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Persuasive Communications to Change Actions: An Analysis of Behavioral and Cognitive Impact in HIV Prevention

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Abstract

This meta-analysis examined the validity of various theoretical assumptions about cognitive and behavioral change following a communication recommending condom use. The synthesis comprised 82 treatment and 29 control groups included in 46 longitudinal reports with measures of perceived severity and susceptibility, attitudes and expectancies, norms, perceptions of control, intentions, knowledge, behavioral skills, or condom use. Results indicated that across the sample of studies, communications taught recipients about facts related to HIV and also induced favorable attitudes and expectancies, greater control perceptions, and stronger intentions to use condoms in the future. Moreover, messages that presented attitudinal information and modeled behavioral skills led to increased condom use. Results are discussed in the context of theories of human behavior and change and in reference to HIV-prevention interventions.

Keywords

HIV and condom use; behavior; attitude; persuasion; intervention; meta-analysis

Client-centered approaches and pragmatic skill-building interventions to reduce infection with HIV appear to be indispensable tools in reducing the epidemic of this disease (Kelly, 1982; Kelly & St. Lawrence, 1988, 1990). However, interventions to prevent HIV infection must also use less effortful yet persuasive approaches to reach large audiences at different

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levels of risk for HIV. In persuasive communications, a standard recommendation is presented, accompanied by material designed to increase the chance that message recipients will comply with the recommendation. Given the number of communications to prevent HIV that have been delivered over the years, there should be considerable knowledge about the impact of these communications on condom use. To date, however, there has been no precise estimation of the impact of persuasive messages that recommend condom use, nor is there knowledge of the general impact of different types of persuasive arguments designed to increase condom use. For example, the health belief model (Janz & Becker, 1984; Rosenstock, 1974; Rosenstock, Strecher, & Becker, 1994) and the protection– motivation theory (Floyd, Prentice-Dunn, & Rogers, 2000; Rogers, 1975) imply that communications will increase condom use when they induce recipients' (a) fear of the severity of the disease and (b) beliefs that they are personally susceptible to it (but see the null meta-analytic findings of Gerrard, Gibbons, & Bushman, 1996). However, other conceptualizations identify different factors that are relevant to behavioral change. The theory of reasoned action (Fishbein & Ajzen, 1975) and the theory of planned behavior (Ajzen & Madden, 1986; for a meta-analysis, see Albarracín, Johnson, Fishbein, & Muellerleile, 2001) suggest that communications are likely to increase protection behaviors when they can successfully induce (c) perceived desirability of the behavior (i.e., positive attitudes and expectancies about the behavior) and (d) normative pressure to engage in the behavior (i.e., social norms). The theory of planned behavior suggests that communications should also increase (e) perceptions that the behavior is easy and up to the individual (i.e., perceived behavioral control). Thus, communications that increase procondom attitudes, norms, and perceptions of control should correspondingly increase (f) behavioral intentions and actual actions. Like the theory of planned behavior, social–cognitive theory (Bandura, 1986, 1989, 1994) implies that communications will successfully increase condom use when they increase recipients' perceptions that they are capable of implementing the behavior. Furthermore, social–cognitive theory (Bandura, 1989) and the information–motivation– behavioral skills model (Fisher & Fisher, 1992) both assume that people are more likely to perform a behavior once they acquire relevant (g) knowledge and (h) behavioral skills. Therefore, to be effective, communications should successfully model behavioral skills. As Fishbein and his colleagues (Fishbein et al., 1992, 1993, 1995; see also Albarracín, Fishbein, & Middlestadt, 1998) observed, not all of these models incorporate all of the same constructs, nor are the relations among the constructs the same in different models. In combination, however, these theories suggest a number of communication strategies that can be expected to change behavior.

The various models of behavioral prediction and change have implications for the design of communications because they make specific predictions concerning the predictors of condom use behavior. Given the educational objectives of mass-media approaches and limited-scope communications, we expected changes in knowledge to be large and generalizable across studies. These knowledge-inducing strategies, however, may have limited influence on condom use (Fisher & Fisher, 1992). Because condom-use-related communications have concentrated on informing audiences of the mechanisms of the disease and its transmission, we expected limited effects on perceived threat and vulnerability, attitudes, norms, perceived behavioral control, and behavioral skills. It is important to note, however, that communications should be effective to the extent that they

contain arguments designed to induce favorable attitudes, norms, perceived behavioral control, and behavioral skills. We meta-analyzed reports of outcomes of communications to increase condom use on the basis of these predictions.

Method

Review and Inclusion Criteria

We conducted a thorough review of reports that were available by January 1998. We first conducted a computerized search of Medline, PsycINFO, ERIC, Social Science Citation Index, and Dissertation Abstracts International using a number of key words, including *HIV (AIDS) messages, HIV (AIDS) communications, HIV (AIDS) interventions, HIV (AIDS)* prevention, and health education and HIV (AIDS). Second, we manually searched all available years after 1985 of 20 journals relevant to HIV and communication. We also checked cross-references in the obtained reports, sent requests for information to all HIV researchers funded by the National Institute of Mental Health, and contacted selected experts and agencies who could provide relevant materials.

We used several eligibility criteria to gather a sample of studies that could serve our objectives well, as explained below.

