Prospects of implicit measures in assessment of defensive function of explicit homophobia in heterosexuals

Ljiljana B. Lazarević[1], Ana Orlić[2], and Goran Knežević[3]

[1]*Institute of Psychology, Faculty of Philosophy, University of Belgrade, Serbia*
[2]*Faculty of sport and physical education, University of Belgrade, Serbia*
[3]*Department of Psychology, Faculty of Philosophy, University of Belgrade, Serbia*

Some authors state that one of the functions of explicit homophobia is defensive, and that it has roots in latent attraction towards same sex. Large body of evidence suggests that implicit techniques enable assessment of those cognitions hidden from conscious awareness. Sample of 277 heterosexuals completed several implicit (Implicit Association Test-IAT and Affective Priming-AP) and explicit measures of attitude (Test of homophobia and Connotative differential). Multi-group SEM analysis was done to investigate cross-sample stability of the model postulating influence of IAT and AP factors on latent explicit factor. Analyses suggest that both in males and females IAT latent factor predicts negative explicit attitude. Results revealed that explicit homophobia is related to implicit, negative attitude toward homosexuals and not to implicit attraction towards same sex.

Key words: explicit homophobia, defensive function, Implicit Association Test, Affective Priming

Authors define homophobia as irrationally negative attitude toward homosexuals, and an aversion toward interacting with gay individuals (Adams, Wright, & Lohr, 1996; Lock & Kleis, 1998; Mahaffey, Bryan, Ito, & Hutchison, 2011)[1]. Literature reports that homophobia is a widespread phenomenon, both in heterosexuals and homosexuals (Lock & Kleis, 1998). Different theoretical

1 In literature different authors use different terms for negative attitudes toward homosexuals: e.g., antigay bias (Mahhafey et al., 2011), antigay prejudice (Herek, 2004), antigay attitudes (Lock & Kleis, 1998), homophobia (Adams et al., 1996; Weinberg, 1973, as cited in Herek, 2009), homonegativism (Hudson & Ricketts, 1980, as cited in Adams et al., 1996), etc. In this paper, we have decided to use term homophobia, since it encompasses both cognitive or intellectual aspect and emotional responses including fear, anger, discomfort, disgust, etc. (Adams et al., 1996).

perspectives, ranging from psychodynamic to theories of sociocultural development, have investigated reasons for intense antigay attitudes in certain people.

Herek (1987, 2000) distinguishes four main functions of prejudice to explain why people have negative feelings toward individuals based on their sexual orientation, i.e., value-expressive, social-expressive, experiential, and defensive. Authors claim that defensive function is more specific for sexually-related than for other kinds of prejudice, and sometimes it is used as a sole definition of antigay bias (Mahaffey et al., 2011). Theoretical explanation for defensive function of homophobia stems from psychodynamic conception, stating that latent attraction to gay sex is a primary source of homophobia (Freud, 2004, 2009). In other words, this view suggests that homophobia might result from defence mechanisms triggered by the anxiety related to the unconscious or denied attraction of the individual to gay people (Baumeister, Dale, & Sommer, 1998; Herek, 1987, 2000; Lock & Kleis, 1998).

Since defensive mechanisms are assumed to be unconscious, crucial problem is their measurement. Most of the methods used for the assessment of these constructs, so called implicit techniques, are based on the indirectedness of the responses from which we conclude about the measured construct (e.g., Nosek, Hawkins, & Frazier, 2011; Wittenbrink & Schwarz, 2007). Namely, authors agree that implicit measures assess automatic evaluations associated with attitude object, that perceiver may not be aware of, or is not aware of their influence on behaviour, or cannot control them (Fazio & Olson, 2003; Greenwald & Banaji, 1995; Greenwald, McGhee, & Schwartz, 1998; Jellison, McConnell, & Gabriel, 2004).

Some studies using implicit techniques tried to provide empirical evidence for defensive function of explicit homophobia, but the results were inconsistent. One early study using changes in heart rate as indicators of fear or phobia, reported increased heart rates in highly homophobic males when viewing slides with male homosexual activity (Sheilds & Harriman, 1984, as cited in Lock & Kleis, 1998). Another study going in favour of defensive function of homophobia demonstrated that highly homophobic heterosexual men had increased penile arousal to stimuli depicting gay man engaged in homosexual activity (Adams et al., 1996). Lock and Kleis (1998) based on these presented findings conclude that defensive homophobia may result from psychological anxiety or unconscious homosexual arousal. More recent study by Zeichner and Reidy (2009) using lexical decision task preceded by gay man erotic video as implicit measure, found evidence to support defensive function of explicit homophobia. Namely, primes with homosexual content facilitated answers to anger and anxiety words, but not to disgust. Authors point that for sexually prejudice people anxiety or fear activate defence mechanisms, while diminished disgust is an indicator of latent attraction to homosexual content.

