

HIV-transmission knowledge, five-factor personality traits and psychopathy as determinants of risky sexual behaviors

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On a sample of 203 males and 219 females the effects of HIV-transmission knowledge, five-factor personality traits and three components of psychopathy (antisocial behavior, interpersonal manipulation and impulsive thrill seeking) on overall risky sexual behaviors as well as risky sexual behaviors during previous month were explored by using a series of hierarchical regression analyses. The main hypothesis tested in this research is that psychopathy is an important predictor of risky sexual behaviors beyond and above the knowledge about the consequences of risky sexual behavior and personality traits.

The results show that HIV-transmission knowledge predicts only overall risky sexual behaviors on the sample of men. Five-factor personality traits do not predict either measure of risky sexual behaviors in men and on the sample of women extraversion is a positive predictor of both measures of risky sexual behaviors. Antisocial behavior significantly and positively predicts both criterion variables on the sample of men and on the sample of women impulsive thrill seeking positively predicts only overall risky sexual behaviors. Also, HIV-transmission knowledge predicts both measures of risky sexual behaviors in interaction with interpersonal manipulation only on the sample of women. Women with less HIV-transmission knowledge and high in interpersonal manipulation show a higher increase on both measures of risky sexual behaviors in comparison with women who know more about HIV-transmission.

The results obtained were explained mainly by proximal physiological processes and possible distal evolutionary mechanisms which determine reproductive success and sexual behaviors of men and women.

Key words: HIV-transmission knowledge, five-factor personality traits, psychopathy, risky sexual behaviors

Engaging in risky sexual behaviors can be extremely costly when their physical, emotional, and financial consequences are taken into account. Apart from running the risk of becoming pregnant or getting their partner pregnant, individuals who engage in risky sexual behaviors also increase the likelihood of contracting sexually transmitted diseases (STDs), including HIV. Therefore, increasing HIV-transmission knowledge is a primary goal of educational programs aimed at promoting healthy sexual behaviors and risk-re-

ducing behavioral changes. Knowledge, attitudes, behaviors and practices about HIV transmission have been assessed in the general population of many countries in order to organize preventive programs or change behavioral practices of those with risky behaviors (London & Robles, 2000).

However, it seems that knowledge of the possibility of being exposed to sexual diseases does not always lead to desired behavioral changes in sexually active college students and adolescents (Gray & Saracino, 1989). Namely, studies examining the effects of HIV knowledge on risky sexual behaviors have yielded equivocal results (Keselman, Kaufman, & Patel, 2004; Kotchik, Shaffer, Miller, & Forehand, 2001). Some of them found that greater knowledge about HIV was related to more consistent contraception use (Baker et al., 2003; Bazargan, Kelly, Stein, Husaini, & Bazargan 2000), fewer sexual partners (Zimet, et al., 1992), and increased worry and guilt about the possibility of having been exposed to HIV and/or other STDs following casual sex encounters (Baldwin, Whiteley, & Baldwin, 1990). On the other hand, many studies found no relationship between HIV knowledge and sexual risk-taking (Bachanas et al., 2002; Baldwin et al., 1990, Fisher, Fisher, Williams, & Malloy, 1994; Hol-

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lar & Snizek, 1996; Mahoney, Thombs, & Ford, 1995), and several studies even found that some individuals (especially sexually unrestricted ones) who had more knowledge about safe sex behavioral practices, were more likely to engage in unprotected sexual intercourse (Seal & Agostinelli, 1994). Also, the results of the studies examining the modifications of sexual behavior practices on the basis of HIV-transmission knowledge show that fewer than half of the participants reported consistent use of condoms (Baldwin & Baldwin, 1988; Gray & Saracino, 1991). These results suggest that preventive sexual behaviors are not primarily based only on knowledge about safe sex and transmission of STDs but also that this knowledge does not guide behavior in situations where people are contemplating sexual intercourse. It is possible that one of the reasons why this kind of knowledge is not predictive of sexually risky behaviors is that the decision to engage in them often occurs without rational consideration of the associated risks (Keselman, et al., 2004).

Therefore, it is proposed that high-risk sexual behaviors could be related to some personality variables, which would predict more spontaneous behaviors, and less rational considerations of potential consequences. There are several other reasons why risky sexual behaviors should be studied in relation to personality. First, personality refers to broad dispositions and may help to explain why some individuals engage in risky behaviors. Second, personality is stable over long periods of time, which makes early identification of at-risk individuals possible, and third, understanding which dimensions of personality are most strongly related to risky behavior may suggest who the target of an intervention will be, and how the interventions should be planned (Miller, et al., 2004). Additionally, studies examining the relations between personality and knowledge show that these two domains are relatively weakly related. Only openness to experience is consistently positively related to different types of domain specific knowledge including health knowledge acquisition (Ackerman, Bowen, Beier, & Kanfer, 2001; Beier & Ackerman, 2003).

Generally, research dealing with relations between personality and risky sexual behaviors is often analysed using a single or a few personality traits at a time, neglecting the benefits of using comprehensive taxonomic models of personality, such as the five-factor model. Current results suggest that five factor personality traits are related to several sexual behaviors (e.g. number of partners, use of drugs or alcohol before or during sex, number of sexual intercourses without a condom, giving birth at an early age, sex outside one's primary relationship, early sexual initiation etc.; Miller, et al., 2004). In a number of studies, low agreeableness and conscientiousness, and high extraversion were related to various risky sexual behaviors (Hoyle, Fejfar, & Miller, 2000; Miller, et al., 2004; Trobst, Herbst, Masters, & Costa, 2002; Vollrath, et al., 1999). However, controversial results appear regarding neuroticism. For example, Trobst, Herbst, Masters & Costa (2002) found high neuroticism to be posi-