1. 1. Studies were included if they described the outcomes of a verbal, written, or visual communication to promote condom use. We excluded interventions to promote safer intravenous-drug-related behaviors or abstinence from sex, except when they also included a condom-use component.
2. 2. The studies we included concerned outcomes of communications. Therefore, we excluded more complex interventions in which recipients engaged in behaviors as part of the intervention, including role-playing and practicing condom-use related skills, as well as counseling-and-testing approaches.
3. 3. We only synthesized studies that either provided exact information or provided statistical significance and direction to calculate the effect of the communication over time, and we excluded reports without a pretest. Most of the reports obtained pre- and posttest measures on the same sample, but others obtained pre- and posttest data on independent samples (see Cook & Campbell, 1979). Effect sizes did not vary as a function of the type of design used in the study.
4. 4. In addition to including at least one communication to increase condom use, reports often (but not always) included comparison and control conditions. Groups that researchers treated as “comparison” conditions but that were presented with a communication were considered *treatment* groups. We considered *control* groups those that were presented with no persuasive message whatsoever.

Coding of Study Characteristics

Two independent raters coded characteristics relevant to the report and the methods used in the study. After the initial training, intercoder agreement was 95%, and occasional disagreements were resolved by discussion and further examination of the studies.

We coded studies for characteristics of the report, including (a) publication year, (b) first author's affiliation to behavioral sciences (e.g., psychology or social work) or medical sciences (e.g., epidemiology, community health, or medicine), (c) first author's academic or nonacademic affiliation, (d) country of intervention (i.e., United States vs. other countries), and (e) language of intervention (English vs. other languages).

We read the reports to determine whether communications included (a) threat arguments, such as discussions about the recipients' personal risk of contracting HIV or other sexually transmitted diseases; (b) attitudinal arguments, such as discussions of the positive implications of using condoms for the health of the partners and for the romantic relationship; and (c) normative arguments about support for condom use provided by friends, family members, or partners. We also classified reports according to the presence of factual information about or descriptions of (a) mechanisms of HIV, (b) HIV transmission, and (c) methods of HIV prevention. In addition, we established whether the message verbally reviewed or modeled behavioral skills for situations in which (a) the partner does not want to use a condom, (b) the recipients or their partners are sexually excited, or (c) alcohol or drugs are involved.

We also recorded features of the sampling of recipients of the persuasive communication, including demographic characteristics of the target group as well as specific characteristics or behaviors of the target group that are associated with HIV-infection risk. To describe the target population, we retrieved (a) the percentage of men in each group; (b) the mean or median age of the sample; (c) the percentage of participants of European descent as a measure of ethnic diversity; (d) the percentage of participants who completed high school; (e) population of the city at the time the intervention was conducted; (f) baseline level of condom use, which we classified as *low* (i.e., sample mode was never or almost never, or mean was 40% of the time or less), *moderate* (i.e., sometimes, or 40%–80% of the time), or *high* (i.e., always or almost always, or 80% of the time or more); and (g) baseline knowledge level, represented with the mean percentage of correct responses on knowledge questionnaires when such questionnaires were available.

To determine characteristics or behaviors of the sample associated with HIV-infection risk, we coded for (a) predominant group in each sample (i.e., men who have sex with men, intravenous-drug users, partners of intravenous-drug users, female sex workers, runaway youth, college students, middle school or high school students, and teachers and staff in educational and health institutions). We then categorized samples as being (b) lower or higher risk for HIV, depending on whether they were predominantly composed of students, teachers, and school staff or included other groups. We also recorded (c) the percentage of participants known to be HIV positive and sexual behavior in the sample, including percentage of participants who were (d) straight; (e) gay, lesbian, or bisexual; (f) monogamous; (g) multiple partnered; and (h) sexually inactive.

We coded for other methodological characteristics that are relevant to delivery of the communications. We thus classified each treatment group according to whether (a) the setting of the intervention comprised mass-communication media, clinics, community settings, or schools. We also recorded (b) the media selected to deliver the intervention,

including face-to-face interactions, videos, and brochures, posters, or print; (c) whether exposure to the communication was individual or in groups; and (d) duration of the communication in hours.

Finally, we coded issues related to measurement precision and reactivity, including (a) whether the design was within subjects or whether different samples were used at pre- and posttests, (b) whether participants were randomly assigned to conditions, (c) mean payment in exchange for participation, (d) mean and median number of days between the treatment and the posttest, (e) whether there was formative research to adapt the intervention to the target population and media, and (f) whether the intervention attempted to reach general population recipients or was targeted to a specific group. When there was a specific target sample, we further recorded whether the target was a specific (g) gender or (h) ethnic group. We also coded groups that partook in the study voluntarily as (i) self-selected, relative to captive groups that could not refuse to participate (i.e., volunteers vs. participants in classroom or prison settings). Finally, we calculated (j) attrition rates for each group included in the meta-analysis.

Retrieval of Effect Sizes

Two raters calculated effect sizes independently. Disagreements were examined by a third researcher and resolved by discussion. Raters were instructed to calculate effect sizes representing change from the pretest to the posttest. Efforts were made to calculate effect sizes for all measures of the constructs of interest that each paper measured. When there was more than one measure of a construct in one particular study, we first calculated effect sizes for each one and then obtained the average, which was used as the effect size for that particular variable (see Johnson, 1993).

To represent change from pretest to posttest measures, we used Becker's (1988) *g*, which is calculated by subtracting the mean at posttest from the mean at pretest and dividing the difference by the standard deviation of the pretest measure. We calculated effect sizes representing change in perceived severity, perceived susceptibility, attitudes and expectancies, norms, control perceptions, intentions, knowledge and behavioral skills, and condom use behavior. In all cases, we considered the wording of the measures and not the authors' labels for constructs. We describe typical measures accepted as operationalizations of each variable below.

