

## Beliefs as predictors of condom use by injecting drug users in treatment

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### Abstract

This study was conducted to clarify (1) the extent to which health beliefs selected from Protection Motivation Theory can combine to correctly classify 72 injecting drug users (IDUs) as condom users or non-users and (2) which of the beliefs ('vulnerability to a regular partner', 'vulnerability to a casual partner', 'self-efficacy', 'response efficacy', 'response costs' and 'social norms') were most influential in this distinction. Results of a logistic regression indicated that these beliefs were significant predictors of condom use. Overall, 83.3% of participants were correctly classified according to condom use, with condom 'non-users' being more accurately predicted (94.0%) than 'users' (59.1%). 'Vulnerability to a regular partner' and 'social norms' were significant multivariate and univariate predictors of condom use, and 'response costs' were significant univariate predictors. IDUs were confident of their ability to use condoms, considered themselves highly vulnerable to HIV infection from casual partners and were confident in the efficacy of condoms to protect them from AIDS. However, the majority of IDUs were not condom users, particularly with 'regular' partners. Findings suggest that HIV prevention programmes should target beliefs regarding risks from

known partners, perceived norms and negative consequences of condom use in order to increase condom use by IDUs in treatment.

### Introduction

Injecting drug users (IDUs) continue to engage in needle use practices that place them at risk for HIV infection (Crofts *et al.*, 1999). There is therefore increased risk of HIV infection from unprotected sex with them. Sexual contact with IDUs has been identified as the primary source of HIV infection for non-drug using heterosexuals (Rhodes and Quirk, 1995). Whilst risky needle use by IDUs has decreased (Loxley *et al.*, 1992), their sexual behavior has proved consistently more difficult to modify [e.g. (Loxley and Hawks, 1994)]. IDUs of particular interest are those who are sexually active and whose sexual behavior places them or their partners at risk, but who do not belong to traditionally high sexual risk groups (such as homosexual men or sex workers). Not identifying with one of these high-risk groups may be part of the reason that, while many in these identified groups have begun to change the safety of their sexual practices, IDUs as a whole have not (Ekstrand and Coates, 1990; Loxley and Hawks, 1994). Studies indicate that condom use is low (Loxley, 2000) and partner change rates relatively high in IDUs (Rhodes and Quirk, 1995). There is a need to improve understanding of factors underlying condom use in IDUs, to better inform future intervention efforts (Chapman, 1997).

Health-related beliefs have been considered when attempting to discern important influences on condom use and have accounted for significant

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amounts of variance in AIDS-relevant sexual behavior in other populations [e.g. 49% in gay men (Van der Velde and Van der Pligt, 1991)]. They are particularly important since they are altered more easily than other factors also associated with condom use (e.g. demographics) and interventions manipulating particular beliefs have lead to changes in AIDS-relevant behaviors [e.g. (Raghubir and Menon, 1998)].

Protection Motivation Theory (PMT) (Rogers, 1983) is one of a number of models of health-protective behaviors which has been applied to understanding condom use [e.g. by undergraduate students (Dinoff and Kowalski, 1999)]. PMT identifies 'vulnerability', 'self-efficacy', 'response efficacy', 'response costs' and 'social norms' (as a reward of maladaptive behavior) as key in eliciting 'protection motivation', which is measured by 'intentions to engage in an adaptive behavior' [in this case, condom use] (Rogers, 1983). Certain modifications of PMT in application to understanding condom use may be warranted, however. It appears that *actual* condom use is likely to be a better dependent variable than intentions to use condoms, since beliefs predicting these two can differ [e.g. Bryan *et al.*, 1997; Godin *et al.*, 1997]. In addition, perceived 'severity' (of the consequences of developing AIDS) is also identified by PMT as an important predictor of health behavior, but is likely to be uniformly high, and therefore not useful when attempting to distinguish condom users and non-users [e.g. (Aspinwall *et al.*, 1991)].