tively associated with risky sexual behaviors, while Vollrath, et al. (1999) found that individuals high in neuroticism less frequently engage in risky health behaviors, including sexual behaviors, the latter being explained by a greater propensity to anxiety and pessimism and greater health concern of individuals high in neuroticism. Eysenck (1976) argued that anxiety and disgust associated with neuroticism suggest that people high in neuroticism would not engage in much sexual behavior at all, and Zuckerman and Kuhlman (2000) argue that neuroticism-anxiety in their alternative five-factor model is not likely to be related to any risk taking behavior. Openness to experience was not found to be a significant predictor of risky health behavior (Vollrath, et al., 1999), a result explained by an inclination of persons who are open to experience to seek mental or spiritual experiences rather than bodily stimulation provided by risky health behaviors. In one large international study project encompassing 52 countries in 10 world regions, Schmitt (2004) found openness to experience to be inconsistently related to risky sexual behaviors as for example relationship infidelity and sexual promiscuity.

Studies examining personality traits included in psychobiological models of personality often test the assumption that traits related to testosterone (e.g. psychoticism, sensation seeking, impulsivity) are associated with risky sexual behaviors. Consistent with this hypothesis, Hoyle et al. (2000) found that psychoticism was significantly related to sexual promiscuity and unprotected sex. Also, sensation seeking and impulsivity are related to risky sexual behaviors (Hernandez & Smith, 1991; McCoul & Haslam, 2001), and may place individuals at greater risk of HIV infection, STDs and pregnancy (Donohew et al., 2000). Some authors argue that sensation seeking and impulsivity together contribute to a decision-making process that may sometimes be irrational (Donohew, et al., 2000). Summarizing the results of a number of studies examining relations between both psychobiological and five-factor models of personality and several risky sexual behaviors, Hoyle, Fejfar & Miller (2000) in their meta-analysis found that high sensation seeking, high impulsivity and low agreeableness are most consistently related to all risky sexual behaviors analyzed, while neuroticism and low conscientiousness have an effect on some specific sexual behaviors.

Although the five-factor model of personality as comprehensive personality taxonomy is valuable for research examining relations between personality and health because of its broad conceptualization, it does not allow for more subtle analyses of behavior in a specific context (Ouellette, 1999; Smith & Williams, 1992). Namely, the five-factor model does not explain how each of its dimensions could be manifested in different contexts and what consequences it has for well-being and adaptation in various situations (Van Heck, 1997). Also, research suggests that several other personality constructs, such as those derived from a cognitive or social learning approach (e.g. optimism and health lo-

cus of control) could not be subsumed under the five-factor model (Smith & Williams, 1992), and that they additionally, above and beyond the five-factor personality traits, contribute to various health outcomes (e.g. Scheier, Carver, & Bridges, 1994). Therefore, along with the five-factor model, some narrower constructs relevant for specific health outcomes should also be included in research. Thus, for example, when considering risky sexual behaviors, some recent research shows that psychopathy could also be important for their prediction (e.g. Barr & Quinsey, 2004; Mealey, 1995; Williams, Spidel & Paulhus, 2005). Psychopathy is a personality construct characterized by impulsivity, antisocial behavior, lack of remorse, manipulateness, egocentricity, superficial charm, shallow affect and deception (Hare, 2003). Behaviorally, psychopaths are characterized by persistent, repetitive and remorseless violation of the rights of others and rules of society, while interpersonally, they have been described as lacking in conscience and empathy, and willing to gratify their own needs and desires without considering the consequences for themselves or others (Barr & Quinsey, 2004).

There are two main views of psychopathy. The first consider psychopathy as a mental disorder that causes psychopathic behaviors. Thus, the diagnostic category of antisocial personality disorder is conceptually and empirically related to psychopathy. The second view, derived from evolutionary psychology, sees psychopathy as an adaptation that evolved as a result of selection pressures. Compared with the pathological view, evolutionary conceptualisation considers psychopathy as a normal evolutionary outcome. Features of psychopathy that support this conceptualisation are resistance to treatment, its universality across cultures, physiological correlates, heritability and the benefits it gives to the individual. Evolutionary perspective suggests that psychopathy may involve a life history strategy in which mating, rather than parental effort is preferentially pursued (Wiebe, 2004). Namely, psychopaths try to obtain as many partners as possible, as opposed to investing in their offspring. From this perspective, psychopathy includes behaviors necessary to enact a high mating effort strategy. For example, manipulateness may help initiating numerous shallow relationships, leaving romantic relationships and ignoring parental responsibilities. It should be mentioned that within the evolutionary perspective there are some differences in conceptualisation of psychopathy, some authors connecting it primarily to the mating effort (e.g. Barr & Quinsey, 2004; Wiebe, 2004), while others see psychopathy as a more general life history strategy that ensures different resources including status, friendship and group loyalty (e.g. Mealey, 1995).

Correlates of psychopathy include violent offending, frequent and violent recidivism, substance use disorders and sexual assault (Brown & Forth, 1997). Research has shown that psychopathy is also useful in predicting future offending (Hemphill, Hare, & Wong, 1998; Walters, 2003), poor

treatment responsiveness (Reid & Gacono, 2000; Salekin, 2002) and poor institutional adjustment (Hobson, Shine, & Roberts, 2000; Walters, 2003). Psychopathy has been found to be related to a wide range of risky and violent sexual behaviors, various negative attitudes and cognitions towards partners and relationships in general, several indicators of infidelity (Williams, Spidel & Paulhus, 2005), and promiscuous sexual attitudes (Harms, Williams & Paulhus, 2001). Additionally, it has been found that adolescent substance abusers high in psychopathy reported more risky behaviors, less favorable HIV risk related attitudes and intentions than those low in psychopathy, despite higher levels of HIV-transmission knowledge and methods of self-protection, as well as improved perceptions of susceptibility for contracting HIV (Malow et al., 2005).