Perceived severity and vulnerability (perceived threat—Studies often assessed perceived AIDS severity by having participants rate their agreement with statements like "Fear of infection with HIV and AIDS affects my life" (Hämäläinen & Keinänen-Kiukaanniemi, 1992, p. 138). Perceived vulnerability was typically measured with participants' assessments of the likelihood that they could become infected with HIV in the future (e.g., "There is practically no chance I could get AIDS"; O'Leary, Jemmott, Goodhart, & Gebelt, 1996, p. 520).

Attitudes and expectancies—Attitudes toward the behavior were typically measured with semantic differential scales (e.g., "Do you think using a condom every time you have vaginal sex with your main partner would be pleasant or unpleasant? And would you say it

would be extremely, quite, or slightly [pleasant/unpleasant]?"; Centers for Disease Control [CDC], 1993, p. 12). Researchers sometimes obtained expectancy-value (or indirect) estimates of attitude by subjectively weighting the belief that a behavioral outcome will occur by the evaluative implications of that outcome (e.g., "Show that you care" or "Make you worry less"; CDC, 1993, pp. 3 and 5, respectively). Behavioral or outcome beliefs were typically measured with bipolar probability statements linking the behavior to a set of outcomes (e.g., "Using a condom would take all the fun out of sex for me"; O'Leary et al., 1996, p. 520), whereas outcome evaluations were measured by means of bipolar evaluative items (e.g., "Becoming pregnant now would be good or bad"; CDC, 1993, p. 5). Change in direct and indirect measures was combined into a global index of change in attitudes and expectancies.

Norms—According to Fishbein and Ajzen (1975), subjective norms are influenced by a set of salient beliefs about the normative prescriptions of specific (salient) referents, weighted by the motivation to comply with each of those referents. For example, a man may perceive social pressure to use condoms if he believes that his partner thinks that he should use condoms, and he is motivated to comply with the partner. In this meta-analysis, we combined both direct and indirect belief-based measures of norms to assess the normative influence of the communications. Subjective norms were typically measured with probability scales in response to statements like the following: "Would you say that most of the people who are important to you think that you should or should not use a condom for vaginal sex with your main partner?" (CDC, 1993, p. 12). Normative beliefs were generally assessed with bipolar probability statements about the opinion of a specific referent (e.g., "Do you feel that your main partner thinks you should or should not use a condom every time you have vaginal sex with her?"; CDC, 1993, p. 6), whereas motivations to comply were typically measured with unipolar scales in response to items like the following: "When it comes to protecting yourself from AIDS, do you want to do what your main partner thinks you should do?" (CDC, 1993, p. 6).

Control perceptions—*Control perceptions* refers to expectations of personal control over condom use and self-efficacy. General measures of perceptions of control included items like the following: "Now it is just a 'what if question, but if you wanted to use a condom every time you have anal sex with your main partner, how sure are you that you could?" (CDC, 1993, p. 17). Other researchers asked participants to rate statements like the following: "I can use a condom without fumbling around" (Kelly et al., 1997, p. 1285). Specific measures of self-efficacy comprised items that related control to specific events. For example, the Community Demonstration Projects Research Group (CDC, 1993) included items like the following: "How sure are you that you can use condoms every time for vaginal sex with your main partner when your partner doesn't feel like using them?" or "When there aren't any condoms around, how sure are you that you can wait until you get one every time before having vaginal sex with your main partner?" (p. 7). Similarly, O'Leary et al. (1996) asked participants to report whether "it would be easy or hard to refuse to have sex with a person if s/he won't use a condom" (p. 520).

Intentions—Measures of intentions assessed the intent or willingness to use condoms in the future. Typical items were "In the future, do you plan to use condoms?" (Eldridge et al., 1997, p. 67) or "In the next six months, how likely do you think it is that you will start using a condom every time you have vaginal sex with your main partner?" (CDC, 1993, p. 11).

Knowledge—A large number of studies assessed the participant's knowledge about HIV or AIDS and typically comprised a series of statements that the participant evaluated as true or false (e.g., "The AIDS virus can be caught through ordinary close social contact, such as sitting next to an infected person"; Rigby, Brown, Anagnostou, Ross, & Rosser, 1989, p. 149). Knowledge scores in most cases were calculated by computing the percentage of questions a participant answered correctly. When researchers reported statistics for individual items, we calculated effect sizes for each question and then averaged those effects into a global measure of change in knowledge (see Johnson, 1993).

Negotiation skills—Typically, measures of negotiation skills assessed the participant's ability to communicate about sex or sexual assertiveness skills. For example, participants in a study by Eldridge et al. (1997) were presented with coercive sexual situations leading to unsafe sex and asked to respond as they would in that situation. Independent raters then evaluated participants' negotiation skills on a scale from 1 (*unlikely to prevent risk behavior*) to 10 (*likely to prevent risk behavior*).

Condom use—Condom use measures included assessments on subjective frequency scales as well as reports of the number of times participants used condoms over intercourse occasions. For example, the Community Demonstration Projects Research Group (CDC, 1993) asked participants, "When you have vaginal sex with your main partner, how often do you use a condom?" (p. 11), and participants provided their response on a scale from 1 (*every time*) to 5 (*never*). Similarly, to obtain a more precise report of condom use, Ploem and Byers (1997) asked participants to report the frequency of sexual intercourse over the previous 4 weeks as well as the number of occasions of sexual intercourse for which condoms were used. The researchers then derived a percentage of condom use for each participant.