However, several studies by Mahaffey and her colleagues in which startle eye blink was used as implicit measure of antigay bias, did not provide

enough evidence that stronger self-reported antigay bias is followed by strong implicit attraction to gay stimuli (Mahaffey, Bryan, &, Hutchison, 2005a, 2005b; Mahaffey et al., 2011). Namely, results of these studies showed that men with high explicit antigay bias had less positive affect (i.e., grater startle magnitude) toward photographs with homosexual content.

Another study in which viewing time and sequential priming task were used as implicit techniques demonstrated that relationship between latent and explicit homophobic attitudes is moderated by self-deception (Meier, Robinson, Gaither, & Heinert, 2006). Namely, homophobic individuals high in self-deception demonstrated implicit aversion to gay stimuli, while for individuals low in self-deception performance on implicit measure was not correlated with explicit measures. In other words, these results indicate that the basis of defensive homophobia is not implicit attraction, as suggested by psychodynamic theory, but implicit aversion to same sex individuals. However, authors of this study pointed that further confirmation of their results is necessary especially because non-standard implicit techniques were used.

The most empirically validated implicit techniques are affective priming (AP) task and Implicit Association Test (IAT), which are designed for measuring the evaluative association underlying the implicit attitudes (e.g., Banse, Seise, & Zerbes, 2001; Fazio, 2001; Fazio, Jackson, Dunton, & Williams, 1995; Greenwald et al., 1998; Hofmann, Gawronski, Gschwender, Le, & Schmitt, 2005; Lane, Banaji, Nosek, & Greenwald, 2007). The IAT measures associative strength between two target categories (e.g., Gay-Straight) and two categories of attributes (e.g., Pleasant-Unpleasant), where respondent is forced to categorize stimuli representing both target concepts and attributes (Greenwald, Nosek, & Banaji, 2003; Olson & Fazio, 2003). The basic idea of IAT is to compare the average reaction times (RTs) when the respondent sorts out stimuli in two *opposite* tasks of double categorization. Namely, categorization in IAT is based on the assumption that it should be easier to make a particular behavioural response (i.e., to press one key) when the concepts are strongly associated in memory (i.e., congruent), than when they are weakly associated (i.e., incongruent). By comparing the average categorization times in congruent and incongruent trials, the associative strength between certain concepts and attributes of positive or negative valence is measured (e.g., negativity towards gay people would be evident in faster categorization of Gay-Unpleasant and Straight-Pleasant in comparison to Gay-Pleasant and Straight-Unpleasant).

The AP assesses association strength by measuring reaction time on target stimulus presented after a prime stimulus. In other words, it evaluates how the prime (e.g., Gay or Straight picture) facilitates evaluation of subsequently presented target (e.g., positively or negatively valenced word) (Fazio et al., 1995). For example, positive attitude towards gay people would be evident in faster latencies to positive words preceded by gay prime.

According to some authors underlying mechanisms of IAT and AP are different, where IAT assesses attitudes toward category as a whole, while AP assesses attitudes toward category exemplars (DeHouwer, 2003; Fazio & Olson, 2003; Foroni & Semin, 2012; Olson & Fazio, 2003). Based on the evidence suggesting that affective priming effects are driven by proprioceptive information which is tightly related to affective processing, and that IAT effects are driven mostly by abstract representations (Foroni & Semin, 2012), we can argue that AP taps automatic affective reaction to stimuli while IAT taps automatic cognitive evaluations of paired concepts. Additional argument for considering IAT effects as cognitive evaluations of paired concepts can be found in results of studies demonstrating that in prejudice assessment IAT effects are at least to some extent consequence of learning (for overview see Jellison et al., 2004). In other words, depending on the social environment and long-term reinforcement certain concepts would be considered as congruent and evaluated as more positive or negative.

Studies where IAT and/or AP were used as implicit techniques are not numerous, and are mostly interested in convergent and predictive validity of these implicit techniques in the assessment of attitudes toward homosexuality (Banse et al., 2001; Snowden, Wichter, & Gray, 2008; Steffens, 2005). Studies by Banse et al. (2001) and Steffens (2005) investigated potentials of IAT in assessment of attitudes toward homosexuality, while Snowden et al., (2008) investigated convergent validity of IAT and AP in assessment of sexual preference. All studies provided evidence on validity of implicit measures in the assessment of homosexuality-related construct.