Studies dealing with relations between psychopathy and the big five personality traits suggest that it is moderately related to lower agreeableness and lower conscientiousness, while its relations with neuroticism and extraversion are somewhat more complex. Regarding facets of neuroticism, psychopathy is related to low anxiety, low self-consciousness, and low vulnerability but high angry hostility and high impulsiveness, and regarding facets of extraversion, it is related to low warmth and low positive emotions but high excitement seeking (Lynam, 2002; Paulhus & Williams, 2002; Williams, Nathanson & Paulhus, 2003). Specifically, four components of psychopathy (antisocial behavior, interpersonal manipulation, impulsive thrill seeking and cold affect) correlated negatively with agreeableness, cold affect and interpersonal manipulation correlated negatively with conscientiousness, while extraversion correlated positively with impulsive thrill seeking (Williams & Paulhus, 2005). Studies that conceptualize psychopathy as a mental disorder most frequently state that psychopathy can be understood from the perspective of the five-factor model of personality (Widiger & Lynam, 1998), i.e. as an extreme variant of common dimensions of personality (Miller, Lynam, Widiger, & Leukefeld, 2001).

Previous studies dealing with the relations of psychopathy and sexual behaviors were most frequently carried out on male prisoners and focused primarily on the more serious forms of sexual violence (e.g. rape). One way to test the hypothesis that psychopathy is an adaptation primarily directed towards increasing reproductive success through a greater number of short-term sexual relationships is to explore its relations with risky sexual behaviors, a necessary by-products of such reproductive strategy, and to do it on unincarcerated subjects of both sexes in their reproductive age. Namely, it should be mentioned that in current studies exploring psychopathy, unincarcerated subjects and females are understudied groups.

Therefore, the aim of the present study was to explore the relations of HIV- transmission knowledge, five-factor personality traits and psychopathy with risky sexual behaviors on a sample of healthy young people. These relations were

examined on samples of men and women, respectively, because during our evolutionary past different selection pressures influenced great differences in sexual behaviors and experience between males and females (Trivers, 1972). It was assumed that HIV-transmission knowledge would be weakly and inconsistently related to risky sexual behaviors while extraversion, low agreeableness and conscientiousness as well as psychopathy, would be positively related to risky sexual behaviors. Namely, the five-factor personality traits would predict risky sexual behaviors above and beyond HIV-transmission knowledge and would also be more strongly related to risky sexual behaviors than HIV-transmission knowledge. Additionally, to the degree to which psychopathy is an adaptation directed towards the mating effort, and not a mental disorder which can be understood as an extreme variant of five-factor personality traits, it would predict risky sexual behaviors of men and women, even after HIV-transmission knowledge and five-factor personality traits were controlled for.

Furthermore, it could be assumed that different components of psychopathy would be more important for prediction of risky sexual behaviors in men and women. As is well known, men can directly increase their reproductive success by having greater numbers of short-term sexual relationships. Along with some physical characteristics, their reproductive success is mainly determined by their ability to provide various resources (Buss, 1999). Antisocial behaviour, compared with other components of psychopathy measured in this study, might contribute most to this ability. Namely, antisocial behaviors include acts such as being impulsive, picking on other people or getting into fights, not worrying about hurting other people etc., which could foster male intrasexual competition.

While men offer women other resources in exchange for sex, women do not, which means that women's sexuality has an exchange value, whereas man's sexuality does not (Baumeister & Vohs, 2004). Therefore, it could be stated that the tendency of women towards greater number of short-term sexual relationships is mostly manipulative, i.e. they use promiscuous behavior as a strategy for gaining various resources (financial, social, genetic etc.; Buss, 1999; Forouzan & Cooke, 2005). Accordingly, interpersonal manipulation as a component of psychopathy might be a better predictor of risky sexual behaviors of women than men.

METHOD

Participants and procedure

Respondents were 422 students (203 males and 219 females) of various faculties from the University of Rijeka. Their ages ranged from 17 to 38 years ($M = 21.03$; $SD = 2.17$). Participation in the study was anonymous and voluntary. The questionnaires were administered in small groups.

Measures

Five-factor personality traits were measured by the Big Five Inventory (BFI; Benet-Martinez & John, 1998). BFI consists of 44 items, and was constructed to allow quick and efficient assessment of five personality dimensions – extraversion (e.g. “I see myself as someone who is outgoing, sociable”), agreeableness (e.g. “I see myself as someone who is helpful and unselfish with others”), conscientiousness (e.g. “I see myself as someone who is a reliable worker”), neuroticism (e.g. “I see myself as someone who worries a lot”), and openness (e.g. “I see myself as someone who is curious about many different things”). Self-report ratings for each item were made on a scale from 1 (disagree strongly) to 5 (agree strongly). Despite its brevity, the BFI has good psychometric properties. In the American and Canadian samples, Cronbach alpha reliability coefficients of the BFI scales typically range from .75 to .90 and average above .80; 3-month test-retest reliabilities range from .80 to .90, with a mean of .85 (Benet-Martinez & John, 1998). Additionally, previous studies have shown that this instrument was useful for cross-language and cross-cultural research (Benet-Martínez & John, 1998), and it also proved to be appropriate for measuring the five-factor model of personality in Croatian language (Schmitt et al., 2004).