Results

Sample of Studies and Communication Impact

We included 46 reports, which provided 82 independent treatment groups and 29 independent control groups. A list of the reports included in the meta-analysis is available from Dolores Albarracín. Of the 46 reports, 23 provided a single data set, 15 provided two data sets, 4 provided three data sets, 3 provided four data sets, and 1 provided five data sets. In all cases, different data sets included different participants. Studies were published around 1991 (*SD* = 3.13) and each group had median sample sizes of fewer than 100 participants. Most reports were published by academic researchers affiliated with the medical sciences, although 38% of the researchers were affiliated with behavioral sciences, such as psychology or education. Eighty-four percent of the studies were conducted in the United States, and 88% of the communications were in the English language. A description of the

persuasive arguments presented in the communication as well other methodological aspects of the reports appears in Table 1. According to independent-sample *t* and chi-square tests, treatment and control groups were comparable along all dimensions.

Psychological and Behavioral Change in Experimental and Control Groups

We calculated weighted mean effect sizes to examine change over time in treatment and control groups and performed corrections for sample-size bias to estimate weighted mean differences (*d.s*). We used Hedges and Olkin's (1985) procedures to calculate weighted mean effect sizes, *d*., and homogeneity statistics, *Q*, which test the hypothesis that a population effect size has no variance across studies. These weighted mean effect sizes appear in Table 2, along with confidence intervals and homogeneity indexes. Between-subjects calculations of the variance followed procedures developed by Hedges and Olkin (1985). When designs were within-subjects, we calculated the variance of effect sizes using Morris's (2000) procedures. We performed calculations for within-subjects effect sizes using three alternate correlations between pre- and posttest measures (see Becker, 1988; Dunlap, Cortina, Vaslow, & Burke, 1996). Thus, we assumed $r = 0$ and $r = .99$ as the most extreme values and also imputed correlations from Project RESPECT (see Kamb et al., 1998), which provided moderate values of this association.

The data in Table 2 suggest that presenting a preventive communication increased recipients' knowledge about HIV and possibly other perceptions as well, whereas the effect sizes in the control groups were generally not different from zero. However, it is difficult to conclude that the communication produced change without comparing change in treatments with change in control conditions. We first used fixed-effects procedures following Hedges and Olkin's (1985) recommendations and fit categorical models to compare *d* across treatment and control groups. These analyses were weighted by the inverse of the variance of each effect size and suggested that, on the one hand, presenting a preventive communication had a strong impact on knowledge ($Q_B = 436.03$). On the other hand, the communications had small significant positive influences on attitudes and expectancies ($Q_B = 4.90$, $p < .001$); perceptions of control ($Q_B = 11.51$, $p < .01$) as well as intentions ($Q_B = 11.20$, $p < .01$); and nonsignificant effects on perceived severity, perceived susceptibility or norms ($Q_B < 2.64$, *ns*), and actual condom use ($Q_B = 1.92$, *ns*). According to supplementary analyses, these effects generalized across studies with and without control groups. Overall, communications increased recipients' knowledge about facts concerning condom use; produced modest changes in attitudes and expectancies, control perceptions, and intentions to use condoms; and generally did not increase condom use.

Influence of Persuasive Arguments on Change in Condom Use Suggested by Different Theories of Behavior

According to the analyses we have described, the communications had no general effects on condom use. As judged by homogeneity statistics, however, the effects of communications on condom use were not homogeneous across studies (see Table 2). Therefore, it is possible that some arguments were effective at increasing condom use. For example, arguments to induce attitudes, norms, perceived control, and behavioral skills are likely to increase condom use, whereas factual information and arguments to induce perceived severity and

vulnerability may have little effect. To examine the effect of the communication arguments on condom use, we regressed *d* for condom use in treatment groups on whether communications attempted to increase (a) perceived threat, (b) positive attitudes toward condom use, (c) supporting norms concerning condom use, (d) knowledge, or (e) behavioral skills. These analyses were first conducted with fixed-effects models and are summarized in Table 3. As the table shows, attitudinal arguments and messages that attempted to develop recipients' skills and control perceptions both correlated with increased condom use. However, arguments to increase norms and provision of information had no generalized influence on condom use, and presenting information about HIV mechanisms negatively correlated with change in condom use. These results were generally confirmed with the use of a multiple regression analysis in which the predictors were entered simultaneously and also with analyses on the difference between change in treatment and experimental groups. Random-effects analyses produced the same patterns, although the significance of the results decreased.