To our knowledge, PMT has never been applied to predicting IDUs' condom use and the studies where sexual behavior/intentions of IDUs have been associated with various beliefs broadly similar to those identified within PMT have certain methodological constraints [e.g. (Kenen and Armstrong, 1992; Kowalewski *et al.*, 1994; Loxley and Hawks, 1994; Bowen and Trotter, 1995; Corby *et al.*, 1996; Lauby *et al.*, 1998; Loxley, 2000)]. Beliefs were not always related to condom use (as opposed to intentions), they were not always quantified making it difficult to systematically compare the relative impact of particular beliefs

[e.g. (Kenen and Armstrong, 1992)], were measured using only one item, compromising the reliability of the measure [e.g. (Abdul-Quader *et al.*, 1990)] or when quantified were not always considered in the context of other beliefs (i.e. using a multivariate model) which compromises interpretation of results [*cf.* (Tabachnick and Fidell, 1996)]. Results from participants from a variety of risk categories were sometimes collapsed [e.g. (Kasprzyk *et al.*, 1998)], and operationalization of beliefs differed widely and were not always consistent with that of PMT or any identified theory.

Nonetheless, certain tentative observations can be drawn from results. 'Social norms' and 'self-efficacy' were most consistently associated with condom use [e.g. (Lauby *et al.*, 1998; Loxley, 2000)], having modest-moderate correlations with IDUs' intentions to use [e.g. 'social factors'  $r = 0.20-0.33$  (Kowalewski *et al.*, 1994); 'perceived behavioral control'  $\beta = 0.28-0.50$  (Corby *et al.*, 1996)]. 'Vulnerability' was a somewhat inconsistent predictor [e.g. (Kowalewski *et al.*, 1994)], perhaps as a result of the way in which the variable has been operationalized. Rogers (Rogers, 1983) indicates that 'vulnerability' should be specifically tied to the health behavior and research additionally suggests that it should also be tied to a specific partner ('I might get AIDS if I don't wear condoms with my regular/casual partner'), rather than an abstract probability [e.g. '[what is your] perceived risk of getting AIDS?' (Bowen and Trotter, 1995)] [*cf.* (Bosga *et al.*, 1995; Reisen and Poppin, 1999)]. Thus, there is a need to (1) clarify the extent to which PMT health beliefs can correctly classify IDU condom users and non-users, and (2) clarify which of the health beliefs examined are most influential in this distinction using methodology which addresses some of the difficulties from previous research. The present study aims to address these needs.

### Hypotheses

Hypothesis 1. The PMT beliefs will combine to distinguish condom users and non-users.

**Table I.** Sample characteristics: sex, recruitment site and partner type (%) (n = 72)

Sex	male	69.4
	female	30.6
Recruitment site	methadone maintenance	83.3
	in-patient detoxification	6.9
	residential rehabilitation	9.7
Partner type	regular only	58.3
	regular and casual	19.4
	casual only	22.2

- Hypothesis 2. 'Self-efficacy' and 'social norms' will be the strongest individual predictors of IDU condom use status.
- Hypothesis 3. Condom use with regular partners will be predicted by perceptions of vulnerability to HIV infection from regular partners. Condom use with casual partners will be predicted by perceptions of vulnerability to HIV infection from casual partners.

## Methods

### Sample

A total of 117 IDUs were interviewed for the study. Participants were eligible to be included in the analysis if they were heterosexual, non-sex-workers, were not HIV-positive, did not have a sexual partner who was HIV-positive, had not been in a monogamous relationship for more than 5 years and had had vaginal/penile sex within the 6 months prior to the study. These criterion were applied to obtain a group of sexually active and at-risk individuals, with broadly similar levels of risk of HIV infection. Of the 117 IDUs, 45 participants were excluded for the following reasons: one subject was HIV-positive and homosexual, four were bisexual, six were sex workers, 22 had been in monogamous relationships for more than 5 years and 12 had not had sex in the previous 6 months. Thus, 72 participants were included within the study, representing 61.5% of the original sample.

The sample comprised 69.4% (50) male and 30.6% (22) female participants, with a mean age of 29.9 years (SD = 5.7) (Table I). Participants

were recruited from addiction treatment programmes in Perth, Western Australia in November/December 1993. These included a methadone maintenance programme (83.3%,  $n = 60$ ), an in-patient detoxification center (6.9%,  $n = 5$ ) and a residential rehabilitation unit (9.7%,  $n = 7$ ). Thus, the sample included only IDUs in treatment, with most participants being opiate users who were in daily contact with services over an extended period (i.e. the methadone maintenance programme) and who had received AIDS-relevant information and HIV testing.

Participants reported that they had had sex with exclusively regular partners (58.3%,  $n = 42$ ), both regular and casual partners (19.4%,  $n = 14$ ), and only casual partners (22.2%,  $n = 16$ ) in the month in which they had last had sex.

