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Heart Versus Reason in Condom Use: Implicit Versus Explicit Attitudinal Predictors of Sexual Behavior

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Abstract. We test the hypothesis that explicit and implicit measures of attitudes would differentially predict deliberate versus spontaneous behavior in the domain of condom use. Students completed explicit attitudinal and thought-listing measures about using condoms and implicit measures using attitude priming and Implicit Association Test (IAT) procedures. An attitude IAT measured the association between condom images and affective images; a self-identity IAT measured association of condoms with the self. We predicted and found that condom use with main partners was predicted by explicit measures but not implicit measures; the opposite was true for condom use with casual partners. Although the attitude priming measure was not positively correlated with casual condom use, the IATs were. The patterns of relations, however, were unexpectedly complex, due to a strong decrease in IAT effects over time, and different IATs assessing unique attitudinal dimensions.

Key words: IAT, priming, implicit attitudes, condom use, sexual behavior

criterion domain

Gefühl versus Vernunft bei der Kondombenutzung: Implizite versus explizite Einstellungen als Prädiktoren sexuellen Verhaltens

Zusammenfassung. Die Annahme, daß explizite und implizite Messungen von Einstellungen in unterschiedlichem Maße deliberatives und spontanes Verhalten vorhersagen, wurde im Bereich der Kondombenutzung überprüft. Dazu wurden die Einstellungen von Studenten zu Kondomen mit verschiedenen expliziten und impliziten Maßen erfasst: Einstellungsskala, Gedankenliste, Einstellungs-Priming und zwei IAT-Prozeduren. Ein Einstellungs-IAT hat die Assoziationen zwischen Bildern von Kondomen und affektiven Bildern gemessen; ein Selbst-Identitäts-IAT hat die Assoziationen zwischen dem Selbst und Kondomen gemessen. Vorhergesagt und gefunden wurde, daß die selbstberichtete Kondombenutzung zwischen dem Selbstverkehr mit festen Partnern durch explizite Maße vorhergesagt wird, aber nicht durch implizite. Das Gegenteil gilt für die Kondombenutzung beim Sexualverkehr mit gelegentlichen Partnern. Hier korrelierten die impliziten Maße – mit Ausnahme des Einstellungs-Primings – positiv mit der Kondombenutzung. Insgesamt war das Ergebnismuster jedoch unerwartet komplex. Das lag zum einen an einer Abnahme von IAT-Effekten über die Zeit und zum anderen an der Erfassung von jeweils besonderen Einstellungsdimensionen durch die beiden IATs.

Schlüsselwörter: IAT, Wissensaktivierung, implizite Einstellungen, Kondombenutzung, Sexualverhalten

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last 6 months. Seventeen (17.5%) participants did not report previous sexual experience¹.

Questionnaire Items

The primary measures of interest follow below. All attitude measures were scored such that higher numbers indicate more positive attitudes toward using condoms.

Target-specific attitude measures. Participants were asked to complete all attitude items, regardless of whether they used condoms or not, and regardless of whether they had sex or not. Two items assessed how they felt about always using condoms with a casual partner and with a main partner, with response options of very good, good, neither good nor bad, bad, or very bad².

Affective attitude measures. Two other attitude measures were designed to be more global affective measures of attitudes toward using condoms. A four-item semantic differential measure had participants respond to "USING CONDOMS IS:" on four adjective pairs: nice/awful, ugly/beautiful, bad/good, and pleasant/unpleasant. To indicate their responses, participants marked one of a series of five boxes which were scored as points from 1 to 5; appropriate items were reverse-scored before averaging responses to the four items. Pilot-testing of the measure in a previous sample ($N = 30$) revealed the four items to be strongly intercorrelated (average $r = .49$, coefficient alpha = .99). A thermometer measure (Greenwald et al., 1998) had participants indicate how cold or unfavorable (0°) to warm or favorable (100°) they felt about using condoms using a thermometer with numbers at 10-degree intervals.

¹ The rates of sexual activity in this sample were comparable to national averages for American college students. For instance, in a 1995 national survey of college students, 17.1% of students at 4-year institutions reported never having had sex, and 65.6% reported having sex in the previous 3 months (Centers for Disease Control and Prevention, 1997).

