Cognitive Heuristics and AIDS Risk Assessment Among Physicians[1]

LINDA HEATH[2]
Loyola University of Chicago

MARVIN ACKLIN
The Queen's Medical Center

KATHERINE WILEY
Loyola University of Chicago

Physicians ($N = 331$) reported perceived risk of HIV exposure, worry about on-the-job HIV exposure, and experience with patients who test seropositive for the HIV. In addition, the use of the availability heuristic was examined by responses to questions about talking and reading about AIDS, and the use of the simulation heuristic was examined by responses to questions about imagining oneself being exposed to HIV on the job. Simulation of the HIV-exposure experience related significantly to perceived risk ($p < .001$), even after variance attributable to actual experience and use of the availability heuristic was taken into account. Availability of AIDS information related marginally to perceived risk after variance attributable to actual experience and use of the simulation heuristic was taken into account. Simulation related strongly with worry about on-the-job exposure ($p < .001$), and availability was not significantly related to worry after variance associated with simulation and experience with AIDS was removed. Implications of these results for physician training are discussed.

Risk assessment is, under the best of conditions, a flawed process (Slovic, Fischoff, & Lichtenstein, 1982). Risk assessment in the highly emotionally charged area of HIV exposure could be prone to even more bias and distortion than is normal. In a recent *American Psychologist* issue devoted to AIDS articles, Baum and Nesselhof (1988) indicate that one important contribution that psychology could make is elucidating the role of cognitive heuristics in the AIDS risk assessment process. In this research, we investigate that issue among a group particularly concerned about possible exposure—medical doctors in a major urban area.

Several studies have highlighted the pervasive fears of HIV-exposure and transmission among health care workers (e.g., Link, Feingold, Charap, Freeman, & Shelon, 1988; O'Donnell, O'Donnell, Pleck, Snarey, & Rose, 1987; Treiber, Shaw, & Malcolm, 1987). Such fears are even associated with stated

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[2]Correspondence concerning this article should be addressed to Linda Heath, Department of Psychology, Loyola University, 6525 N. Sheridan Road, Chicago, IL 60626.

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intentions to leave the medical field (Wiley, Heath, Acklin, Earl, & Barnard, 1990). These fears, often bordering on hysteria, exist despite the reportedly low percentage of patients who are seropositive (3% according to Baker, Kelen, Sivertson, & Quinn, 1987) and the even lower incidence of seroconversion following a single exposure (estimated by the Center for Disease Control at 1% upper confidence boundary following needle puncture exposure). Although such fears are understandable given the horror of the disease, biases and distortions in the risk assessment process might be leading those at comparatively low risk to be excessively fearful. And, as work by Joseph et al. (1987), involving a sample of male homosexuals, has shown, heightened perceived risk does little to increase precautionary behavior but instead serves to increase worry, concern, and various other negative psychological factors. Similarly, Wiley et al. (1990) found the use of precautionary measures to be unrelated to perceived risk of on-the-job HIV infection among a sample of nurses, 80% of whom reported complete compliance with universal precautions regardless of perceived risk level.

Judgments about risk of HIV exposure could be influenced by many of the heuristics and biases that have been outlined by Tversky and Kahneman (1974). For example, biased risk assessments for HIV exposure could arise from the use of the availability heuristic, whereby ease of recall of relevant instances would influence the perceived prevalence of the danger. Discussions with colleagues, attention to the professional journals, concern shown by family members, and even the popular media could all serve to keep relevant instances readily retrievable.

Similarly, the simulation heuristic (Kahneman & Tversky, 1982), based on the ease with which relevant scenarios can be constructed, could also bias judgments of risk. Link et al. (1988) report that 64% of the medical house officers in their study said they had created mental scenarios of what they would do if they were diagnosed with AIDS. Such simulation of an event has been shown to increase the perceived likelihood of the event's occurrence (e.g., Sherman, Cialdini, Schwartzman, & Reynolds, 1985). At least part of the perceived risk of on-the-job HIV infection could be attributable to HIV-exposure simulations and the availability of HIV information.