### Procedure

Participants were approached at the treatment centers. After being assured of the confidentiality and anonymity of their responses, the interviewer read the questions to subjects (due to reported high levels of functional illiteracy in this population) (Turner *et al.*, 1989) and they completed the questionnaire. Ethical clearance was obtained from the relevant body at the University of Western Australia before data collection commenced.

### Measures

The questionnaire requested information including demographics (e.g. age, sex), belief indices, condom use and other sexual behavior, and the selection criteria (e.g. HIV status).

#### *Belief indices*

Measures of beliefs related to HIV/AIDS and condoms were rated using either four or five statements on a seven-point Likert-type scale with end points 'strongly agree' and 'strongly disagree'. Some statements were worded 'negatively' in order to avoid artificially high consistency within responses. Statements were adapted from scales utilized in previous research on health behaviors (Table II).

**Table II.** *Items comprising belief indices*

Vulnerability	<ol style="list-style-type: none"> <li>1. There's a good chance I will get AIDS if I don't use condoms [with my regular/with a casual partner(s)]</li> <li>2. If I didn't use condoms, I would be no more likely to get AIDS than anyone else [with my regular/with a casual partner(s)]</li> <li>3. I am at risk of getting AIDS if I don't use condoms [with my regular/with a casual partner(s)]</li> <li>4. My chances of getting AIDS is small, even if I don't take precautions [with my regular/with a casual partner(s)]</li> </ol>
Personal efficacy	<ol style="list-style-type: none"> <li>1. I can discuss using condoms for AIDS protection with a partner, even when other methods of contraception are being used</li> <li>2. I do not feel comfortable discussing precautions against AIDS with either a doctor or a counselor</li> <li>3. I feel comfortable carrying condoms around with me, 'just in case'</li> <li>4. I feel comfortable buying condoms</li> <li>5. I am able to discuss using condoms with potential partners</li> </ol>
Response efficacy	<ol style="list-style-type: none"> <li>1. Regular use of condoms is an effective method of protection from HIV infection</li> <li>2. Using condoms regularly will not drastically decrease my chances of HIV infection</li> <li>3. Using condoms decreases my chances of getting AIDS</li> <li>4. Using condoms doesn't affect my chances of getting AIDS</li> </ol>
Response costs	<ol style="list-style-type: none"> <li>1. I don't like condoms</li> <li>2. Sex feels just as good if I use condoms</li> <li>3. I don't like condoms, because they interfere with 'spontaneity' in sex</li> <li>4. My partners usually don't mind using condoms</li> </ol>
Social norms	<ol style="list-style-type: none"> <li>1. Most of my friends use condoms regularly</li> <li>2. Not many people I know use condoms regularly</li> <li>3. My friends would approve of me using condoms</li> <li>4. Most of my friends who inject drugs don't use condoms regularly</li> </ol>

- *Vulnerability—regular partner and vulnerability—casual partner.* 'Vulnerability' refers to perceptions of risk of being infected with HIV if the recommended behavior is not adopted (Rogers, 1983). As mentioned, 'vulnerability' has been found to differ according to the type of partner (e.g. a regular partner or a casual one) and was therefore assessed separately for two partner types (regular '*vulner[regular]*' and casual '*vulner[casual]*') using four statements for each type [adapted from (Rippetoe and Rogers, 1987)]. 'Regular partner' was defined as a person with whom a 'steady' sexual relationship had been formed. 'Casual partner' was defined as a partner with whom sex was irregular. The statements were concerned with perceptions of risk of HIV infection from unprotected sex.
- *Self-efficacy.* Within PMT, 'self-efficacy' refers to beliefs about ability and effort required to carry out the recommended health behavior (Rogers, 1983; Rogers and Prentice-Dunn, 1997). Beliefs of perceived 'self-efficacy' were rated on five statements, based on a measure

used by Rosenthal *et al.* (Rosenthal *et al.*, 1989). Statements were concerned with subjects' perceptions of their ability to use condoms for AIDS protection.