² An additional item had identical wording and responses, except that the kind of sex partner was unspecified to provide a general measure of condom use attitudes per se. Two additional behavior items were included for exploratory purposes (talking about safer sex, and turning down sex because of a partner's refusal of condoms). In addition, after completing all other measures in the study, participants completed a measure in which they indicated the degree to which 16 words were familiar to them as being associated with condoms (e.g., latex, rubbers, spermicide, Trojans, Lifestyles, and other condom brand names). This measure was included to identify familiarity of brand names for use in future studies. These additional measures are not discussed further in the current paper.

Condom use. Participants were asked to report their condom use (during vaginal and/or anal sex) during the last 6 months on two key condom items – one asked about frequency of condom use with their steady sex partners, the other asked about condom use with casual sex partners (someone other than their steady partner). Responses (1 to 5) were never, 25%, 50%, 75%, or all of the time. An additional item assessed whether they used a condom the last time they ever had sex.

Condom thoughts. After completing the other explicit measures, participants were asked to list single words that came to mind when they thought of condoms. Two raters independently coded these condom thoughts. Thoughts were coded as positive associations, negative associations and explicit mention of preventative aspects of condom use (excluding words that have negative valence such as "disease"). All other thoughts were coded as neutral. The coders agreed on 94% of the categorizations. Total number of thoughts, and proportion of positive, negative, and preventative thoughts were calculated. In addition, the categorizations of the first listed word and the first three listed words were assessed.

Procedure

Each participant completed the measures anonymously while alone in a small room equipped with a desk and computer. Because the IAT is viewed as relatively impervious to an individual's awareness of what is being measured, the order of completing measures was as follows. The attitude priming measure was completed first, the attitude IAT and self-identity IAT were completed in counterbalanced order, and a questionnaire assessing explicit attitudes, thoughts, and sexual behavior was completed last. All implicit measures were designed to be suitable for subsequent use in contexts in which high-risk populations with limited literacy would be able to complete them under time constraints. Recent research has successfully used brief implicit measures with as few as 20 trials (Hets, Sakuma, & Pelham, 1999) and has used pictures as well as words (De Houwer & Hermans, 1994; Fazio & Dutton, 1997; Giner-Sorolla, Garcia, & Bargh, 1999; Hermans, De Houwer, & Eelen, 1994). Thus in the current study, we used brief sequences of trials, stimuli that were primarily pictures rather than words, and simplified instructions that emphasized speed. All images were 480 × 360 pixel color images (19 × 15 cm) presented against a black background. Details about the pictures are available from the authors.

Attitude priming task. This procedure adapted methodology commonly used to examine automatic

explicit
measures

13
27
30

29 30
Criterion
measures
11 15
14 28

order
of
measures
19
20 21
23 24
25

attitude activation (Bargh et al., 1992; Fazio et al., 1986) to assess the positivity of participants' implicit attitudes toward condoms. The evaluative priming procedure involves brief exposure to condom images, followed by a negative or positive target picture. To the extent to which condom images automatically activate positive or negative affect, responses to subsequent positive or negative target images should be speeded.

(17) An initial block of trials provided baseline response-latencies on target pictures. Participants categorized 24 pictures as good or bad using these keys. As on all implicit measures used, the key (Z versus M) associated with a given category was counterbalanced across participants. The first 4 pictures (2 with positive and 2 with negative valence) were used for practice trials. After these practice trials, the 20 target pictures to be used in the subsequent priming task were presented to assess baseline reaction times to these stimuli. Half of the pictures were pastoral, sensory, or social images of positive valence selected from the International Affective Picture System (IAPS; Lang, Bradley & Cuthbert, 1999; # 7330, 7260, 5001, 1750, 1710, 2165, 4533, 8170, 8510, and 8501); half were sad, disturbing, or frightening images of negative valence (IAPS # 9040, 2800, 3301, 1300, 3181, 1050, 6260, 9140, 9140 and 6350). Participants were asked to respond as quickly as possible without making too many errors. Each picture remained on the screen until the participant responded or until 2.5 seconds had passed without a response. If the participant failed to respond or categorized the picture incorrectly, a red "X" appeared on the screen, ending the trial. A blank screen appeared for 1 second between trials.