In this research, we examine the roles of the availability and simulation heuristics in judgments of risk of on-the-job HIV exposure and worry about such exposure among physicians in a major medical center.

Method

Attending physicians ($n = 133$) and housestaff (residents) ($n = 198$) at a university-affiliated medical center responded to an anonymous, paper-and-pencil survey concerning perceived risk of on-the-job HIV infection, worry

about such infection, and experience with patients who were seropositive. Main areas of specialty were Internal Medicine (19%), Pediatrics (6%), and Surgery (8%). Seventy-eight percent of the respondents were male, and 22% were female.[3] Data were collapsed across all of these groupings, because the groups' responses did not differ significantly.

Table 1 presents the individual items that operationalized all of the constructs used in this paper, as well as the descriptive statistics for the items and the alphas for the computed scales. Because all of the items were converted to z-scores before scales were calculated, descriptive statistics for the scales are not given.

The instrument contained seven items that measured perceived risk of work-related exposure to HIV (see Table 1). These seven items were converted to z-scores and combined additively to create a scale of Risk ($\alpha = .92$). (Order of responses was reversed when needed so a high score always indicates high risk.) Two items that measure worry about possible exposure to HIV correlated .71 and were combined into one measure of Worry. Three items assessed the amount the respondents talked with colleagues about AIDS, talked with family members about AIDS, and read about AIDS in professional literature. These items were combined into one scale of Availability ($\alpha = .68$). Respondents also reported if they had ever imagined themselves being exposed to HIV, with responses including "I have never imagined it happening to me," "I have imagined it once or twice," "I imagine it occasionally," and "I imagine it often." Finally, respondents indicated their own level of experience with AIDS patients, ranging from personal experience, to colleagues' experiences, to no known professional contact.

Results

One set of regression analyses was performed with the Risk scale as the dependent variable and another set with the Worry scale serving as the dependent variable. In each set, a first regression forced reported experience with patients with AIDS or ARC in on the first step. The second regression analysis forced in the attention variable (an operationalization of the avail-

[3]Because this paper concerns only risk of and worry about on-the-job exposure to HIV, information concerning sexual preference was not deemed relevant. Sexual preference information was also not ascertained because combining specialty, rank, and sex might have led to identification of some responses by individual. Although the imaging item did not specify "on-the-job," responses to the follow-up (please explain how you imagined it happening) all involved on-the-job exposure. Although physicians who engage in higher risk behavior off the job might report on-the-job exposure risk differently, such reporting would cause an overall inflation of risk assessments, not one specific to imaging. We can think of no reason to expect that homosexual or IV drug-using physicians would image on-the-job HIV exposure more than their heterosexual or non-IV drug-using colleagues.

Table 1

Scale Reliability Information and Descriptive Statistics for Items

Risk Scale ($\alpha = .92$)

1. What are the chances of people in your occupational specialty being exposed to HIV infection on the job, compared with health care workers in general? (–3, Much below average to +3, Much above average) Mean = .264, Standard Deviation = 2.07

2. What are the chances of YOUR being exposed to HIV infection on the job, compared with health care workers in general? (–3, Much below average to +3, Much above average) Mean = –.015, Standard Deviation = 2.05

3. What are the chances of YOUR being exposed to HIV infection on the job, compared with the average person in your occupational specialty? (–3, Much below average to +3, Much above average) Mean = .026, Standard Deviation = 1.33

4. On the scale below, please arrange the various groups listed according to your estimate of their likelihood of exposure to HIV infection. Enter on the right end of the line the letter of the group that you estimate has the *greatest* likelihood of exposure. Then enter on the left end of the line the letter of the group that in your estimate has the *lowest* likelihood of exposure. Then arrange the letters of the others in between.