The Effect of Persuasive Arguments in Light of Exploratory Analyses of Methodological Characteristics of the Reports

We also considered a number of methodological factors that presumably influence the effectiveness of HIV-prevention communications (see Table 1). For that purpose, we regressed *d* for behavior on moderators pertaining to participants, communication delivery, and measurement. We set the level of all these analyses considered in combination at .05. These analyses showed that change in condom use was positively associated with (a) percentage of male participants ($r = .58$, $p < .001$, $k = 28$), (b) mean age ($r = .29$, $p < .001$, $k = 28$), (c) city population ($r = .34$, $p < .001$, $k = 19$), (d) random (rather than nonrandom) assignment to conditions ($r = .37$, $p < .001$, $k = 28$), (e) amount of payment received ($r = .27$, $p < .001$, $k = 27$), (f) time between treatment and posttest ($r = .34$, $p < .001$, $k = 27$), (g) conducting formative research prior to the intervention ($r = .43$, $p < .001$, $k = 28$), (h) targeting specific instead of general populations ($r = .30$, $p < .001$, $k = 28$), (i) self-selection bias ($r = .28$, $p < .001$, $k = 28$), and (j) attrition rate ($r = .28$, $p < .001$, $k = 21$). Moreover, change in condom use was negatively associated with (a) baseline level of condom use ($r = -.40$, $p < .001$, $k = 28$); (b) inclusion of middle or high school students ($r = -.29$, $p < .001$, $k = 28$); (c) percentage of non-sexually active participants ($r = -.67$, $p < .001$, $k = 9$); (d) presenting the communication in schools instead of other places ($r = -.34$, $p < .001$, $k = 28$); and (e) presenting the communications in brochures, posters, or print versus face-to-face or in videos ($r = -.27$, $p < .001$, $k = 28$).

Given the associations between communication content and other methodological features, it was necessary to replicate the analyses in Table 3 after controlling for potential methodological confounds. For that purpose, we regressed change in condom use in treatment groups on the indicator variables for presentation of arguments concerning attitudes, information about HIV mechanisms, and behavioral skills, while including the methodological variables that correlated with the presentation of each kind of argument. The findings from these analyses were similar to the previous ones and are also summarized in Table 3. Thus, presenting attitudinal information and teaching behavioral skills continued to increase condom use after controlling for correlations with other methodological variables.

However, the significant negative influence of presenting information about HIV mechanisms disappeared once we controlled for other methodological associations. In brief, these analyses suggested that arguments designed to induce positive attitudes as well as those designed to induce behavioral skills and control perceptions were effective. In contrast, presenting information or arguments to increase perceived severity and vulnerability was inconsequential for behavior.

Discussion

For many years, practitioners and researchers have advocated the use of strategies to persuade people to avoid actions that are detrimental to their health and to engage in behaviors that can maximize their physical and psychological well-being. Up to now, however, there was very little information about the overall effects of HIV-related communications outside the context of a particular study.

Our Meta-Analysis in the Context of Prior Knowledge on the Impact of HIV-Prevention Efforts

Although there have been prior meta-analyses of interventions to increase condom use (Kalichman, Carey, & Johnson, 1996; Weinhardt, Carey, Johnson, & Bickham, 1999), there has not been a thorough investigation of the effects of persuasive communications on psychological and behavioral change. First, previous meta-analyses in this area have examined more complex interventions that included messages as well as acquisition of practical experience and other counseling techniques. Therefore, until now, it was not possible to know if such preventive approaches, when effective, were effective because of the arguments presented in support of the condom use recommendation or because of other events brought about by the intervention. Moreover, to date, existing meta-analyses on HIV prevention did not provide an exploration of the assumptions of behavior-change theories that underlie most interventions to induce condom use, did not examine a large sample of studies, and did not test the validity of methodological recommendations that are relevant in this domain.

One important conclusion of our work is that communications designed to increase condom use have psychological influences. For example, we found that the presentation of a preventive message strongly increased recipients' knowledge about HIV. In addition, communications produced small increases in favorable attitudes and intentions to use condoms in the future. These findings are consistent with other meta-analytic reviews that report increases in knowledge, procondom attitudes, and procondom intentions as a result of HIV-prevention interventions, including counseling approaches (Healton & Messeri, 1993; Kim, Stanton, Li, Dickersin, & Galbraith, 1997). However, HIV-prevention communications had no generalized impact on perceived severity, susceptibility, negotiation skills, or actual condom use.

Influence of the Arguments Contained in the Communication on Condom Use

To date, communications designed to prevent infection with HIV have been oriented by several social psychological and clinical models. For example, early in the HIV epidemic,

campaigns concentrated on informing recipients of the risks of infection with HIV and increasing subjective experiences of HIV threat (Fisher & Fisher, 1992). Our meta-analysis shows that neither type of communication had a positive influence on condom use.

Despite the overall null effects of the communications on condom use, messages designed to teach people skills to use condoms successfully (i.e., when their partners refuse to use condoms or when alcohol or drugs are involved) induced more sizable behavioral change than messages that lacked skill-related information (*d*. = 0.36 and 0.16, respectively). It could be that people who feel that they can control their behavior develop stronger intentions to engage in it (Ajzen, 1991; Albarracín et al., 2001). Alternatively, knowledge about behavioral skills may increase one's effectiveness at sorting obstacles to condom use (see, e.g., Bandura, 1994).

Finally, it is possible that other types of information might have more positive effects on condom use. For example, Fisher and Fisher (2000) argued that only information that is directly relevant to prevention may influence condom use or other HIV-protection behaviors. Consistent with this possibility, the effect of presenting information about prevention methods was positive, although nonsignificant. Similarly, attitudinal messages, including those that described the preventive outcomes of condom use, had positive effects on condom use. Thus, whereas information about the intracellular effects of the HIV virus is unlikely to move people to action, thorough information about prevention should have positive effects.

The Influence of Population Characteristics

The work reported in this article represents the first systematic investigation of how communications designed to increase condom use influence different populations. One finding from these analyses is that persuasive messages were more effective at increasing condom use when the samples included greater percentages of male participants. In addition, the communications we surveyed more effectively increased condom use among participants at higher (rather than lower) risk for infection with HIV. Thus, communication effectiveness was greater when the samples had lower rates of initial condom use than when baseline condom use was higher.