Aim of the study

In this study, we try to test hypothesis about defensive function of explicit homophobia in heterosexuals of both sexes, using several implicit and explicit techniques. Having in mind previous studies demonstrating the difference between underlying mechanisms of IAT and AP (DeHouwer, 2003; Fazio & Olson, 2003; Foroni & Semin, 2012; Olson & Fazio, 2003), it seems reasonable to try to empirically validate proposed defensive function of explicit homophobia by using both implicit techniques. If explicit homophobia results from defensive function, we can expect homophobic explicit attitude being related to the deep positive affective reaction to gay stimuli (reflected in positive affective priming potential of homosexual scenes), but more salient implicit negative classification of gay stimuli (reflected in differentially negative associative potential of homosexual scenes on IAT). Additionally, this study should provide further insights into the specific net contribution of different implicit paradigms (containing the same stimuli) in explaining explicit homophobic attitude. We have focused here on attitudes toward male homosexuality because large body of evidence suggests that these attitudes are stronger and more negative in

comparison to female homosexuality (e.g., Herek, 2000; Kite & Whitley, 1996; Steffens, 2005).

Differently from previous studies testing defensive function of homophobia, which were mostly using male respondents (Adams et al., 1996; Lock & Kleis, 1998; Mahaffey et al., 2011; Meier et al., 2006; Zeichner & Reidy, 2009), we have decided to include both sexes. It enables the testing of hypothesis on defensive function of homophobia more precisely: 1) it is expected that in both sexes implicit negative classification assessed by the IAT influences explicit homophobic attitudes, and 2) if defensive function is responsible for explicit homophobia, male homosexual content should show facilitating affective priming effect only in males.

The hypothesized structure of causal influences from implicit latent measures to the explicit one will be modelled by structural equations (multi-group SEM) and tested. If the hypothesis on defensive function of homophobia is true then the causal path from implicit latent measures should not be the same for males and females. In case of homophobic males, latent factor of positive affective reaction to male homosexual stimuli would be related to latent factor of explicit homophobia, while in case of homophobic females this relation would be absent or negative. In case of the cognitive (socially learned) component of implicit attitude (what IAT measures) the different pattern of relations between implicit and explicit measures should be expected: it could be equally relevant for the explanation of homophobic attitudes in both females and males. Correlation between the latent factor of affective reaction and latent IAT factor are expected to be negative, since only affective priming task is expected to reflect the automatic positive reaction to homosexual stimuli against which defensive mechanisms captured by both IAT and explicit homophobia are activated.

Method

Sample

Initial sample consisted of 282 participants. For selection of the heterosexual participants, we have conducted a procedure similar to Snowden, et al., (2008). Based on results obtained on Connotative Differential scale (see below) we have excluded 5 participants whose result indicated that they were homosexual or bisexual. The final sample consisted of 277 heterosexual (56% female) students. All participants agreed to participate and signed an informed consent. They participated in the research in exchange for research participation credits. The average age of the respondents was 20.04 (SD = 1.58). For every participant in the sample, Implicit Association Test and Affective priming data, explicit self-reports, and connotative differential measures were collected.

Instruments and apparatus

IATs and affective priming were conducted in laboratory rooms using PSIHO software (Knežević, 2014). Data were collected on two computers, with 15" screen. For response recording, response pads Cedrus RB–530 were used due to their technical and ergonomic characteristics.

In order to validate two implicit measures (IAT and affective priming task) the same visual and verbal stimuli were used. As stimuli for both implicit techniques, colour pictures showing gay couples and heterosexual couples kissing (five for each category) were used (250x250 pixels). Five verbal stimuli were chosen to belong to the category "pleasant" (beauty, love, joy, happiness, laugh), and five to the category "unpleasant" (ugliness, hate, sadness, cry, pain). Stimuli appeared against the white background, where verbal stimuli were black. All stimuli were presented in the centre of computer screen. The words were presented in black sentence case letters, font Times (type size=30 points). For both implicit techniques, completely randomized design was used.

Implicit Association Test

As per recommendation of the authors, before critical IAT (i.e., homosexuality IAT), control flower-insect IAT was administered (Greenwald et al., 1998). Results of control IAT showed that our respondents have implicit preference for congruent (i.e., flower-positive and insect-negative) over incongruent combination ($D = 0.92$). For the assessment of implicit attitudes towards homosexuality, complete IAT consisting of seven blocks was used (Greenwald et al., 2003; Nosek, Greenwald, & Banaji, 2007). Homosexuality IAT consisted of evaluative decision task (Pleasant-Unpleasant) and homosexual-heterosexual (Gay-Straight) classification task. For evaluative decision task, 10 verbal stimuli (previously mentioned five positive and five negative) were selected, and for classification task, 10 visual stimuli were used. In the IAT, in the first two blocks, so called practice blocks, participant gets familiar with the task and practices single categorization of stimuli in corresponding categories. In the third block, categories are combined (e.g., Pleasant-Straight, Unpleasant-Gay) and participants are required to practice combined categorization. The fourth block, so called, critical block is the same as the third, but the number of trials is doubled. The fifth block is practice block, but with the reversed key-assignments compared to the first block, and participant again practices single categorization task. The sixth block is double categorization practice task with reversed key assignments compared to the third block (e.g., Pleasant-Gay, Unpleasant-Straight), and the final, seventh, block is the same as the previous one but it is critical and the number of trials is doubled. The order of combined categories and category assignment to the left and right response key was counterbalanced across subjects. In addition, order of trials within each task was randomized. Counterbalancing of the block order was done in order to provide control for the effect due to the fact that the IAT scores tend to show stronger associations for the categories that are paired first (Nosek et al., 2007).In the IATs in this research, the superordinate categories were presented at the upper left and upper right corners of the screen, while the target stimuli were presented at the centre. The respondents had the instruction to answer as quickly as possible while trying to make the least number of errors, i.e., wrong classification of the presented stimulus in one of the displayed categories. The inter-trial interval was 150ms. If the subject made an error, red "X" was presented below the target stimuli and, in order to continue with the task, the respondent had to give the correct answer after which the next stimuli was presented.