- *Response efficacy.* 'Response efficacy' is related to the belief that a recommended action is able to avert an undesirable threat (Rogers, 1983). Response efficacy was assessed using four statements adapted from Rippetoe and Rogers (Rippetoe and Rogers, 1987). The statements were concerned with respondents' perception of the ability of condoms to protect them from HIV infection.
- *Response costs.* 'Response costs' of a health behavior are related to the consequences of such action which decrease the probability that the behavior will be consistently adopted (Rogers, 1983). Although this definition could encompass all other measures suggested by PMT, Rogers (Rogers, 1983) provides examples that help clarify the nature of this variable (e.g. monetary cost, inconvenience). 'Response costs' were assessed using four statements adapted from

Jemmott and Jemmott (Jemmott and Jemmott, 1989) and Kenen and Armstrong (Kenen and Armstrong, 1992). Statements were concerned with participants' perceptions of the negative consequences of condom use.

- *Social norms.* 'Social norms' were concerned with participants' perception of the *behavior and attitudes of others* in regard to condoms use. Four statements were used which were adapted from Van der Velde and Van der Pligt (Van der Velde and Van der Pligt, 1991).

#### *Sexual behavior*

Information about sexual behavior was assessed using (1) five questions related to selection criteria (e.g. 'Have you had sex with anybody else [apart from your regular partner] in the last 5 years?') and (2) five questions based on the sexual behavior subscale of the HIV Risk Behavior Scale, including questions related to condom use with regular and casual partners (HRBS) (Darke *et al.*, 1991). On six-point scales, subjects rated how many times they had used condoms when having sex with (1) regular partner(s) ('no regular partner', 'everytime'–'never') and (2) casual partner(s) ('no casual partner', 'everytime'–'never'). The scale was adapted for the present study to measure behavior in *the last month* in which the subject had had sex. (Only results from these questions related to condom use will be presented in the present study.)

#### **Scoring**

##### *Belief indices*

Scores on each of the six belief indices were calculated by summing pertinent ratings (with scores reversed for negatively stated questions). For all indices, a high score was consistent with AIDS risk-reduction behavior.

##### *Condom use*

'Condom use' classification was ascertained using responses to questions regarding use of condoms with regular and casual partners. Because responses to both questions were bi-modally distributed

(Figure 1), participants were classified as either 'users' or 'non-users' of condoms. 'Condom users' were defined as those who reported using condoms with their partners at least 'sometimes'. Thus, 'non-users' were those who indicated that they never or rarely used condoms when having sex with their reported sexual partner. The 14 participants who reported having sex with both regular and casual partners were classified according to their behavior with their regular partner, since this represented the sexual contact with most repeated exposures, which in turn represents a greater risk for HIV infection (Hulley and Hearst, 1989). (Only five of the 14 with both types of partner had different behavior with the two partner types—they were all condom users with casual but not regular partners. A logistic regression was run with these five subjects excluded and results were very similar to those in the present study.)

#### **Data analysis**

To ascertain whether 'condom use' status could be predicted by combination of the belief indices, a multiple logistic regression was conducted.

To enhance the interpretation of this multivariate model, univariate correlations between belief indices and condom use were calculated using Pearson's *r* correlations (Tabachnick and Fidell, 1996).

To ascertain the ability of perceptions of 'vulnerability to casual/regular partners' to predict condom use with each of these partner types, univariate correlations were calculated using Pearson's *r* correlations.

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## **Results**

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#### **Descriptive statistics**

Table III displays means, SDs and internal reliability (Cronbach's  $\alpha$ ) for each belief index. Scores on vulner[casual], self-efficacy and response efficacy were skewed, with mean above mid-range. Most people perceived themselves to be at high risk of being infected with HIV from a casual partner, were highly confident in their ability to use condoms and were highly confident in the ability of condoms to protect from HIV infection. Further, individuals

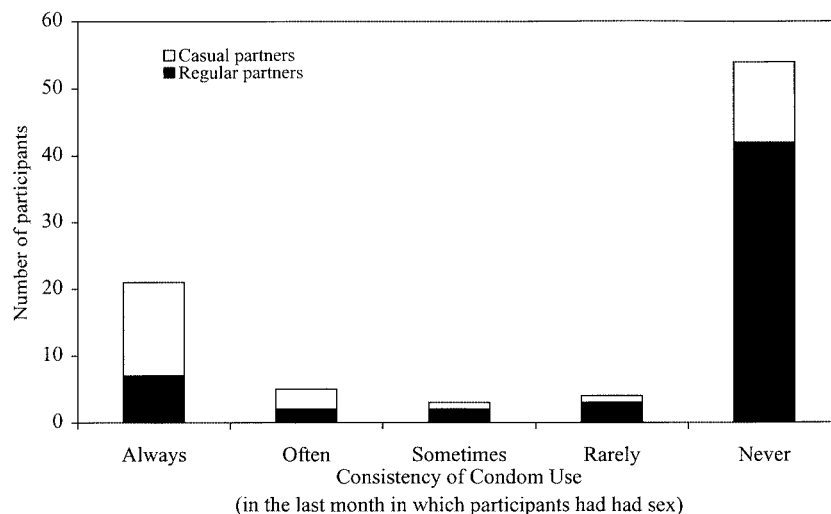


Fig. 1. Consistency of condom use for regular and casual partners.

