic measures in studies of common outcomes and in case-control studies. Am J Epidemiol. 2004; 160:301–305. [PubMed: 15286014]

16. Swartzendruber A, Niccolai LM, Jennings JM, et al. Perceptions about sexual concurrency and factors related to inaccurate perceptions among pregnant adolescents and their partners. Sex Transm Dis. 2012; 39:577–582. [PubMed: 22801338]

17. Kelley S, Borawski E, Flocke S, et al. The role of sequential and concurrent sexual relationships in the risk of sexually transmitted diseases among adolescents. J Adolesc Health. 2003; 32:296–305. [PubMed: 12667734]

18. Drumright LN, Gorbach PM, Holmes KK. Do people really know their sex partners? Sex Transm Dis. 2004; 31:437–442. [PubMed: 15215701]

19. Hess KL, Gorbach PM, Manhart LE, et al. Risk behaviors by type of concurrency among people in three STI clinics in the United States. Sex Health. 2012; 9:280–287. [PubMed: 22697146]

20. Senn TE, Scott-Sheldon LA, Seward DX, et al. Sexual partner concurrency of urban male and female STD clinic patients: a qualitative study. Arch Sex Behav. 2011; 40:775–784. [PubMed: 21052812]

21. Brewer DD, Rothenberg RB, Muth SQ, et al. Agreement in reported sexual partnership dates and implications for measuring concurrency. Sex Transm Dis. 2006; 33:277–283. [PubMed: 16641820]

22. Aral SO. Sexual risk behaviour and infection: epidemiological considerations. Sex Transm Infect. 2004; 80(Suppl 2):ii8–ii12. [PubMed: 15572645]

23. Fenton KA, Johnson AM, McManus S, et al. Measuring sexual behavior: methodological challenges in survey research. Sex Transm Dis. 2001; 77:84–92.

24. Witte SS, El-Bassel N, Gilbert L, et al. Lack of awareness of partner STD risk among heterosexual couples. Perspect Sex Reprod Health. 2010; 42:49–55. [PubMed: 20415886]

25. Lenoir CD, Adler NE, Borzekowski DL, et al. What you don't know can hurt you: perceptions of sex-partner concurrency and partner-reported behavior. J Adolesc Health. 2006; 38:179–185. [PubMed: 16488813]

26. Stoner BP. Avoiding risky sex partners: perception of partners' risks v partners' self-reported risks. Sex Transm Infect. 2003; 79:197–201. [PubMed: 12794201]

27. Witte SS, El-Bassel N, Gilbert L, et al. Predictors of discordant reports of sexual and HIV/sexually transmitted infection risk behaviors among heterosexual couples. Sex Transm Dis. 2007; 34:302–308. [PubMed: 17016237]

28. Riehman KS, Wechsberg WM, Francis SA, et al. Discordance in monogamy beliefs, sexual concurrency, and condom use among young adult substance-involved couples: implications for risk of sexually transmitted infections. Sex Transm Dis. 2006; 33:677–682. [PubMed: 16688099]

29. Warren JT, Harvey SM, Agnew CR. One love: explicit monogamy agreements among heterosexual young adult couples at increased risk of sexually transmitted infections. J Sex Res. 2012; 49:282–289. [PubMed: 21191869]

Key messages

► Perception of partner's non-monogamy is an important factor to consider in understanding initiation of concurrent sexual behaviour.

► Recently perceiving partner's non-monogamy was strongly associated with incident concurrency, suggesting that concurrency may be stimulated quickly by perceived partner non-monogamy.

► As perception of partner non-monogamy may not accurately reflect partner's behaviour, programmes which promote relationship communication skills and explicit monogamy expectations may help reduce concurrency.

Project on Partner Dynamics Study
Baseline interview
(n^a=536, p^b=1,087)

Lost to follow-up
(n=101)

4-month interview
(n^a=435, p^b=727)

Lost to follow-up
(n=58)

8-month interview
(n^a=377, p^b=584)

Lost to follow-up
(n=47)

12-month interview
(n^a=330, p^b=497)

Figure 1.
Project on Partner Dynamics study participants and participant-reported partnerships throughout 1 year of follow-up. (a) Representation of the total number of participants in the study at each interview. All of these participants were eligible for prevalence analyses. However, 176, 256 and 242 participants were ineligible at 4-month, 8-month and 12-month incidence analyses because they were concurrent in the previous interval. (b) Representation of the number of unique partnerships with valid data reported by participants present at each interview, after excluding partnership reports with missing, out-of-range or irreconcilable partnership date data: 5, 56, 43 and 31 partnerships at baseline, 4-month, 8-month and 12-month interviews, respectively.