Affective priming task.

In AP task, participants were told that a picture (of gay and heterosexual couples) followed by the target word would be presented briefly. Respondents evaluated the target word as "pleasant" or "unpleasant" as quickly as possible by pressing either a right key with the right finger or a left key with the left finger. The response keys with the labels "pleasant" and "unpleasant" were counterbalanced across participants.

Each trial consisted of a fixation cross for 1000ms, prime picture for 70ms, followed by the target word (positive or negative). The target word remained on the screen until

participants gave response. There was a 150ms pause before the start of the next trial. Each of the 10 pictures was presented once as a prime for each of the 10 words, making a total of 100 trials. The trials were presented in randomized order.

Explicit measures: Homophobic Attitude Scale-H25, and Connotative Differential-CD15.

For the assessment of explicit attitudes towards homosexuals, 25-item questionnaire *"Test of homophobia – H25"* was administered (Živanović, Đokić, Lazarević, Orlić, & Bjekić, 2014). In the scale there are 12 reversely keyed items. Participants provided answers on 5-point Likert type scale ranging from completely disagree to completely agree. Scale assesses global attitude towards homosexuals, and more specifically focuses on five domains of homophobic attitudes: aversive behaviour, repulsiveness, disparagement, social rigidity, and ego defence. *Aversive behaviour* refers to readiness to act against and/or to actively avoid contact with homosexuals (e.g., I would never insult homosexuals). *Repulsiveness* refers to feeling of disgust and negative emotions, when in contact or when thinking about homosexuals (e.g., When I see homosexuals, I feel nausea and my heart starts pounding). *Disparagement* indicates discrimination and segregation of homosexuals (e.g., Homosexual is just a politically correct term for a faggot). *Social rigidity* is defined as perception of homosexuals as threatening for society and societal norms (e.g., It is unacceptable that a civilized society hunts down homosexuals like beasts). *Ego defence* refers to the fear of compromising own sexual identity (e.g., I fear of thinking about being intimate with the person of the same-sex). Instrument has good validity and psychometric properties, with Cronbach alpha .97 (Živanović et al., 2014).

Connotative differential (CD–15) as a form of the rating scale was also administered (Janković, 2000a, 2000b). This instrument is based on the semantic differential technique, which was postulated by Osgood and associates (Osgood, Succi, & Tannenbaum, 1957) and is intended for measuring the subjective perception of subjects towards the object of attitude. Connotative differential consists of 15 pairs of opposite adjectives given in the form of bipolar evaluation scales with seven items (from –3 to +3). These adjectives are grouped into three dimensions: emotional, arousal, and cognitive. Emotional dimension refers to the emotional and evaluative aspect of subjective perception, and consists of the following scales: unpleasant – pleasant, repulsive – attractive, disgusting – nice, bad – good and undesirable – desirable. Arousal dimension refers to the motivational aspect of subjective perception, and consists of the following scales: unremarkable – remarkable, weak – strong, boring – interesting, unimportant – important, and unexciting – exciting. The last one, cognitive dimension refers to the cognitive aspect of subjective perception and consists of the following scales: meaningless – meaningful, incomprehensible – comprehensible, irregularly – regularly, unknown – well-known and unclear – clear. Connotative differential instrument has good psychometric characteristics, with Cronbach alphas for emotional, arousal, and cognitive dimension .97, .80, and .86, respectively (Janković, 2000a, 2000b). As target concepts "sexual intercourse with same-sex person" and "sexual intercourse with the person of opposite sex" were used, where all subjects had to rate both targets, but order of target concepts was counterbalanced across subjects.

Procedure

Conventionally, explicit measures were taken before the implicit measures (Egloff & Schmuckle, 2002; McDaniel, Beier, Perkins, Goggin, & Frankel, 2009). The explicit measures were assessed during practicals on the faculty courses, while IAT and AP were collected individually (in separate rooms). Half of the sample completed first IAT and then AP, while other half completed tasks in reversed order.