Table III. Characteristics of belief indices: mean, SD and Cronbach's  $\alpha$

Variable	Mean	(SD)	Range	Cronbach's $\alpha$
Vulner[regular]	12.5	(7.0)	5–28	0.86
Vulner[casual]	23.5	(4.0)	10–28	0.63
Personal efficacy	29.8	(5.2)	15–35	0.64
Response efficacy	24.2	(3.3)	18–28	0.42
Response costs	14.1	(5.6)	5–28	0.63
Social norms	15.5	(4.2)	7–28	0.64

perceived themselves to be at greater risk from unprotected sex with casual partners than regular. All belief indices had acceptable internal reliability scores, except 'response efficacy'.

### Participant behavior

A minority of the sample were classified as 'condom users' (30.6%,  $n = 22$ ), with most being 'non-users' (69.5%,  $n = 50$ ). Table IV illustrates differences in condom use according to partner type. Of the 56 participants reporting sex with regular partners, 21.4% were condom users and 78.6% were condom non-users. In contrast, of the 30 participants who had sex with casual partners, 56.7% of participants were condom users and 43.3% were non-users (Table IV).

Table IV. Condom-use status by partner type (%)

	Condom users	Condom non-users
Sex with regular partners ( $n = 56$ )	21.4	78.6
Sex with casual partners ( $n = 30$ )	56.7	43.3

### Evaluation of the model

A logistic regression was conducted in order to evaluate the model, which demonstrated that the model could predict whether participants were users or non-users of condoms (Model  $\chi^2(6) = 21.7$ ,  $P = 0.0014$ ). Overall, 83.3% of the cases were correctly classified as either 'users' or 'non-users' (Table V). In addition, the model was able to predict condom non-users more accurately than users (94.0 versus 59.1%). This should be considered in light of the fact that 69.4% of subjects could be correctly classified by chance (since 69.4% of subjects were non-users). Thus, the model increased the probability of correct classification from chance by a similar proportion for each outcome (69.4–94.0% for non-users and 30.6–59.1% for users).

Perceptions of vulnerability to infection from a regular partner ('vulner[regular]') and perceptions

**Table V.** Observed and predicted classifications for condom users and non-users

Observed	Predicted		Percentage correctly classified
	User	Non-user	
User	13	9	59.1
Non-user	3	47	94.0
Overall			83.3

-2Loglikelihood (-2LL) of model did not differ significantly from zero -2LL ( $\chi^2 = 67.0$ ).

**Table VI.** B and Wald values for individual predictors of condom use within the logistic regression equation

	B	SE	Wald	Significance
Vulner[regular]	-0.1	0.05	5.5	0.02
Social norms	-0.2	0.08	4.1	0.04
Response costs	-0.1	0.07	3.3	0.07
Response efficacy	0.1	0.11	1.7	0.20
Personal efficacy	-0.1	0.08	1.5	0.22
Vulner[casual]	0.1	0.09	0.7	0.41

of normative support for condom use ('social norms') were the only variables which contributed significantly to the prediction of condom use when all other variables were in the equation ( $B = -0.1$ ,  $Wald = 5.5$ ,  $P = 0.02$  and  $B = -0.2$ ,  $Wald = 4.1$ ,  $P = 0.04$  for 'vulner[regular]' and 'social norms', respectively; Table VI). People were more likely to be condom users if they thought they were at risk from unprotected sex with regular partners or those who perceived that normative support existed for condom use.