The finding that HIV-prevention communications are more successful at changing the behavior in higher HIV-risk audiences increases optimism about the success of efforts to reach groups for which the threat of HIV is great. Both government- and community-based organizations have increased their attempts to reach and motivate groups that are socially stigmatized and denied health care opportunities. These efforts may have resulted in more refined methodologies, such as tailoring interventions to specific samples; conducting formative research to identify population characteristics; or implementing effortful, individual communication strategies.

Furthermore, communications targeting students of all ages were associated with decreased change in condom use. From this finding, one might be tempted to conclude that school-based interventions were unsuccessful in curbing the spread of HIV among younger recipients. However, it is conceivable that school-based interventions had behavioral effects

other than increasing condom use. For example, students might have chosen to abstain or delay the onset of sexual intercourse as a result of being exposed to an HIV-prevention communication. Our meta-analysis did not investigate such possibilities.

Recommendations for HIV-Prevention Research

There are three major implications of our meta-analysis for the prevention of HIV and the promotion of health in general. The first is that communication content matters. Although many researchers of attitudes and persuasion have advocated the use of well-designed, population-relevant arguments for many years (see, e.g., Fishbein & Ajzen, 1975; Petty & Cacioppo, 1986), the campaigns that we analyzed were often conducted with little formative research on the target population and little consideration of alternative modes of social influence that might be effective at increasing condom use. For example, a large number of treatments were limited to the presentation of factual information concerning HIV, and only a minority implemented means of increasing behavioral skills in the context of persuasive communications. Our results, however, suggest that research to develop more strategies to increase attitudes and behavioral skills is necessary, considering the limited resources of interventions that are not tailored to the client or do not allow the development of activities on the part of the client. The availability of such strategies should be important for researchers in the area of HIV communication.

Another important conclusion is that both communication and intervention research would benefit from an explication of the effectiveness of specific components of preventive interventions. In the past, Kalichman, Rompa, and Coley (1996) have attempted to decompose the active ingredients of effective interventions, and research by Kamb et al. (1998) has considered the dosage of the behavioral skill strategies. More generally, however, intervention research has focused on the effectiveness of multicomponent interventions without an analysis of the potential use of each strategy or the impact of specific combinations of techniques. The results we have described highlight a need to implement more complex experimental designs that permit researchers to draw conclusions about the types of messages and interventions that work best.

Fisher and Fisher (1992) have questioned whether the apparent effectiveness of HIV-prevention communications is contingent on methodological factors of the intervention. Our meta-analysis thoroughly analyzed methodological factors that can bias conclusions about the effectiveness of a given communication and confirmed Fisher and Fisher's suspicion. For example, many of the communications we surveyed were designed without conducting formative research. This failure to explore the cognitive and motivational bases of condom use in a given group can compromise the effectiveness of the persuasive message. Other methodological factors were important as well. For example, behavioral change was greater when participants received more money in exchange for participation, when the sample was self-selected, and when attrition was higher. Future outcome research should intensify efforts to control for these potential biases, as well as others, such as the presence of controlled dosage or the use of different types of persuasive sources.

Limitations and Final Note

The interventions we examined in this work were limited to communications in which recipients were relatively passive. That is, we excluded consideration of more complex interventions in which participants engaged in active problem solving and gained actual behavioral experience. Future syntheses should concentrate on more complex counseling efforts and examine the potential advantages of more participatory strategies that prior research has suggested (see, e.g., Kelly, 1982). Another important limitation of our work is its correlational nature. Thus, moderator analyses may have little causal meaning because they often reflect co-occurrence of study characteristics. To this extent, our findings are best understood in the context of primary, experimental evidence on the effects of specific approaches to prevention. Finally, whereas the literature had a mean publication year of 1991, technology to induce behavioral change has become increasingly sophisticated over the years. To this extent, future research syntheses may uncover more homogeneous and promising effects of HIV-prevention interventions.

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Table 1

Descriptive Statistics

Variable	Treatment groups (*k*= 82)	Control groups (*k*= 29)
Persuasive arguments in the communication		
Threat inducing		
%	22	NA
SD	—	—
k	82	NA
Attitudinal		
%	77	NA
SD	—	
k	82	
Normative		
%	12	NA
SD	—	—
k	82	NA
Information		
Mechanisms of HIV		
%	37	NA
SD	—	—
k	82	NA
HIV transmission		
%	60	NA
SD	—	—
k	82	
HIV prevention methods		
%	76	NA
SD	—	—
k	82	NA
Behavior skills		
Skills when partner refuses to use condoms		
%	12	NA
SD	—	—
k	82	NA
Skills when partner is too excited		
%	1	NA
SD	—	—
k	82	NA
Skills when alcohol or drugs are involved		
%	10	NA
SD	—	—

Variable	Treatment groups (*k*= 82)	Control groups (*k*= 29)
k	82	NA
Participants		
Male		
Mean %	43.52	41.84
SD	34.81	33.98
k	79	28
Age in years		
M	25.58	22.85
SD	8.82	9.09
k	75	27
Ethnic descent		
European		
Mean %	62.12	63.21
SD	30.37	34.90
k	78	28
African		
Mean %	23.57	19.85
SD	28.06	28.84
k	77	27
Latin American		
Mean %	6.54	9.57
SD	13.63	20.14
k	77	27
Asian		
Mean %	4.19	4.36
SD	8.16	11.14
k	77	27
North American Indian		
Mean %	0.64	0.48
SD	1.25	1.11
k	77	27
Other		
Mean %	3.73	3.53
SD	12.05	5.10
k	77	27
High school graduates[a]		
Mean %	56.03	51.92
SD	46.54	48.82
k	59	23
Size of population of town (millions)		