Results

Implicit Measures – "Data Trimming" in IAT and AP task

Before conducting other analyses that included IAT and AP, the distributions of these measures were examined. The data were "cleaned" of the usual speeded task impurities. According to the general agreement among scholars (Greenwald et al., 2003), in IAT data trimming, we screened the data in order to exclude the RTs longer than 10000ms and shorter than 300ms. In AP task, RTs below 300ms were excluded and trials with incorrect responses were excluded (3.8%). In addition, for both implicit techniques, if more than 10% of the response latencies met these criteria the concerned subjects were to be excluded from further analysis. However, in the preliminary analyses, no subjects from the sample met this criterion and none of them were excluded from the sample.

Score calculation and reliability analysis.

For calculation of D measure in IAT task, ***improved scoring algorithm*** recommended by Greenwald et al. (2003) was used. Positive D values indicate implicit preference for combined categories straight and pleasant over gay and pleasant. In AP task, two differential scores were calculated. For AP positive score (AP+), RTs for positive targets on straight primes were subtracted from RTs for positive targets on gay primes. Higher AP+ score indicates shorter RTs on positive targets when straight primes precede them. For AP negative score (AP-), RTs for negative targets on gay primes were subtracted from RTs for negative targets on straight primes, where higher score indicates shorter RTs on negative targets when gay primes preceded them.

On Test of homophobia – H25 average score was calculated for each respondent. Since average values on H25 range from 1 to 5, higher scores indicate more homophobic attitudes.

For connotative differential, three differential scores were calculated for three dimensions (emotional, arousal, and cognitive) by subtracting scores for attitude target "sexual intercourse with the person of same sex" from the attitude target "sexual intercourse with the person of opposite sex". For all three scores higher values indicate stronger positive attitude toward heterosexuality. Reliability analysis conducted in this study demonstrated that all instruments have good Cronbach alpha coefficients, ranging from .825 (for IAT) to .963 (for H25)[2].

Descriptive statistics and preliminary analysis.

Descriptive statistics for all applied measures on total sample and on subsamples are displayed in Table 1.

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2 Reliability coefficients for IAT and AP were calculated on differential scores.

Table 1
Descriptive statistics for all applied measures

	Total sample ($N=277$)				Male ($N=122$)				Female ($N=155$)			
	Min	*Max*	*M*	*SD*	*Min*	*Max*	*M*	*SD*	*Min*	*Max*	*M*	*SD*
IAT (D)	-1.56	2.26	0.70	0.55	-1.56	2.26	0.82	0.55	-0.82	1.86	0.61	0.53
AP +	-0.18	0.51	0.03	0.07	-0.11	0.51	0.05	0.08	-0.18	0.21	0.02	0.06
AP −	-0.16	0.40	0.01	0.07	-0.16	0.40	0.02	0.08	-0.13	0.21	0.00	0.05
H25	1.00	4.96	2.45	0.99	1.20	4.96	3.19	0.86	1.00	4.40	1.88	0.65
EMO_{CD}	-1.40	6.55	4.43	1.78	-1.40	6.55	5.42	1.35	-0.20	6.00	3.66	1.69
ARO_{CD}	-3.00	6.92	3.74	2.15	-2.40	6.92	4.97	1.71	-3.00	6.00	2.78	1.96
COG_{CD}	-1.25	6.00	4.23	1.85	-1.20	6.00	5.12	1.55	-1.25	6.00	3.53	1.77

Note: *N*-sample size; *Min*-minimum; *Max*-maximum; *M*-mean; *SD*-standard deviation; IAT(D) –D measure on IAT toward homosexuality; AP+ –difference score for positive targets; AP– –difference score for negative targets; H25 Test of homophobia score; EMO_{CD}-score on affective dimension of connotative differential CD15; ARO_{CD}-score on arousal dimension of connotative differential CD15; COG_{CD}-score on cognitive dimension of connotative differential CD

On total sample, Implicit Association Test assessing attitudes towards male homosexuality demonstrates moderately positive preference for heterosexuality in comparison to male homosexuality ($D = .70$). T-test analysis revealed statistically significant differences between male and female respondents on IAT, where females had more positive implicit attitude towards gay man, $t(275) = 3.24$, $p < .01$.

On affective priming task, analysis of variance for repeated measures revealed interaction between prime type (straight and gay), and valence of the target (positive and negative words), $F(1, 259) = 44.92$, $p < .01$, $\eta^2 = .15$. Results of Tukey HSD post hoc test show that heterosexual primes facilitated RTs for positive words in comparison to RTs for gay primes, $p < .01$. However, when targets were negative words there was no statistically significant difference in RTs for gay and heterosexual primes. In addition, this pattern of results was consistent across subsamples.