### Univariate correlations

A matrix of the correlations between belief indices and condom use was calculated (Table VII). Moderate significant correlations were found between condom use and 'vulner[regular]', 'social norms' and 'response costs' ( $r = -0.4$ ,  $P = 0.001$ ,  $r = -0.3$ ,  $P = 0.007$  and  $r = -0.4$ ,  $P = 0.001$ , respectively). Those who perceived themselves to be vulnerable to infection from regular partners perceived support from others for condom use and

**Table VII.** Univariate correlations between belief indices and condom use

Variables	1	2	3	4	5	6
1 Vulner[regular]						
2 Vulner[casual]	0.1					
3 Personal efficacy	0.1	0.4 <sup>b</sup>				
4 Response efficacy	0.1	0.4 <sup>b</sup>	0.4 <sup>b</sup>			
5 Response costs	0.4 <sup>b</sup>	0.3 <sup>b</sup>	0.3 <sup>b</sup>	0.2 <sup>a</sup>		
6 Social norms	0.1	0.4 <sup>b</sup>	0.3 <sup>a</sup>	0.3 <sup>a</sup>	0.3 <sup>a</sup>	
7 Condom use	-0.4 <sup>b</sup>	-0.1	-0.2	-0.02	-0.4 <sup>b</sup>	-0.3 <sup>b</sup>

Significance: <sup>a</sup> $P < 0.05$ ; <sup>b</sup> $P < 0.01$  (one-tailed).

Numbers on the horizontal heading correspond with variable labels in the left column.

perceived low costs associated with condom use were more likely to use them. There were a number of inter-correlations between beliefs.

### Perceptions of vulnerability and partner type

For the 56 IDUs who had had sex with regular partners, condom use with these regular partners was significantly correlated with 'vulner[regular]' ( $r = -0.4$ ,  $P = 0.002$ ). Those who perceived themselves to be vulnerable to infection from regular partners were more likely to be condom users. There were no significant univariate predictors of condom use for the 30 IDUs who had had sex with casual partners.

## Discussion

This study indicated that:

- In general, IDUs did not use condoms consistently, particularly with regular partners.
- Beliefs combined to correctly classify IDUs as condom users or non-users.
- IDUs who did not perceive themselves to be at risk from regular partners, who did not perceive others to support condom use and who perceived higher 'costs' of using condoms were less likely to use them.
- Condom use with regular partners was predicted by perceptions of vulnerability to them. Condom use with casual partners was not significantly

related to perceptions of vulnerability to infection from them.

- IDUs (1) considered themselves to be highly vulnerable to HIV infection from unprotected sex with casual partners, (2) were confident in their ability to use condoms and (3) were confident in the ability of condoms to protect them from HIV.

### Beliefs as predictors

The present study confirmed that IDUs' beliefs regarding HIV and condom use can be used to correctly classify a large proportion of the sample as either 'users' or 'non-users' of condoms, with condom non-users being more accurately predicted than users. Thus, beliefs are important in understanding IDUs' condom use and can inform interventions to increase safer sex in this population. Results also confirmed concerns regarding condom use and sexual behavior by IDUs, whose behavior placed them and their partners at continued risk of HIV infection. Reasons why this might be the case can be considered by examining individual beliefs significant in predicting condom use.

Consistent with results from a qualitative study of a similar population (Loxley 2000), the study found that perceived 'vulnerability to infection from a regular partner' and 'social norms' were the only significant predictors of condom use status. The moderately strong univariate relationship between the two beliefs and condom use was comparable with previous research [e.g. (Kasprzyk *et al.*, 1998)]. The ability of 'vulner[regular]' to predict condom use may be because it refers to risk from specific and familiar (i.e. regular) partners rather than the abstract, global risk suggested by the more anonymous term 'casual partner(s)' [*cf.* (Reisen and Poppin, 1999)]. IDUs (and others) may be inclined to use partner selection, rather than condom use, as their primary protection from HIV infection and rely on their ability to 'tell' if someone is high risk by looking at them (Moore and Rosenthal, 1993; Loxley 2000). Further, several participants mentioned results from HIV screening tests. Negative results from this screening appeared

to provide a sense of security—that since infection has not occurred thus far, both partners were 'safe' and there was no perceived need for behavior change. This is problematic, since a negative result only reflects sero-status 3 months prior to the last test and is only as 'safe' as the protective behavior (sexual and needle use) of both sexual partners since then (Tessier *et al.* 2001). These beliefs should be borne in mind when counseling IDUs regarding HIV behaviors. There may also be a tendency to focus on relative risks from needle use. IDUs might correctly assess that unsafe needle use is more risky than unprotected sex—although a reduced risk does not mean a negligible one (Loxley and Davidson, 1991). Further research could examine needle use and sexual behavior of IDUs and their partners to assess perceived and actual levels of risk, and what influences these.