After this baseline block, participants were told that the task would now become more difficult. Immediately preceding the pleasant and unpleasant pictures, another picture would appear that they were to ignore. They should again categorize the second picture (the target picture) as good or bad, as quickly as possible. Participants saw a prime (a condom or non-condom image) appear for 184 msec, followed by a blank screen for 100 msec, followed immediately by the target picture, a pleasant or unpleasant image, for a stimulus onset asynchrony (SOA) of 284 msec. The target images were the 10 positive and 10 negative images viewed in the baseline trials. The primes were 5 condom or 5 non-condom pictures developed for this study. The non-condom images were of a variety of neutral objects (e.g., markers, antacid package).

³ In a pilot study (Marsh et al., 2000), 55 undergraduate students used 9-point scales to rate the condom and non-condom images as to how pleasant or unpleasant each

A 2 (Prime: Condom or Non-condom) \times 2 (Target: Positive or Negative) design was used in the priming block of trials. Each target picture appeared once following a condom picture and once following a non-condom picture. Each condom and non-condom prime appeared once before a positive and once before a negative target for a total of 40 trials.⁴ For each trial, the particular prime and target pictures were chosen at random. Four practice trials (using 4 neutral primes, 2 additional pleasant, and 2 additional unpleasant target pictures) preceded the 40 priming trials. The error message and inter-trial interval were identical to the baseline block.

Attitude IAT. The attitude IAT measure involved 5 blocks of trials. Each single-task block had 20 trials; each dual-task block had 40 trials. In Block 1, participants categorized 10 positive and 10 negative scenes as good or bad (IAPS # positive: 5760, 5780, 2080, 5600, 8380, 8200, 8030, 8461, 7570, 7570; negative: 9810, 6570, 6510, 3230, 9250, 9433, 3015, 9911, 3015, 1200) using the z and m keys. In Block 2, participants used these keys to categorize new condom and non-condom images as to whether they were condoms or not.⁵ In Block 3, these tasks were combined by randomly intermingling the scenes with condom and non-condom objects, requiring students to use the same key press to indicate both "condom or good" for instance. For Block 4 and 5, the key associated with "condom" was reversed, and the tasks in Block 2 and 3 were repeated.

image made them feel, and how calm/relaxed/bored or excited/nervous/jittery each made them feel. On average, the condom and non-condom pictures had neutral ratings of valence, with slightly more positive ratings for the non-condom pictures ($M = 5.12$, $SD = 0.71$) than for the condom pictures ($M = 4.79$, $SD = 1.37$), paired $t(54) = -1.86$, $p = .07$. Condoms were viewed as neutral in arousal-value ($M = 4.52$, $SD = 1.73$) whereas the other images were viewed as lower in arousal-value ($M = 3.20$, $SD = 1.39$), paired $t(54) = 6.35$, $p < .01$. Rating scales were completed on the computer, allowing response latencies to be assessed. On average, it took pilot participants equally long to make valence ratings of condom and non-condom pictures, $t(54) = -0.40$, and equally long to make arousal ratings of condom versus non-condom pictures, $t(54) = 1.45$, $p = .15$.

⁴ For 21 participants, an additional block of 40 trials was also presented; the data were not used in present analyses.

⁵ The condom and non-condom pictures were also rated by the same participants who provided pilot data on the images used in the attitude priming task. On average, the condom and non-condom pictures each received mean ratings at the neutral midpoint on valence, paired $t(54) = -0.32$. All were rated as relatively low in arousal, though condom pictures were rated as more stimulating ($M = 4.42$ out of 9) than non-condom pictures ($M = 3.20$), paired $t(54) = 5.90$, $p < .001$. Response times did not vary as a function of whether images were condom or non-condom pictures, paired $t(54) = -1.35$, $p = .18$ for valence ratings and paired $t(54) = -.50$ for arousal ratings.