On total sample, scores on Test of homophobia demonstrate moderately homophobic attitudes. T-test analysis demonstrated that female respondents have less homophobic attitudes than males, $t(275) = 14.41$, $p < .01$.

Scores on all dimensions of connotative differential scale, CD15, demonstrate strong preference for sexual intercourse with the person of opposite sex, which indicates positive attitude towards heterosexuality. On all dimensions of CD15, i.e., emotional, arousal, and cognitive, females had less negative attitudes toward homosexuality, $t(275) = 9.38$, $p < .01$, $t(275) = 9.76$, $p < .01$, $t(275) = 7.82$, $p < .01$, respectively.

Convergent validity of implicit measures

Testing of convergent validity across genders showed lower coefficients and different patterns of significant correlations (Table 2). In male subsample, implicit measures were not significantly correlated, and there were no significant correlations between implicit and explicit measures. All explicit measures were significantly correlated.

Table 2
Convergent validity of implicit and explicit measures: Correlation matrix

	Male subsample $N = 122$							Female subsample $N = 155$						
	IAT	AP+	AP-	H25	EMO_{CD}	ARO_{CD}	COG_{CD}	IAT	AP+	AP-	H25	EMO_{CD}	ARO_{CD}	COG_{CD}
IAT	1	-.10	-.16	-.06	.07	.01	.07	1	.05	.01	.33**	.31**	.19*	.26**
AP+	-.10	1	.25**	.10	.03	.05	.06	.05	1	.06	.07	.08	.01	.12
AP-	-.16	.25**	1	.13	.04	.07	.08	.01	.06	1	.10	.05	.09	.08
H25	-.06	.10	.13	1	.40**	.65**	.60**	.33**	.07	.10	1	.55**	.45**	.49**
EMO_{CD}	.07	.03	.04	.40**	1	.60**	.83**	.31**	.08	.05	.55**	1	.79**	.89**
ARO_{CD}	.01	.05	.07	.65**	.60**	1	.76**	.19*	.01	.09	.45**	.79**	1	.73**
COG_{CD}	.07	.06	.08	.60**	.83**	.76**	1	.26**	.12	.08	.49**	.89**	.73**	1

Note: IAT – D measure on IAT toward homosexuality; AP+ – difference score for positive targets; AP– – difference score for negative targets; H25 – Test of homophobia score; EMO_{CD} – score on affective dimension of connotative differential CD15; ARO_{CD} – score on arousal dimension of connotative differential CD15; COG_{CD} – score on cognitive dimension of connotative differential CD15.
** Correlation is significant at the .01 level (2-tailed).
* Correlation is significant at the .05 level (2-tailed).

In female subsample, implicit measures did not correlate, while IAT score had significant correlation with H25 and all three dimensions of CD15 scale. All explicit measures were significantly correlated.

Structural model testing: cross-sample stability

Latent factor of explicit attitude had loadings from H25 and three dimensions on connotative differential CD15. In order to make possible extraction of latent IAT factor, instead of one we have created four IAT difference scores with taking into account that all types of stimuli (straight and gay pictures, pleasant and unpleasant words) are equally represented in these four new measures. In other words, what is different in these four IAT measures are concrete stimuli, not the types of stimuli. The expected similar pattern of reactions on the type of stimuli independent of the concrete stimuli enabled extraction of the IAT latent factor. Latent IAT factor had loadings on four IAT scores, while AP latent factor had loadings on AP positive and AP negative score.
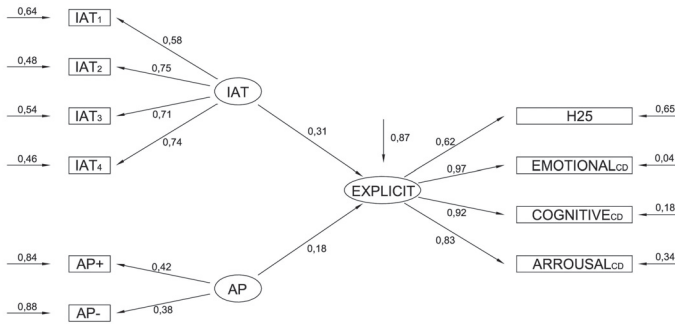
Figure 1. Model testing cross-sample parameters stability
(error variances are from the female group)

In order to test cross-sample stability of the hypothesized model, multi group SEM was performed. Five submodels with increasing strictness were tested: configural invariance model, metric invariance model, latent variance invariant model, path invariant model, and error variances invariant model.