Psychopathy was assessed with the 31-item version of the Self-Report Psychopathy Scale (SRP-III; Williams, Nathanson, & Paulhus, 2003) that has been translated into Croatian. Originally modeled after the Psychopathy Checklist-Revised (PCL-R; Hare, 2003), it shows an oblique four-factor structure: antisocial behavior (e.g. “I have attacked someone with the idea of seriously hurting him or her”), impulsive thrill-seeking (e.g. “I enjoy driving at high speed”), interpersonal manipulation (e.g. “It is sometimes fun to see how far you can push someone before they catch on”), and cold affect (e.g. “I am the most important person in this world and nobody else matters”). SRP-III items are thought to be less extreme than PCL-R items and thus more appropriate for subclinical samples. The validity and psychometric properties of the original SRP-III version have been supported in numerous studies (e.g., Paulhus & Williams, 2002; Williams, Nathanson & Paulhus, 2003). Responses are scored on a scale from 1 (strongly disagree) to 5 (strongly agree). Because the cold affect scale had very low reliability coefficient (.36), this factor was not included in further analyses.

HIV-transmission knowledge was assessed with an 18-item HIV Knowledge Questionnaire (HIV-KQ-18; Carey & Schroder, 2002) translated into Croatian. It assesses knowledge needed for HIV prevention (e.g. “A person can get HIV from oral sex”). Respondents indicate whether they think the statement is true, false or they indicate that they “do not know”. A single summary score is obtained by summing the number of items correctly answered (“do not

know” responses are scored incorrect). Previous analyses indicated that the HIV-KQ-18 internal consistency coefficients across samples are from .75 to .89, test-retest stability across several intervals ranged from .93 to .97, and that it is valid and sensitive to knowledge changes resulting from risk reduction interventions (Carey & Schroder, 2002).

Risky sexual behavior was assessed by 8 items from HIV/AIDS Risk Behavior Form (Huba et al., 1996). Originally, it consisted of 17 items with YES/NO answer format and measured major issues of HIV risk and retransmission (e.g. risk due to sexual contact and injection drug use), code number of sexual partners, sex acts with and without condom protection, hemophilia and other blood transfers, tendency to have sex while intoxicated or high, sex trade and sexual history of sex partners (e.g. “Have you ever had sex with someone who used to or is currently injecting drugs?”). In the present study only the items measuring risky sexual behaviors were used. The questionnaire appears in two forms. In the first form, for each behavior the participant notes whether he/she has ever been engaged in that behavior, and if yes, in the second form whether he/she had been engaged in that behavior in the previous 30 days. Each of these indicators was coded dichotomously: a value of 1 indicated the risk was present, and 0 indicated that it was not known to be present.

RESULTS

In Table 1, means, standard deviations, gender differences and internal consistency coefficients (Cronbach-alphas) for all measures used in the study are presented.

Correlations between the five-factor traits, three components of psychopathy, HIV-transmission knowledge, and risky sexual behaviors for men and women, respectively, were computed. The correlations obtained are presented in Table 2.

Five-factor personality traits are relatively weakly correlated with all components of psychopathy on the sample of men, and especially with impulsive thrill seeking. On the other hand, on the sample of women, this dimension of psychopathy is significantly related to all five-factor model dimensions, except neuroticism. Regression analyses show that on the sample of men, five-factor model dimensions are most highly related to interpersonal manipulation ($R = .41$; $p < .001$), and on the sample of women to impulsive thrill seeking ($R = .46$; $p < .001$). In any case, the magnitude of the relationship of five-factor personality traits with three components of psychopathy, suggests that when compared to the five-factor model, psychopathy represents an additional and relatively independent personality dimension.

HIV-transmission knowledge is significantly and positively related to openness to experience on both samples, and positively to overall risky sexual behavior on the sam-

Table 1
Means, standard deviations and internal consistency coefficients (Cronbach-alpha) of the measures used in the present study

VARIABLES	MALES		FEMALES		<i>t</i>	Cronbach' alpha
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Extraversion	28.05	4.38	28.44	5.15	0.85	.79
Agreeableness	31.65	4.59	33.38	4.66	3.83***	.73
Conscientiousness	31.21	5.54	31.13	5.50	0.13	.83
Neuroticism	20.15	5.11	21.89	5.67	3.30***	.83
Openness	35.97	6.06	37.57	5.76	2.79**	.83
ASB – Psychopathy	19.62	5.43	16.44	4.10	6.76***	.72
ITS – Psychopathy	23.61	5.28	22.83	5.72	1.45	.74
IPM – Psychopathy	17.62	4.03	15.95	4.00	4.25***	.62
HIV – transmission knowledge	11.30	4.01	12.39	2.80	3.24***	.55
Risky sexual behaviors – overall	1.48	0.86	1.65	0.94	1.96*	.56
Risky sexual behaviors – previous 30 days	0.81	0.90	0.99	0.92	1.97*	.54

Note. *** $p < .001$; ** $p < .01$; * $p < .05$; men ($N = 203$), women ($N = 219$); ASB - antisocial behavior; ITS – impulsive thrill seeking; IPM – interpersonal manipulation.

ple of women. None of the measures of risky sexual behaviors are related to five-factor model dimensions on the sample of men, while on the sample of women extraversion is positively and agreeableness negatively related to them. On the sample of women all three dimensions of psychopathy are related to risky sexual behaviors, while on the sample of men only antisocial behavior.

In order to explore how HIV-transmission knowledge, five-factor personality traits and psychopathy predict risky sexual behaviors, a series of hierarchical regression analyses were conducted on the samples of men and women, respectively. Two measures of risky sexual behaviors were used as criterion variables, while HIV-transmission knowledge was included as predictor variable in the first step of the regression analyses, the five-factor personality traits in the second, and three components of psychopathy in the third step. The results of these analyses on the sample of men are shown in Table 3.

The results obtained on the sample of men show that HIV-transmission knowledge is a positive predictor of overall risky sexual behaviors. Five-factor personality traits do not

significantly predict risky sexual behaviors after HIV-transmission knowledge has been controlled for. However, three components of psychopathy as a group of variables in the third step significantly increase the coefficient of multiple correlation, with antisocial behavior as the only significant positive predictor. Similar results are obtained when risky sexual behaviors performed in the previous 30 days are analyzed as a criterion variable, except that this time HIV-transmission knowledge is not a significant predictor of risky sexual behaviors. The results suggest that higher antisocial behavior in men significantly predicts risky sexual behaviors in the previous 30 days, and together with greater HIV-transmission knowledge, it also predicts overall risky sexual behaviors.