Implicit measure: attitude
12 pictures
18 26
31 29
33

The primary blocks of interest (Blocks 3 and 5) involve dual categorization tasks. As others have also used brief versions of IATs (e.g., Bosson et al., 2000), we excluded practice blocks for dual categorization tasks (Greenwald et al., 1998). The other blocks were used to prepare participants by having them complete each categorization task separately. Which keys were associated with which categories was counterbalanced across participants. Thus, some participants had "condom + good" pairing in Block 3, whereas others had "condom + good" pairing in Block 5. Within each block, order of stimuli presentation was determined randomly. If an incorrect response was given, an error message "X Try again" printed in red text appeared and participants were required to press the correct key before continuing. Immediately after pressing the correct key, the next stimulus picture appeared.

Self-identity IAT. The procedural details and counterbalancing were identical to the attitude IAT, however pronouns were substituted for pleasant and unpleasant scenes (self: me, I, self, mine, and myself; nonself: they, them, it, and their). The dual categorization tasks thus required participants to categorize pronouns as "me" or "not me" intermingled with categorization of "condom" and "non-condom" images, using one key to distinguish "me + condom" (for instance), and one to indicate "not-me + non-condom."

Results and Discussion

Explicit Attitude Measures

To assess whether the explicit attitude measures (affective and target-specific items) addressed different facets of condom use, the attitude measures were correlated with one another as well as with participants' thoughts and behavior regarding condoms. The measures involved in these analyses have rea-

sonable reliability as analyses based on the semantic differential measure indicate. Internal consistency was adequate in the current sample (coefficient alpha = .80); moreover, the scale demonstrates good test-retest reliability over 5 weeks ($r = .76$, Marsh, Johnson, Scott-Sheldon, & Smith-McLallen, 2001). Other attitude and behavior measures demonstrate similar stability over time ($r_s = .62$ to $.90$), with attitudes and behavior toward condom use with casual partners showing the least stability ($r_s = .34$ and $.41$ respectively).

As Table 1 indicates, the thermometer and semantic differential scales were highly correlated, and correlations of these affective measures with attitudes toward condom use with a main partner also revealed large effect sizes. Attitudes toward condom use with casual partners were no more than moderately linked with attitudes toward using condoms with main partners and global affective measures.

Overall, participants' explicit attitudes were quite positive but somewhat less so on the affective measures. The mean scores on affective measures reflected about 74% of the maximum score possible ($M = 3.71$, $SD = 0.82$, for semantic differential scale; $M = 74.35^\circ$, $SD = 26.65$ on the thermometer item) whereas the other three items had mean scores reflecting 90% of the maximum possible score ($M_s = 4.05$, 4.68 , and 4.85 for main partner, unspecified partner, and casual partner, respectively, $SD_s = 0.99$, 0.65 , and 0.46). Expressed as a proportion of their total scale values, the affective means were significantly lower than the other explicit attitude means, $p_s < .01$. Moreover, attitudes toward condom use with main partner were significantly less positive than responses on the other attitude measures $p_s < .01$. Interestingly, virgins reported particularly positive attitudes. For example, virgins felt extremely warm toward using condoms – an average of 93° in contrast to 61° for individuals below the median in overall condom use and 78° for those above the median in condom use. This pattern suggests that initial,

Table 1. Correlations Between Self-Reported Attitudes Toward Using Condoms

	Thermometer	Condom Attitude Measures		
		Semantic Differential	With Steady Partner	With Casual Partner
Semantic differential	.73	–	–	–
Condoms with steady partner	.62	.61	–	–
Condoms with casual partner	.24	.15	.27	–
Condoms with unspecified partner	.47	.42	.43	.40

Note: Correlations of about .1 can be considered as reflecting small effect sizes, .3 to reflect medium effect sizes, and .5 or above to reflect large effect sizes (Cohen, 1977). $N = 95$ to 97 for all correlations. Correlations smaller than .2 were not statistically significant, $p > .05$.

Implicit
measures:
self-concept

33 18
29 26
31

16
Scoring
of
IAT

Markman & Messner, in press; Greenwald et al., 1998; Rudman, Greenwald, Mellott, & Schwartz, 1999). Consistent with Greenwald et al. (1998), we excluded the first two responses in the blocks to reduce variability due to lack of practice with the task, and we excluded latencies associated with incorrect responses (8% of total responses on the combined-task trials). Responses that were slower than 3000 msec or faster than 300 msec were excluded (0.6% of combined-task trials). All analyses are based on log transformations of response latencies.