Table 1

Selected baseline characteristics of 536 participants enrolled in the Project on Partner Dynamics, Los Angeles, California, USA, 2006–2009

Characteristic	No.*	Percentage
Birth sex		
Female	275	51.3
Male	261	48.7
Age (years)[†]	23 (3.8)	
18–24	336	62.7
25–30	200	37.3
Race/ethnicity		
White, non-Hispanic	159	29.7
Black, non-Hispanic	151	28.2
Hispanic/Latino	149	27.8
Other	77	14.4
Age at sexual debut (years)[†]	16 (2.6)	
15	192	35.9
16–18	269	50.3
>18	74	13.8
Number of sex partners, lifetime[†]	15 (18.9)	
1	19	3.6
2–5	138	25.8
6–10	146	27.3
11–49	196	36.7
>49	35	6.6
Number of sex partners, past 4 months[†]	2 (1.5)	
1	245	45.7
2	151	28.2
>2	140	26.1
Alcohol or other drug use during sex[‡]		
Yes	399	74.6
No	136	25.4
History of STD diagnosis		
Yes	134	25.0
No	398	74.3
Do not know	4	0.8
History of injection drug use		
Yes	11	2.1
No	525	98.0
Sex with an injection drug user, ever		
Yes	53	9.9

Characteristic	No.[*]	Percentage
No	453	84.5
Do not know	30	5.6

[*] Total number of non-missing observations. Missing observations: number of sex partners in lifetime (2); age at sexual debut (1); alcohol and other drug use in the past 4 months (1).

[†] Mean and (SD). Median and (IQR) were age, 23(6); age at sexual debut, 16(3); number of sex partners in lifetime, 9(13) and number of sex partners in the past 4 months, 2(2).

[‡] Defined as reported alcohol and other drug use during sex with one or more partners in the past 4 months at the baseline interview.

Table 2

Prevalence and incidence of concurrent sexual partnerships among 536 participants enrolled in the Project on Partner Dynamics, Los Angeles, California, USA, 2006–2009

	Prevalent concurrency[*]		Incident concurrency[†]	
	No.[‡]	Percentage	No.[‡]	Percentage
Baseline	208/536	38.8	–	–
4-months	119/435	27.4	22/259	8.5
8-months	87/377	23.1	27/255	10.6
12-months	84/330	24.5	43/242	17.8

[*] For each participant, prevalent concurrency at each interview was defined by an overlap in reported sexual partnership dates during the recall period preceding the interview.

[†] Incident concurrency was defined as overlap in sexual partnership dates for participants, among those with no overlap during the recall period preceding the previous interview.

[‡] Denominators for prevalence are all participants interviewed about the preceding recall period. Denominators for incidence are participants who were not concurrent during the recall period preceding the previous interview.

Table 3

Unadjusted associations of selected participant characteristics with prevalent and incident concurrencies among 536 participants enrolled in the Project on Partner Dynamics, Los Angeles, California, USA, 2006–2009

Characteristic	Prevalent concurrency			Incident concurrency		
	Prevalence (%)†	PR	95% CI	Incidence (%)†	RR	95% CI
Birth sex						
Female	17.1	Ref		9.5	Ref	
Male	35.2	2.1	1.6 to 2.7**	16.5	1.7	1.2 to 2.6**
Age (years)						
18–24	27.0	Ref		14.2	Ref	
25–30	23.2	0.9	0.7 to 1.1	9.2	0.6	0.4 to 1.0
Race/ethnicity						
White, non-Hispanic	24.6	Ref		12.7	Ref	
Black, non-Hispanic	25.2	1.0	0.7 to 1.5	11.1	0.9	0.5 to 1.5
Hispanic/Latino	28.1	1.1	0.8 to 1.6	15.7	1.2	0.8 to 2.0
Other	23.4	1.0	0.6 to 1.5	7.0	0.6	0.3 to 1.2
Age at sexual debut (years)						
15	31.3	1.4	1.1 to 1.8**	15.6	1.5	1.0 to 2.2
>15	22.4	Ref		10.7	Ref	
Number of sex partners, lifetime						
1–5	15.2	Ref		8.0	Ref	
6–10	20.1	1.3	0.9 to 2.0	12.6	1.6	0.9 to 2.7
>10	36.0	2.4	1.6 to 3.4**	14.8	1.9	1.1 to 3.0*
Alcohol or other drug use with 1+partners, 0–4 months ago						
Yes	31.4	2.0	1.5 to 2.6**	16.3	2.3	1.4 to 3.6**
No	15.9	Ref		7.2	Ref	
Alcohol or other drug use with 1+partners, 4–8 months ago						
Yes	27.9	1.5	1.1 to 2.0**	12.4	1.2	0.8 to 1.9
No	18.9	Ref		10.5	Ref	
Perceived partner non-monogamy, 0–4 months ago						

Characteristic	Prevalent concurrency			Incident concurrency		
	Prevalence (%)[†]	PR	95% CI	Incidence (%)[†]	RR	95% CI
Yes	48.8	2.7	2.1 to 3.4 [**]	33.2	4.6	3.0 to 7.0 [**]
No	18.1	Ref		7.2	Ref	
Perceived partner non-monogamy, 4–8 months ago						
Yes	36.8	1.9	1.5 to 2.4 [**]	15.3	1.4	0.9 to 2.3
No	19.5	Ref		10.8	Ref	

[*]
p<0.05.

[**]
p<0.01.

[†]Concurrency was defined as having overlapping partnerships during the 4-month recall period. Incident concurrency was defined as concurrency among participants who were not concurrent during the preceding recall period (ie, 4–8 months ago).

PR, prevalence ratio; RR, risk ratio.