The results of hierarchical regression analyses on the sample of women are shown in Table 4.

The results obtained on the sample of women show that HIV-transmission knowledge in the first step of the analysis is a significant positive predictor of overall risky sexual behaviors, but after personality traits are included, it does not significantly predict overall risky sexual behaviors. Five-factor personality traits significantly contribute to the pre-

Table 2
Correlations among five-factor personality traits, three components of psychopathy, HIV-transmission knowledge and risky sexual behaviors for men and women

VARIABLES	E	A	C	N	O	ASB	ITS	IPM	HIV	RSBO	RSB30
E – Extraversion		.01	.37***	-.24***	.41***	.03	.12	.22***	-.01	.13	.08
A – Agreeableness	.11		.19**	-.47***	.01	-.15*	-.11	-.27***	-.07	-.08	-.08
C – Conscientiousness	.15*	.17**		-.36***	.22***	-.23***	-.05	-.04	.01	.04	.04
N – Neuroticism	-.32***	-.35***	-.25***		-.14*	.14*	-.05	-.06	-.01	-.02	.01
O – Openness	.28***	-.01	.15*	-.15*		-.07	-.01	.17*	.17*	.10	-.02
ASB – Psychopathy	.13	-.17**	-.27***	.02	.10		.44***	.24***	-.01	.22**	.20**
ITS – Psychopathy	.28***	-.23***	-.18**	-.04	.24***	.40***		.42***	-.11	.13	.01
IPM – Psychopathy	.20**	-.31***	-.07	-.13	.06	.40***	.42***		.05	.12	.03
HIV – transmission knowledge	.12	-.09	.02	-.04	.24***	.11	.10	.07		.25***	.09
RSBO – Risky sexual behaviors – overall	.22***	-.19**	-.05	-.01	.08	.20**	.31***	.29***	.17*		.53***
RSB30 – Risky sexual behaviors – last 30 days	.15*	-.01	-.07	.03	.01	.19**	.10	.18**	.07	.53***	

Note. *** $p < .001$; ** $p < .01$; * $p < .05$; men ($N = 203$) – above the main diagonal; women ($N = 219$) – under the main diagonal; ASB - antisocial behavior; ITS – impulsive thrill seeking; IPM – interpersonal manipulation.

Table 3
The results of hierarchical regression analyses with risky sexual behaviors as criterion variables (sample of men)

RISKY SEXUAL BEHAVIORS – OVERALL						
PREDICTOR VARIABLES	<i>R</i>	<i>R</i> ²	ΔR^2	<i>F</i> - change	OVERALL <i>F</i>	Beta
1. step	.23	.052	.052		10.75***	
HIV KNOWLEDGE						.23***
2. step	.29	.084	.032	1.33	2.92**	
HIV KNOWLEDGE						.21**
PERSONALITY TRAITS						
Extraversion						.13
Agreeableness						-.11
Conscientiousness						.01
Neuroticism						-.05
Openness						.03
3. step	.37	.14	.054	3.91**	3.34***	
HIV KNOWLEDGE						.21**
PERSONALITY TRAITS						
Extraversion						.09
Agreeableness						-.09
Conscientiousness						.06
Neuroticism						-.05
Openness						.05
PSYCHOPATHY						
Antisocial behavior						.23**
Impulsive thrill seeking						.03
Interpersonal manipulation						-.01
RISKY SEXUAL BEHAVIORS – PREVIOUS 30 DAYS						
1. step	.06	.004	.004		.71	.06
HIV KNOWLEDGE						
2. step	.16	.026	.022	.87	.85	
HIV KNOWLEDGE						.06
PERSONALITY TRAITS						
Extraversion						.10
Agreeableness						-.12
Conscientiousness						.04
Neuroticism						-.03
Openness						-.06
3. step	.28	.079	.053	3.57**	1.78	
HIV KNOWLEDGE						.04
PERSONALITY TRAITS						
Extraversion						.08
Agreeableness						-.14
Conscientiousness						.08
Neuroticism						-.08
Openness						-.04
PSYCHOPATHY						
Antisocial behavior						.26***
Impulsive thrill seeking						-.12
Interpersonal manipulation						-.06

Note. *** $p < .001$; ** $p < .01$; * $p < .05$.

diction of overall risky sexual behaviors, with extraversion as a positive and agreeableness as a negative predictor of overall risky sexual behavior. After the effects of HIV-transmission knowledge and five-factor personality traits have been controlled for, three components of psychopathy as a group significantly increase the coefficient of multiple cor-

relation, with impulsive thrill seeking as a significant positive predictor of overall risky sexual behaviors.