To estimate the reliability of the IAT, the relations were assessed between scores calculated from the first and second halves of the measure. The split-half reliability was .57 for attitude IAT. Next, to describe the overall IAT effect (ability to categorize condoms with bad pictures versus good) across participants, we calculated the average response latency for the two combined-task blocks and conducted an analysis of variance (ANOVA) examining the effects of block-type (2 levels: condom+good<non-condom+bad>; condom+bad<non-condom+good>) X order of IAT (attitude or self-identity 1st) X order of blocks (2 levels: condom+good block 1st or 2nd). The first independent variable (IV) was a within-subjects factor; the other two IVs were between-subjects factors.

Unlike IATs conducted for objects for which there is expected to be vast agreement (e.g., insects versus flowers) or strong consensual evidence of racism (i.e., quicker responding to white + positive than to black + positive), we had no a priori expectations that speed on one block should generally be faster for participants than the other block. No consensual pattern of greater speed for one block over the other was found, $F = 1$, nor did block type interact with block order or task order. Only a significant block order X IAT order interaction was found, $F(1, 91) = 6.36, p < .05$. The pattern of means indicated merely that participants completed the blocks uniformly fast when they had prior practice with the other IAT; when the attitude IAT was first, participants completed both blocks more slowly when the condom+bad block came last.

Consistent with other IAT research (Greenwald et al., 1998), IAT effects were calculated as the difference between the average latency for trials in the dual categorization blocks ("condom+bad/non-condom+good" minus "condom+good/non-condom+bad"). More positive numbers indicated more positive condom attitudes-quicker response when condom was keyed with good than when it was keyed with bad. In addition, split-half IATs for the first and second halves of each block were calculated similarly (i.e., IAT_{first half} compared the first 20 trials in

the 2 blocks, and IAT_{second half} compared the last 20 trials).

As implied by the lack of main and interactive effects with block type, the average IAT effect did not differ from zero, $p = .30$, indicating that there was no consistent pattern of positive or negative attitudes toward condoms across participants. The overall IAT effect (Greenwald et al., 1998) slightly favored the condom+good pairing by 15 msec per trial, where mean latency per trial was 811 msec. Even when the slightly favored block occurred first, the effect size of the IAT effect was quite small ($d = 0.11$). Thus, examining the distribution of scores revealed that the sample was nearly equally divided between positive and negative scorers on this dimension.

As Table 4 indicates, attitude IAT was not correlated with condom use with steady partner, nor with condom use at last occasion of sex. As predicted, however, having more positive implicit attitudes was associated with condom use with casual partners. However, the effect size was moderately small, $r(35) = .23$; a moderate effect that was statistically reliable was found only for IAT_{first half}, $r(35) = .36, p < .05$.

As with the attitude priming task, we had neither expectations of substantial relations between implicit measures and explicit attitude and thought measures nor any such findings, $|r|s < .09$. Patterns were the same with IAT_{first half} and IAT_{second half}. The only correlation larger than .10 was the correlation between IAT and attitudes toward condom use with casual partner, $r = .12, ns$ ($rs = .11$ for each split-half IAT). (Note that statistical power was reduced for detecting reliable effects with casual partner-condom use because only a third of the sample reported casual sex with a casual partner.)

Order of blocks did not generally moderate the relations between IAT attitudes and other measures. Regression analyses on condom use with casual partners, for instance, indicated that including order (and interactions with order) in the equations did not improve prediction of this variable ($p > .18$). Nor were other relations moderated by order, with the exception of the small overall correlation between implicit attitudes and attitude toward use with casual partner⁹.

Self-identity IAT. The same exclusion criteria – excluding extreme responses (> 3000 msec or < 300 msec), incorrect responses, and the first two re-

⁹ Order of blocks interacted with the effects of the implicit attitude measure, $p < .05$ such that the explicit-implicit attitude correlation was positive when the condom + good block was first, $r = .47, p < .05$, but not when it was last, $r = -.09$.