Table 3
Model testing cross-sample stability

Model	$c^2(df)$	SRMR	RMSEA (90% CI)	CFI	$\Delta c^2 \Delta df$
Configural (baseline) invariance	71.39(64)	.048	.029 (0.00-.061)	.99	
FL invariance	81.12(74)	.058	.026 (0.00-.057)	.99	9.73(10) n.s.
FL, FV invariance	81.35(75)	.061	.025 (0.00-.056)	.99	9.96(11) n.s.
Invariance of paths from implicit latent factors to the explicit latent factor	85.51(77)	.079	.028 (0.00-.058)	.99	14.12(13) n.s.
EV, invariance	114.74(87)	.075	.048 (.018-.071)	.98	43.35(23)**

Note: FL = Factor loadings; FC = Factor covariances; FV = Factor Variances; EV = Error variances; EC = Error covariances; CFI = Comparative Fit Index; SRMR = Standardized Root Square Mean Residual; RMSEA = Root Mean Square Error of Approximation; RMSEA (90% CI) = 90% Confidence Intervals for RMSEA; $\Delta\chi^2\Delta df$ = difference in χ^2 and dfs between baseline and nested models; ** p <0.01

As can be seen from Table 3 only model assuming residual invariance significantly deteriorates in comparison to the baseline, configural model. It means that what cannot be assumed is that the variables measure the latent constructs with the same degree of measurement error in males and females (level 5 assumption). But, it can be assumed that the strength of relations between specific measures and underlying constructs are the same across the samples (i.e., that metrics or scale intervals are equal so that various scores can be meaningfully compared across genders), and that variances of latent factors are also equal. What is most important, the hypothesis that the structure of relations between implicit factors and the explicit one is not different in the two groups cannot be rejected. It means

that only IAT influences (g1 = 0.31, t = 4.32) explicit homophobic attitude in both groups, while AP does not (g2 = 0.18, t = 1.56).

The first submodel to be tested was the most lenient one – model of "configural" invariance (level 1), assuming the invariance of the structure of relations among the variables (Horn & McArdle, 1992). Level 2 submodel – "metric invariance" – assumes the factor loadings are equal across samples. Level 3 submodel involved additional constraining – the variances of the latent variables are equal across samples. Level 4 submodel assumes that the paths from both implicit latent factors to the explicit one are equal across samples. Level 5 submodel assumes error variances of the variables to be equal across samples. Correlation matrices between normalized scores have been modelled, method of parameter estimation was maximum likelihood.

Discussion

Aim of the study was to test hypothesis about defensive function of explicit homophobic attitudes. This hypothesis proposes that anti-gay attitude might be a defence mechanism generated by anxiety related to latent attraction to same-sex (Herek, 1987, 2000; Lock & Kleis, 1998). Based on theoretical assumption about the nature of implicit measures (Fazio & Olson, 2003; Foroni & Semin, 2012; Greenwald et al., 2003; Olson & Fazio, 2003), it was assumed that they would be useful tool for assessment of processes and cognitions hidden from conscious awareness, but that may be important for formation of homophobic attitude. For testing of this hypothesis, we have used two empirically validated implicit measures (i.e., Implicit Association Test and Affective Priming) (Greenwald et al., 2003; Lane et al., 2007; Fazio, 2001), and two explicit measures: Test of homophobia H25 (Živanović et al., 2014) and Connotative differential-CD15 (Janković, 2000a, 2000b).

Preliminary analyses of sex differences in attitudes toward male homosexuality revealed that females do have more positive attitudes than males on both explicit measures, i.e., H25 scale and CD15. These results are in line with some previous studies showing that females have less negative attitudes towards homosexuality in general (Herek, 2002; Herek & Capitanio, 1999; Kite & Whitley, 1996). Our female respondents had more positive implicit attitude measured with IAT, which is in accordance with previous study by Steffens (2005) showing larger negative IAT effects in males than in females. However, results show that on affective priming positive words were facilitated by heterosexual primes in both subsamples. Interestingly, processing of negative words was not affected by the type of prime. It seems that for heterosexuals, gay scenes are not affectively arousing unlike scenes depicting people in heterosexual activity. In other words, this finding suggests that AP does not capture affective arousal on homosexual stimuli (neither positive nor negative), but only positive affective arousal on heterosexual stimuli. This result may not be surprising since

some studies using brain imaging techniques show that brain activation pattern characteristic for sexual arousal in homosexuals and heterosexuals was present only when viewing video of their respective sexual orientation (Paul et al., 2008).

Analyses showed that explicit measures demonstrated strong convergent validity, which was not the case for implicit measures since they had zero intercorrelations. This is in line with some previous studies reporting zero to low coefficients of convergent validity of implicit techniques (DeHouwer, 2003; Fazio & Olson, 2003; Foroni & Semin, 2012; Olson & Fazio, 2003). Our results go in favour of studies arguing that IAT and AP differ with respect to underlying mechanisms and that tap different aspects of implicit processes (DeHouwer, 2003; Fazio & Olson, 2003; Foroni & Semin, 2012; Olson & Fazio, 2003).