The findings that (1) condoms are used more often with casual partners than regular, (2) there is generally high perceived risk of infection from casual partners, but that (3) the perception of risk from casual partners does not differentiate users and non-users is interesting. It may be that a heightened sense of risk is understood between casual partners and therefore it is more acceptable to ask an acquaintance to use condoms than a known partner who 'should' be trustworthy. Thus, 'social norms' and 'response costs' may be the more important influence on condom use in casual partnerships. This could be clarified by future research examining predictors of exclusively casual partners.

Our results suggest that although 'response costs' reflect behavior, they are superseded by the individuals' perception of their vulnerability and whether others are using condoms [*cf.* (Lauby *et al.*, 1998)]. It seems that interventions shifting perceptions of risk from *known* partners and of 'social norms' may in turn affect perceptions of the 'costs' of using condoms.

The generally high rating of 'self-efficacy' may explain its unexpected non-significance as a predictor of condom use. Education campaigns may have successfully improved both confidence in condom use and perceived effectiveness of con-



doms in protecting from HIV infection. The low internal reliability of 'response efficacy' makes interpretation of results tentative, however.

The moderately strong inter-correlations between beliefs suggests that there may be conceptual overlap between indices, and/or that individuals are consistent in the degree to which they have 'taken on board' messages related to condom use and HIV infection. In addition, it may mean that intervention efforts influencing one belief may lead to changes in a number of others.

Together, it appears that IDUs in treatment are confident that they are able to use condoms, and believe that they are effective at preventing HIV infection, but (given that they are not at risk from their partners and that no-one else is using them) many do not do so. It appears we need to personalize the risk of HIV infection for individuals from known partners, make condom use the assumed norm within these relationships and to a lesser degree address the perceived costs associated with condom use [*cf.* (Loxley and Davidson, 1998)]. In other populations, interventions have successfully increased people's perceptions of their vulnerability to HIV infection and increased their intentions to use condoms [e.g. (Raghubir and Menon, 1998)], and peer educators may be particularly effective vehicles of change (Loxley 2000).

### **Theoretical and methodological constraints**

PMT and other cognitive models of health behavior have been criticized for ignoring the process of weighing up which is said to take place when deciding whether to use condoms, and assuming that individuals will use them if they understand themselves to be at risk (Loxley and Davidson, 1998). Rogers and Prentice-Dunn (Rogers and Prentice-Dunn, 1997), however, clarify that PMT does not assume rationality in the decision maker, but that decision making is affected by cognitive and motivational biases. Thus, although IDUs may acknowledge that they are somewhat at risk from unprotected sex with a given partner, they will balance this against factors such as the embarrassment of suggesting or insisting on condom use.

Beliefs within the study were correlated with behavior which had occurred up to 6 months prior to participants being interviewed, meaning that beliefs may not have been the same as those held at the time they had had sex. Further, when examining correlational relationships between variables (as in the present study) it is not possible to establish the direction of causality or whether causal mechanisms exist at all. Therefore, it would be preferable to use a longitudinal method to measure beliefs *close* in time and *prior to* sexual encounters [*cf.* (Reisen and Poppen, 1999)].

One of the aims of the present study was to use belief indices with multiple items to improve confidence in the reliability of responses. The only moderate internal reliability of belief indices (especially response efficacy) may have weakened observed relationships between them and condom use. This underlines concerns regarding the reliability of findings from previous research, which rely only on one item to measure particular beliefs, and perhaps suggests that the sample and/or population are less consistent reporters than 'normal' adult populations.

The size of the sample was small and drawn only from clinical populations, which limits the reliability and generalizability of the results and precluded further analysis regarding beliefs predictive of behavior for other subgroups (such as gender and partner type or treatment programme) which may be influential [e.g. (Kazprzyk *et al.*, 1998)]. Being in treatment predicted 'very risky sexual behavior' in women (but not men) in one previous study (Loxley *et al.*, 1998), which may mean the women in the present study population are more risky than female IDUs not in contact with treatment. Future research should use larger samples and could examine beliefs particular to drug use type or programmes, and should seek to include IDUs not in contact with treatment programmes.

These results suggest that interventions to increase condom use should increase the perception of vulnerability to infection from *known* sexual partners and make condom use the assumed 'norm'. Future research should make use of a longitudinal

design examining predictors specific to subgroups within the given population and making use of more reliable measures of beliefs.

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