   4a. Rank given to "Someone in your occupational specialty" (1, Highest Likelihood to 12, Least Likelihood) Mean = 7.41, Standard Deviation = 3.13

   4b. Rank given to "Yourself" (1, Greatest Likelihood to 12, Least Likelihood) Mean = 7.78, Standard Deviation = 3.21

   4c. Scale rating given to "Someone in your occupational specialty" (1, Least Likelihood to 46, Greatest Likelihood) Mean = 17.43, Standard Deviation = 10.78

   4d. Scale rating given to "Yourself" (1, Least Likelihood to 46, Greatest Likelihood) Mean = 15.89, Standard Deviation = 10.87

Worry Scale ($r = .71$)

1. I worry about my own possible exposure to HIV. (1, Always to 5, Never) Mean = 3.13, Standard Deviation = 1.00

2. How worried are you about the possibility of on-the-job exposure to HIV? (1, Not at all worried to 7, Extremely worried) Mean = 3.34, Standard Deviation = 1.63

Availability Scale ($\alpha = .68$)

1. I discuss AIDS issues with my friends and family (1, Often to 4, Never) Mean = 1.90, Standard Deviation = .61

2. I read about AIDS in professional material such as newsletters and journals (1, Often to 4, Never) Mean = 1.41, Standard Deviation = .55

Continued

Table 1. *Continued*

3. I discuss AIDS issues with my colleagues (1, Often to 4, Never) Mean = 1.71, Standard Deviation = .57

Imaging Item

Have you ever imagined yourself being exposed to HIV? (1, Yes, I imagine it often to 4, I have never imagined it happening to me) Mean = 2.77, Standard Deviation = .83

Experience Item

Which statement best describes your professional experience with AIDS patients? (1, "I have treated many patients with AIDS or ARC"; 2, "I have treated a few patients with AIDS or ARC"; 3, "I have treated only one patient with AIDS or ARC"; 4, "I have not treated patients with AIDS or ARC, but my colleagues at this hospital have"; and 5, "As far as I know, I have had no professional contact with a patient with AIDS or ARC") Mean = 2.99, Standard Deviation = 1.22

ability heuristic) last, after experience and imaging were in the equation. A third regression analysis forced imaging, our operationalization of the simulation heuristic, in last after experience and attention were in the equation.

Risk scale. The analyses of perceived risk of on-the-job exposure to HIV were based on the seven item Risk scale.[4] Reported actual experience with AIDS or ARC patients was entered on the first step, and accounted for 5% of the variance in perceived risk ($F(1,197) = 10.54, p < .002$). When the Attention scale (composed of questions about attention given to AIDS in professional media and in conversations with family, friends, and colleagues) was forced in after experience and imaging, it accounted for 2% of the variance in perceived risk ($F(3,195) = 3.78, p = .053$). The strongest predictor by far was the imaging variable, which, when forced into the equation last accounted for 13% of the variance in perceived risk of on-the-job exposure ($F(3,195) = 32.36, p < .001$).

Worry scale. The analyses on worry associated with on-the-job exposure to HIV was based on the two worry items. When reported experience with AIDS

[4]Data from respondents who failed to rank all 12 occupations on risk items involving rank (i.e., "Self" and "Your Occupational Specialty") could not be used. Consequently, the N for analyses involving the Risk scale drops to 202. A second version of the Risk scale that deleted those two items was constructed, based on the other five risk items ($\alpha = .87$). Regressions conducted with this Risk scale produced the same pattern of results. Specifically, Experience alone accounted for 5% of the variance ($F(1,254) = 13.69, p < .001$); Imaging entered last accounted for 11% of the variance ($F(3,252) = 33.87, p < .001$); and Availability entered last accounted for 2% of the variance ($F(3,252) = 5.52, p < .05$, a slight increase in significance).

or ARC patients was forced into the regression equation first, it accounted for 2% of the variance in worry ($F(1,316) = 6.97, p < .01$). When the attention variable was forced in last, it accounted for less than 1% of the variance (R^2 change = .002, n.s.). The imaging variable, however, accounted for 25% of the variance in worry when entered last into the equation ($F(3,314) = 108.19, p < .001$).