Variable	Treatment groups (*k*= 82)	Control groups (*k*= 29)
M	1,042	1,394
SD	1,751	2,044
k	72	26
Level of baseline condom use		
Never or almost never (< 40%)		
%	50	42
SD	—	—
k	16	12
Sometimes (40%–80%)		
%	47	50
SD	—	—
k	15	12
Always or almost always (≥80%)		
%		38
SD	—	—
k	1	12
Knowledge score at baseline		
M	71.55	69.57
SD	11.77	14.36
k	58	20
Sexual behavior		
Straight participants		
Mean %	54.91	74.58
SD	50.05	49.72
k	16	4
Gay or lesbian participants		
Mean %	45.09	25.43
SD	50.05	49.72
k	16	4
Monogamous participants		
Mean %	27.99	29.08
SD	19.38	26.94
k	11	3
Multiple-partner participants		
Mean %	49.11	46.29
SD	31.73	37.80
k	16	4
Non–sexually active participants		
Mean %	17.19	21.46
SD	20.84	25.28
k	22	10

Variable	Treatment groups (*k*= 82)	Control groups (*k*= 29)
Predominant group		
Men who have sex with men		
%	11	7
SD	—	—
k	76	27
Intravenous-drug users		
%	15	15
SD	—	—
k	76	27
Partners of intravenous-drug users		
%	7	7
SD	—	—
k	76	27
Female sex workers		
%	1	4
SD	—	—
k	76	27
Multiple-partner heterosexuals		
%	11	0
SD	—	—
k	76	27
Participants with a history of STDs		
%	7	4
SD	—	—
k	76	27
Participants with severe mental illness		
%	1	0
SD	—	—
k	76	27
Substance abuse clinic inpatients		
%	1	0
SD	—	—
k	76	27
College students		
%	32	41
SD	—	—
k	76	27
Middle and high school students		
%	32	37
SD	—	—
k	76	27

Variable	Treatment groups (*k*= 82)	Control groups (*k*= 29)
Teachers		
%	4	4
SD	—	—
k	76	27
College staff		
%	1	0
SD	—	—
k	76	27
HIV+ participants		
Mean %	10.29	0.94
SD	27.48	0.81
k	13	3
Communication delivery		
Setting of exposure		
School		
%	60	NA
SD	—	—
k	82	NA
Community (street, community center, gay bar)		
%	22	NA
SD	—	—
k	82	NA
Clinic		
%	15	NA
SD	—	—
k	82	NA
Mass communication		
%	6	NA
SD	—	—
k	82	NA
Media of delivery		
Face to face		
%	73	NA
SD	—	—
k	82	NA
Videos		
%	46	NA
SD	—	—
k	82	NA
Brochures, posters, or print		

Variable	Treatment groups (*k*= 82)	Control groups (*k*= 29)
%	22	NA
SD	—	—
k	82	NA
Treatment applied individually		
%	20	NA
SD	—	—
k	82	NA
Duration of communication in hours		
M	5.03	NA
SD	10.94	NA
k	70	NA
Measurement and other methodological factors		
Within-subjects design		
%	82	90
SD	—	—
k	82	29
Random assignment of participants to conditions		
%	31	35
SD	—	—
k	82	29
Payment received ($)		
M	5.94	2.86
SD	24.29	10.49
k	81	28
Days between treatment and posttest		
M	60.07	NA
SD	94.39	NA
k	79	NA
Days between treatment and posttest		
Mdn	12	NA
SD	94.39	NA
k	79	NA
Formative research was conducted		
%	32	38
SD	—	—
k	82	29
Specific population targeted		
%	87	93
SD	—	—
k	82	29

Variable	Treatment groups (*k*= 82)	Control groups (*k*= 29)
Sample targeted by ethnicity		
%	7	7
SD	—	—
k	82	29
Sample targeted by gender		
%	22	14
SD	—	—
k	82	29
Self-selected samples		
%	51	31
SD	—	—
k	81	29
Attrition rate		
M	13.35	19.92
SD	17.88	22.36
k	67	25

Note. Dashes in cells indicate that the variable was categorical and a standard deviation could not be computed. *k*= number of groups used to calculate statistics; NA = treatment variable did not apply to a given control group; STD = sexually transmitted disease.

[a]Samples with high school students were considered to have incomplete high school education.

Table 2

Effect Sizes Representing Psychological and Behavioral Change

	Treatment groups			Control groups		
Measure	**Change**	***k***	***n***	**Change**	***k***	***n***
Perceived severity						
Fixed		21	5,067		6	675
d.	0.04			−0.04		
LL	0.00			−0.13		
UL	0.07			0.05		
HS	79.11***			10.51		
Random		21	5,067		6	675
d.	0.03			0		
LL	−0.07			−0.18		
UL	0.14			0.18		
HS	0.03*			0.01		
Perceived susceptibility						
Fixed		13	2,141		5	563
d.	0.08			−0.06		
LL	0.02			−0.15		
UL	0.13			0.04		
HS	18.76			6.02		
Random		13	2,141		5	563
d.	0.09			−0.02		
LL	0.01			−0.21		
UL	0.17			0.17		
HS	0.004			0.008		
Attitudes and expectancies						
Fixed		5	318		4	343
d.	0.10			−0.05		
LL	0.01			−0.15		
UL	0.20			0.05		