Only extraversion positively predicts risky sexual behaviors in the previous 30 days. Three components of psychopathy as a group of variables in the third step significantly increase the coefficient of multiple correlation,

Table 4
The results of hierarchical regression analyses with risky sexual behaviors as criterion variables (sample of women)

RISKY SEXUAL BEHAVIORS – OVERALL						
PREDICTOR VARIABLES	<i>R</i>	<i>R</i> ²	ΔR	<i>F</i> - CHANGE	OVERALL <i>F</i>	Beta
1. step	.17	.028	.028		6.16*	
HIV KNOWLEDGE						.17*
2. step	.33	.111	.083	3.98**	4.41***	
HIV KNOWLEDGE						.12
PERSONALITY TRAITS						
Extraversion						.24***
Agreeableness						-.20**
Conscientiousness						-.05
Neuroticism						-.01
Openness						-.02
3. step	.41	.171	.060	5.05**	4.79***	
HIV KNOWLEDGE						.12
PERSONALITY TRAITS						
Extraversion						.16*
Agreeableness						-.09
Conscientiousness						.02
Neuroticism						.04
Openness						-.05
PSYCHOPATHY						
Antisocial behavior						.05
Impulsive thrill seeking						.18*
Interpersonal manipulation						.13
RISKY SEXUAL BEHAVIORS – PREVIOUS 30 DAYS						
1. step	.06	.004	.004		.80	
HIV KNOWLEDGE						.06
2. step	.20	.041	.037	1.65	1.51	
HIV KNOWLEDGE						.05
PERSONALITY TRAITS						
Extraversion						.19**
Agreeableness						.01
Conscientiousness						-.10
Neuroticism						.07
Openness						-.02
3. step	.28	.078	.037	2.77*	1.96*	
HIV KNOWLEDGE						.03
PERSONALITY TRAITS						
Extraversion						.15**
Agreeableness						.08
Conscientiousness						-.05
Neuroticism						.10
Openness						-.02
PSYCHOPATHY						
Antisocial behavior						.13
Impulsive thrill seeking						.04
Interpersonal manipulation						.14

****p*< .001; ***p*< .01; **p*< .05.

although neither component contributed independently and significantly.

Moderating effects of HIV-transmission knowledge

As HIV-transmission knowledge is generally low correlated with personality traits within both samples, and has a

very small effect on risky sexual behaviors, it was assumed that it may have more complex relations with risky sexual behaviors, i.e. that it moderates the effects of personality traits on criterion variables. Namely, because moderating models allow relevant relationships to be decomposed into components, they are useful for theory development and testing as well as for the identification of possible points

of intervention. The hypothesis that HIV-transmission knowledge moderates the effects of personality traits on risky sexual behaviors was also examined by hierarchical regression analyses on the samples of men and women, respectively. As criterion variables, two measures of risky sexual behaviors were used. HIV-transmission knowledge was included in the first step of the two regression analyses, five-factor personality traits in the second, and interaction terms of personality traits and HIV-transmission knowledge in the third. In the other two regression analyses instead of the five-factor personality traits, three components of psychopathy were used. The interaction term was calculated as the product of the two variables after these variables were centered. Five interaction terms were included in the analyses in which interactions between HIV-transmission knowledge and five-factor personality traits were analysed, while three interaction terms were included in the analyses in which interactions between HIV-transmission knowledge and three components of psychopathy were analysed. The results obtained show that in the sample of men interaction effects of five-factor personality traits and HIV-transmission knowledge as well as interaction effects of three components of psychopathy and HIV-transmission knowledge do not significantly increase the coefficient of multiple correlation, either in predicting overall sexual behaviors or in predicting risky sexual behaviors in the last month. On the sample of women, only the interaction effect of HIV-transmission knowledge and three components of psychopathy in the third step of the analysis significantly increase the coefficient of multiple correlation in predicting overall risky sexual behaviors ($R = .42$; $R^2 = .17$; $\Delta R^2 = .030$; F -change =

2.54; $p < .05$), and in predicting risky sexual behaviors within last month ($R = .29$; $R^2 = .09$; $\Delta R^2 = .034$; F -change = 2.60; $p < .05$). In both analyses only the interaction between interpersonal manipulation and HIV-transmission knowledge were significant (Beta for overall risky sexual behaviors is $-.19$; $p = .02$; Beta for risky sexual behaviors in the previous 30 days is -0.17 ; $p < .05$), both interaction effects showing that with the increase in interpersonal manipulation the frequency of risky sexual behaviors increases more in women with low HIV-transmission knowledge. Figure 1 presents interaction effect of interpersonal manipulation and HIV-transmission knowledge on risky sexual behaviors within the previous month.

DISCUSSION

The results of the present study show that on the sample of women, HIV-transmission knowledge does not predict either overall risky sexual behaviors or risky sexual behaviors over the previous month, and the same has been found on the sample of men for risky sexual behaviors reported for the previous month. However, knowledge about HIV-transmission is a significant predictor of the increase of the overall risky sexual behaviors on the sample of men.

These results correspond to those found in studies exploring the effects of health education on sexual behaviors, as well as to results of studies examining relations between health knowledge, attitudes and behavior. For example, literature review of 53 studies on the effects of sexually specific health education interventions on young people's sexual behavior has shown that in twenty-seven of them, sexual health education neither increased nor decreased sexual activity, twenty-two have found that HIV and/or sexual health education either delayed the onset of sexual activity and reduced the number of sexual partners, unplanned pregnancy and STDs rates, while in three studies increases in sexual behavior associated with sexual health education have been found (Grunseit, Kippax, Aggleton, Baldo, & Slutkin 1997). Additionally, a number of studies have shown that factual knowledge of health risks does not translate into protective health behaviors, including sexual behaviors (Ajduković, Ajduković, & Prišlin, 1991; Byrnes, 2002; Elliot, Crump, McGuire & Bagshaw, 1999; Moatti & Souteyrand, 2000; Štulhofer et al., 2007). It is possible that relations between factual knowledge and sexual behaviors have been obscured by instruments that do not succeed in measuring in-depth understanding of HIV, its transmission and the necessity for protective health behaviors. Usually, in such studies the knowledge is measured by simple factual questions using true/false or multiple-choice answer options, which provide limited insight into the nature of HIV knowledge (Siegel, DiClemente, Durbin, Krasnovsky, & Saliba, 1995). Some authors suggest that for successful promotion of protective sexual behaviors, relevant and understandable information, easily implemented in real life and directly linked to sexual decision making, are needed (Bandura, 1994).