Discussion

The simulation heuristic appears to be strongly related to fear and perceived risk of HIV exposure among physicians, beyond the effect of actual experience with patients who are seropositive. That is, even controlling for exposure to patients who are HIV positive, imaging strongly related to perceived risk of on-the-job HIV exposure and to levels of worry associated with such exposure. These findings suggest that perceived risk and attendant worry are not just rational responses to actual danger but are colored by the mental imaging that has occurred. Respondents who reported that they had imagined themselves being exposed to HIV on the job reported significantly higher levels of worry about such exposure and higher perceived risk of such exposure. As in other research (e.g., Sherman et al., 1985), imagining this event makes it appear more likely.

The availability heuristic, here operationalized as amount of attention given to AIDS in professional media and personal and professional conversations, was only marginally related to perceived risk of on-the-job exposure and was not related to worry about such exposure, after variance associated with simulation and actual experience was taken into account. These findings are indirect evidence of the causal direction in the relationships found between the simulation heuristic and perceived risk and worry.

One could argue that high levels of perceived risk and worry would lead to simulation or imaging of exposure, rather than imaging leading to worry and perceived risk. Given the contemporaneous nature of these data, we cannot discount this possibility, but such an argument could also be made for worry and risk and the availability heuristic. That is, if risk and worry lead to simulation, they should also lead to increased attention to AIDS risk in conversations and professional media. Because this relationship is absent, the causal direction argument for simulation is weakened, although by no means eliminated. Possibly some bidirectional causality is present, but previous research and the pattern in the current data point to imaging being a strong causal agent.

The high levels of worry and concern among health care personnel pose a threat to our health care delivery system. In our sample, 17% of the physicians responded that they would "probably" or "definitely" refuse to treat patients

with AIDS if they were given the option, and 4.5% said they had considered changing occupations because of the threat of AIDS. Medical education and AIDS awareness programs should be designed to avoid the "imagine it happened to you" scenarios, which may lead to unrealistically high estimates of risk of on-the-job exposure and the attendant worry and distress. This suggestion is based not only on these data but also on the large number of laboratory studies that have found this relationship between imaging and perceived likelihood or risk.[5]

Although we do not know what a correct estimate of risk of on-the-job exposure to HIV is, we can probably safely assume that such estimates should be closely related to the number of patients with HIV with whom the physician has contact. (Even among physicians who routinely see many patients who are HIV positive, the CDC data strongly suggest that perceived risk of on-the-job infection should be very low.) Factors that are related to higher levels of perceived risk but that are unrelated to objective risk can, however, be interpreted as leading to "unrealistically high" estimates. This research shows that imaging is related to perceived risk of HIV exposure regardless of level of actual exposure to patients who are seropositive for the HIV. In fact, in these analyses, Imaging was a much stronger predictor of perceived risk than was actual exposure to patients with AIDS or ARC. In this regard, we consider imaging to lead to unrealistic estimates of the risk of on-the-job exposure to HIV.

Might there be some benefit to overestimating risk of on-the-job HIV exposure that offsets the negative affective effects? Some have suggested that such increased perceived risk might be useful to increase the use of precautionary behaviors and therefore maintain safety. However, this suggestion is at variance with the research evidence. Both Joseph et al. (1987) and Wiley et al. (1990) found no relationship between perceived risk of exposure and protective behaviors, although both studies found perceived risk to be associated with negative affective states. Further, Wiley et al. (1990) found 80% complete compliance with universal precautions reported among nurses, regardless of perceived risk of HIV exposure.

Mere exposure to AIDS information appears to play much less of a role in generating high-risk perceptions and high levels of worry. Consequently, hospitals should be able to design staff development programs that do not raise worry and risk perceptions. Such programs, however, should avoid

[5]Although we have not conducted an evaluation of such an intervention, education programs for medical personnel would be fertile grounds for such evaluations if the ethical concerns about research designs could be addressed. For example, could we ethically randomly assign someone to a high-imaging condition if we hypothesize, based on a large body of research, that such an assignment could result in higher perceived risk, worry, and intention to leave the medical profession?

personal scenarios as a means of increasing involvement. We are not suggesting that medical personnel or hospitals ignore or minimize the threat of on-the-job exposure to HIV or that hospitals not develop programs to train their personnel in safety precautions. Safety precaution training programs, however, should focus on information and procedures rather than having participants imagine themselves being exposed to HIV on the job.

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