Hypothesis about defensive function of homophobia presumes that latent homosexuality should manifest as explicit negative attitude toward same sex objects (Adams et al., 1996; Baumeister et al., 1998; Herek, 1987, 2009; Lock & Kleis, 1998; Mahaffey et al., 2011; Moss, 2001). Several studies using different experimental paradigms and measures tried to empirically validate this assumption, but the results were inconclusive (Adams et al., 1996; Mahaffey et al., 2005a, 2005b; Mahaffey et al., 2011; Meier et al., 2006). Moreover, these studies were dealing only with explicit homophobia in males.

Inclusion of female respondents and use of several measurement techniques, both implicit and explicit, enabled more precise test of defensive function of explicit homophobia. Since object of measurement in our study is an attitude towards male homosexuality, it was reasonable to expect different patterns of relations between implicit and explicit measures in males and females. Specifically, in case of homophobia toward gay man, confirmation of psychodynamically derived hypothesis would result in the following: in male respondents explicit attitude is determined by implicit affective attraction to gay pictures (i.e., AP) and more pronounced negative classification of gay stimuli (i.e., IAT), while in females only cognitive component of implicit attitudes (i.e., IAT), but not implicit preference for gay pictures predict explicit attitude.

Multi-group SEM analysis showed that the structure of relations between implicit attitudes towards homosexuality and the explicit one is the same in both males and females. Since the product-moment correlations between explicit and implicit measures were different, it is possible that the power of our experiment was not high enough to detect significant improvement after allowing for the difference between implicit and explicit latent factors in males and females. However, the difference in correlations (presence of correlations between IAT and explicit measures in females and absence of correlations between implicit and explicit measures in males) is not in the direction that would undermine the conclusion about inadequacy of the defensive homophobia hypothesis. It can be concluded that only cognitively mediated implicit negative attitudes predict explicit homophobia, while emotionally mediated implicit attitudes did not. Therefore, our results indicate that explicit homophobia does not stem from

implicit affective attraction towards same sex, as hypothesis about defensive homophobia would suggest.

Our results indicate that implicit attitudes are relevant for explicit attitude formation, but only those cognitively mediated, which operate in the straightforward, not defensive manner: the more negative implicit attitudes are the more negative are explicit attitudes. Results are not supporting the idea that latent attraction to same-sex would cause homophobic attitude. Our data are in accordance with some previous studies demonstrating that stronger anti-gay attitude is related to stronger implicit aversion to stimuli with homosexual content (Mahaffey et al., 2005a, 2005b, 2011; Meier et al., 2006). However, results of this study are not in accordance with some of the studies using physiological implicit measures for detection of defensive function of explicit homophobia (e.g., Adams et al., 1996; Shields & Hariman, 1984, as cited in Lock & Kleis, 1998). Here we should note that the possibilities of direct comparison of results of the studies using physiological and other implicit techniques are to some extent limited. Namely, considering physiological parameters as mere indicators of affective states is not completely justifiable since they are only describing physiological arousal and hence the assessment of the valence of provoked reaction remains open question (Mahaffey et al., 2005a, 2005b). Therefore, future studies are highly necessary in order to understand the relationship between physiological parameters and psychological measures of affective reactions and states. Our data are also not in accordance with one recent study using lexical decision task preceded by gay-man erotic video showing that explicit homophobia might have defensive function (Zeichner & Reidy, 2009). One reason for this discordance of results can be found in the fact that in the lexical decision task Zeichner and Reidy (2009) were using targets describing particular emotions (i.e., fear, anger, disgust, and happiness), while our design did not include markers of specific (i.e., pre-defined) emotions. However, in this part, problem of direct comparison of results of the studies using different implicit techniques rises again, and additional empirical evidence on reasons for discordance of the results are necessary.

Our results did not support the hypothesis of defensive function of explicit homophobia. The defender of the hypothesis could still argue that the latent attraction to same sex in some people is so deeply repressed that it cannot surface even through implicit techniques, and more specifically, affective priming paradigm. It could be possible, but then one can justifiably ask whether the supposed latent attraction to same sex could be captured by experimental procedures. To prevent the usual objection that psychoanalytically driven explanations are not falsifiable the defender of the hypothesis should give *a priori* reasons (before knowing the results of the experiment) why the repressed attraction to same sex could not be registered by the paradigm.

Final comments

To sum up, empirical results from this study do not support conceptions on defensive function of explicit homophobia and indicate quite the opposite. Namely, based on our study explicit homophobic attitudes are more determined by cognitively mediated negative implicit attitude towards homosexuals. These findings are more in favour of theories of socio-cultural development proposing importance of long-term learning in social environment.

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