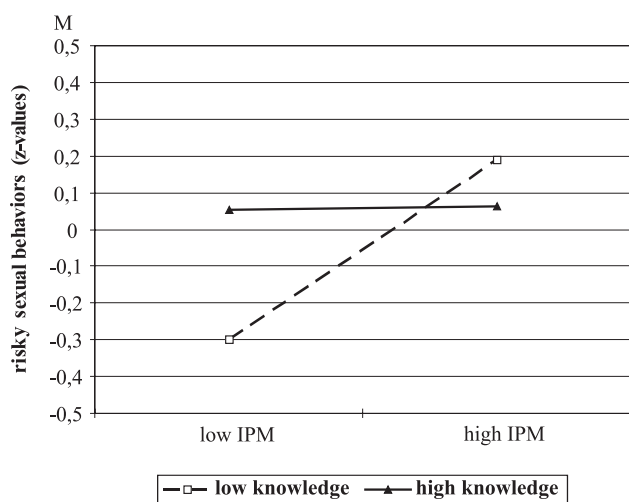


Figure 1. Interaction effect of interpersonal manipulation (IPM) and HIV-transmission knowledge on women risky sexual behaviors in previous 30 days.

Although existing health behavior models do not dispute that one's knowledge about a disease, including the knowledge of risk factors and protection measures, is an important determinant of protective sexual behaviors, each of them number several other possible determinants of sexual behaviors. A central hypothesis of the various health behavior models such as e.g. Health Belief Model (Rosenstock, 1990), the Protection Motivation Theory (Prentice-Dunn & Rogers, 1986), and the Theory of Reasoned Action (Ajzen & Fishbein, 1980) is that perception of the risk associated with some behaviors drives a person to engage in protective behaviors. Unfortunately, this hypothesis has not always been confirmed, and very often just the opposite results were found, showing that the greater the risk perception, the smaller the intention to change the behavior and the greater its maintenance in the future (e.g. van der Pligt, 1996).

How can we explain the fact that in spite of having factual knowledge and perceiving objective risks due to their sexual behaviors people do not make the decision to change these behaviors? Why do we behave irrationally? The most frequent answer to this question is the presence of biases in the cognitive process by which an individual evaluates the risk he/she is actually facing, which could lead to a distorted perception of invulnerability (Kreuter & Strecher, 1995; Taylor & Gollwitzer, 1995; van der Pligt, 1996). It could be assumed that these cognitive biases are proximal mechanisms of distal adaptive processes functionally important for survival and reproductive success. Namely, we could presume that those health behaviors relevant either for survival (e.g. food preference) or reproductive success (e.g. sexual behaviors including risky sexual behaviors), are difficult to abandon or change. For example, abandoning eating sweet/fatty food, prolonging sexual abstinence and/or avoiding potential sexual partners because of the risk of getting STDs or changing the habits included in sexual intercourse by behaving in a protective fashion (e.g. condom use) usually demand effort. On the other hand, because these behaviors are relevant for our reproductive success, they could be expected to be relatively easy to learn or get used to. However, health behaviors not relevant for survival and reproductive success in our ancestors' environment (e.g. regular blood pressure control) or those that are nowadays performed in new forms or environmental contexts compared to behaviors practiced in our ancestral past (e.g. taking pills vs. taking herbs for medication or exercising in a fitness club vs. daily physical activities in a hunter-gatherers society), are presumably easier to discard, but more difficult to get used to.

Although HIV-transmission knowledge alone has not proved to be important for the prediction of risky sexual behaviors, the results of the present study show that it significantly predicts risky sexual behaviors in interaction with interpersonal manipulation on the sample of women. Namely, women who do not know much about HIV-transmission and at the same time are manipulative in interpersonal relations show a higher increase in the frequency of overall risky sexual behaviors and over the previous month

than those who know more about HIV-transmission. These interaction effects are relatively weak, but seem to be important because they suggest that having information about behavioral risks connected with getting HIV could in a way protect women who have a tendency to be manipulative by suppressing their risky sexual behaviors.

Except in interaction with HIV-transmission knowledge, and beyond and above the effects of HIV-transmission knowledge and five-factor personality traits, different components of psychopathy alone significantly predict overall and risky sexual behaviours over the previous month on the sample of men and overall risky sexual behaviors on the sample of women. On the sample of men, antisocial behavior is a significant predictor of both measures of risky sexual behaviors. Research indicates that this component of psychopathy corresponds phenotypically to an impulsive-aggressive (externalizing) behavioral style and genotypically to a basic weakness in inhibitory control systems (Hicks & Patrick, 2006). Individuals with high scores on this dimension are disinhibited, impulsive and prone to social deviance. Because of the impulsiveness of their hostile and hedonistic behaviors, these individuals may often fail to use available information to anticipate risks. Thus, although they might gratify their impulse, they usually bring upon themselves unforeseen and undesirable consequences, such as social alienation, incarceration, or bodily harm (Patterson & Newman, 1993). Patterson and Newman (1993) state that disinhibited individuals' impulsive behavioral style stems partly from their active, nonreflective reaction to punishment or frustration. Their typical reaction could be depicted as "go ahead" rather than pausing to "think about". Such an impulsive response can be maladaptive because it may lead to undesirable consequences and prevents pausing to learn from experience. In this sense antisocial behavior could be seen as conceptually similar to extraversion, although the results of the present study do not confirm this. Namely, extraversion and antisocial behavior are not significantly related on both samples of participants, which is most probably the result of the fact that extraversion measured by BFI inventory is primarily saturated with sociability. This behavioral pattern, the basis of which is antisocial behaviour, also partly corresponds to Gray's behavioral activation or reward system (BAS) that promotes approach behavior (Gray, 1987). Therefore, in this way, risky sexual behaviors in men could be explained as the result of a strong BAS.