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	Treatment groups			Control groups		
Measure	**Change**	***k***	***n***	**Change**	***k***	***n***
HS	7.25			0.85		
Random		5	318		4	343
d.	0.14			–0.07		
LL	–0.05			–0.17		
UL	0.34			0.03		
HS	0.02*			0.003		
Norms						
Fixed		9	983		4	184
d.	0.009			0.03		
LL	0.03			–0.10		
UL	0.15			0.17		
HS	8.20			5.73		
Random		9	983		4	184
d.	0.10			0.005		
LL	0.01			–0.30		
UL	0.20			0.31		
HS	0.01*			0.04		
Control perceptions						
Fixed		7	3,601		3	116
d.	0.47			0.16		
LL	0.43			–0.02		
UL	0.50			0.33		
HS	50.06***			1.07		
Random		7	3,601		3	116
d.	0.31			0.13		
LL	0.09			–0.13		
UL	0.53			0.40		
HS	0.06*			0.01		
Intentions						

	Treatment groups			Control groups		
Measure	**Change**	***k***	***n***	**Change**	***k***	***n***
Fixed		6	1,951		3	284
d.	0.09			–0.15		
LL	0.04			–0.27		
UL	0.13			–0.02		
HS	4.08			1.91		
Random		6	1,951		3	284
d.	—			–0.13		
LL	—			–0.47		
UL	—			0.21		
HS	—			0.003		
Knowledge						
Fixed		63	18,632		20	4,081
d.	0.52			0.08		
LL	0.51			0.04		
UL	0.54			0.11		
HS	1,840.33***			37.84**		
Random		63	18,632		20	4,081
d.	0.54			0.09		
LL	0.42			0.01		
UL	0.65			0.16		
HS	0.18***			0.01*		
Negotiation skills						
Fixed		5	609		1	24
d.	0.10			0.07		
LL	0.01			–0.37		
UL	0.19			0.51		
HS	14.03*			—		
Random		5	609		—	—
d.	0.16			—		
LL	–0.28			—		

	Treatment groups			Control groups		
Measure	**Change**	***k***	***n***	**Change**	***k***	***n***
UL	0.59			—		
HS	0.09			—		
Condom use						
Fixed		28	22,878		12	16,165
d.	0.06			0.04		
LL	0.04			0.01		
UL	0.09			0.07		
HS	141.27***			36.86***		
Random		28	22,878		12	16,165
d.	0.14			0.08		
LL	0.03			–0.09		
UL	0.24			0.25		
HS	0.07***			0.07**		

Note. This table presents effect sizes calculated using standard fixed-effects procedures (Hedges & Olkin, 1985) procedures and random-effect models fit with hierarchical linear modeling (Raudenbush, 1994) obtained from statistics that included nonexact *p* values. Weighted mean effect sizes (*d*.) include standardized mean differences calculated within and between subjects, depending on whether pre- and posttest measures were obtained for the same or different samples. The statistics summarized are Becker's (1988) *g* ($M_{posttest}$–$M_{pretest}$/$SD_{pretest}$). The variance of Becker's *g* was computed following Becker's or Hedges's (Hedges & Olkin, 1985) recommendations for within- and between-subjects analyses, respectively. In calculating the variance of Becker's *g*, the correlations were obtained from the Project RESPECT data set. Effect sizes, standard errors, and homogeneity indexes (*Q*) for within-subjects statistics were also calculated with correlations from Project RESPECT. Dashes in cells indicate that insufficient effect sizes were available in the analysis. *k*= number of groups; *d*= weighted mean difference; *LL*= lower limit of 95% confidence interval; *UL*= upper limit of 95% confidence interval; HS = homogeneity statistic was *Q* and variance of *d*. for fixed- and random-effects models, respectively (*Q* approximates an asymptotic chi-square distribution with *k*– 1 *df*).

*$p < .05$.

**$p < .01$.

***$p < .001$.

Table 3

Effect Sizes for Change in Condom Use in Treatment Groups as a Function of Theoretical Constructs Addressed in Message Arguments

	Arguments		Regression analyses[a]	
Construct	**Present**	**Absent**	**Single**	**Multiple**
Threat			− .10	−0.08
d.	0.04	0.07		
k	7	21		
Attitudes and expectancies			.33***	0.38***
d.	0.07	−0.15		
k	23	5		
Norms			.14	0.19
d.	0.08	0.04		
k	9	19		
Information				
Mechanisms of HIV			− .17*	−0.10
d.	0.03	0.08		
k	7	21		
Disease transmission			.08	0.08
d.	0.08	0.06		
k	15	13		
Disease prevention methods			.14	0.13
d.	0.07	−0.02		
k	22	6		
Behavioral skills				
When partner refuses to use condoms			.29***	0.37***
d.	0.20	0.05		
k	5	23		
When alcohol or drugs are involved			.19*	0.14
d.	0.16	0.06		
k	5	23		

Note. The table presents weighted mean effect sizes (*d*.s) when the message did and did not manipulate a given construct (e.g., threat). Regression coefficients correspond to single and multiple regression analyses. In multiple regression analyses, potential confounds were entered into the equation along with the key predictor. *k*= number of groups.

[a] $k = 28$ for all regression analyses.

* $p < .05$.

*** $p < .001$.