The results obtained on the sample of women are somewhat more complex. Apart from impulsive thrill seeking, which along with extraversion, significantly predicts overall risky sexual behaviors, their risky sexual behaviors reported for the previous month are significantly predicted only by extraversion. Furthermore, interpersonal manipulation is significantly related to both measures of risky sexual behaviors (Table 2), although it does not significantly predict them (Table 4). Previous studies reported that manipulative women are more likely to be flirtatious (Forouzan & Cooke, 2005), which is in accord with the results of the present study, suggesting that in wom-

en with high psychopathy, a desire to exploit may strengthen their promiscuous sexual behavior. In other words, their risky sexual behaviors may reflect both impersonal lifestyle as well as parasitic lifestyle, with sexuality being used as a strategy for manipulating and obtaining financial and social resources. Interpersonal manipulation also comprises elements of grandiosity and narcissism (insincere charm, inflated ego, lying and manipulation) and is negatively related to the self-conscious feelings of guilt and shame (Wiebe, 2004). Compared to antisocial behavior, interpersonal manipulation corresponds phenotypically to weak stress reactions and an agentic interpersonal style and genotypically to a core weakness in defensive (fear) reactivity (Hicks & Patrick, 2006). According to these characteristics interpersonal manipulation is similar to Gray's behavioral inhibition system (BIS), which corresponds to the degree of anxiety. Therefore, it could be assumed that the tendency towards risky sexual behaviors in women is a consequence of a strong BAS and a weak BIS. In this context the interactional effect of HIV-transmission knowledge and interpersonal manipulation on risky sexual behaviors of women can be better understood. Namely, it seems that in women inclined to interpersonal manipulation, HIV-transmission knowledge strengthens behavioral inhibition by increasing anxiety level, which in turn interrupts behaviors that may lead to aversive consequences and direct attention towards careful analysis of the environment. These results may suggest that attempts to change health behaviors by induction of fear and anxiety are more efficacious for people evolutionarily predisposed to be more susceptible to the adverse consequences of these health behaviors, as for example in the case of risky sexual behaviors that could have more undesirable outcomes in women than in men (e.g. unwanted pregnancy, single parenthood etc.).

From the evolutionary point of view, it seems logical that sexual behaviors in women are regulated by a greater number of intrapersonal control mechanisms than in men. As is well known, women invest more in their offspring than men, which is one of the reasons why they are more limited in getting offspring and why they are more selective regarding the characteristics of their potential sexual partners (Trivers, 1972). On the other hand, smaller investment in one's offspring and greater reproductive capacity in men enable their overall reproductive success to be more easily increased by having a greater number of sexual partners. These are the reasons why males are in mutual competition with each other for reproductive resources of females and why their variability in reproductive success is greater than in females. Also, for these reasons, men are selected to be more responsive to the environmental cues that signal probability of reproduction, while sexuality of women is under the greater influence of intrapsychic factors (Geary, 1999). The results of the present study also confirm this. Contrary to men, risky sexual behaviors of women are predicted by extraversion, impulsive thrill seeking and interactions between interpersonal manipulation and HIV-transmission knowledge. The results of some studies also show that males are more susceptible to environmental

influences than females. For example, while a male will express sociopathy (often used as a synonym for psychopathy) with a lower heritability than is required for expression in a female, the heritability of the trait is greater for females, meaning that the environmental component of the variance is greater for males (Mealy, 1995). However, there are some other findings originating from social psychological studies examining proximal mechanisms, showing that women's sexual behaviors are more contextually bound (e.g. Werner-Wilson, 1998). Future research should address these inconsistencies in the studies dealing with proximal and distal mechanisms which determine sexual behaviors in male and female.

Generally, the results obtained in this study confirm that psychopathy is an organized behavior pattern that facilitates short-term, often impersonal sexual relationships, in order to maximize individual reproductive success and it therefore represents an important risk marker for risky sexual behaviors in men and in women. However, the availability of birth control and contraception decreases the probability that such sexual relationships will result in reproductive success. Nowadays, there are more opportunities for psychopaths to find naive victims, which enable them to coerce and cheat in domains outside sexual relations (Mealy, 1995). Psychopathy, especially in men, can therefore be currently used in the service of resources and status accumulation which increase the psychopath's opportunities for consensual sex, and therefore, fitness. In women, psychopathy probably facilitates the exchange of sex for some other resources (Baumeister & Vohs, 2004).

There are several limitations to the present study, one of them being the difficulty of establishing causal relations in a cross-sectional design, and the other, exclusive reliance on a questionnaire assessment, which can bias the results in different ways. For example, health behaviors have a tendency to be under-reported in questionnaires (Vollrath, et al., 1999). Moreover, in future research, other measures of psychopathy should be taken into account because in the questionnaire used in the present study, cold affect had a very low reliability coefficient and was, therefore, not used in further analyses. Numerous studies show that emotional deficit (i.e., shallowness and a lack of guilt or remorse) may be one of the primary personality characteristics of psychopathy (Habel, Kühn, Salloum, Devos, & Schneider, 2002). Furthermore, the question of invariability of psychopathy in men and women remains open. For example, some degree of financial dependency may be socially and culturally acceptable for women, while similar behaviors are considered "parasitic" for men. Such gender-linked variations will adversely affect gender equivalence. Also, in future research, mechanisms through which psychopathy exerts effects on risky sexual behaviors in men and women respectively should be examined in more detail. Until now, several processes that may be etiologically relevant to psychopathy, such as poor passive avoidance learning (Schacter & Latane, 1964), poor response modulation (Patterson &

Newman, 1993), weak fear potentiated startle (Patrick, Bradley, & Lang, 1993) or diminished electrodermal classical conditioning to aversive stimuli (Lykken, 1957) have been proposed. However, their role in risky sexual behaviors of men and women is still unknown.

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