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Gregory T. Bender

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June 5, 1995

The Effect of Consistent and Inconsistent Evidence and the Presence and Absence of Risk Evidence on the Perceived Risk of Acquiring AIDS

by

Gregory T. Bender

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To the Graduate Faculty:

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Jesus Christ--for faith, hope, love, and Your gift of salvation.

TABLE OF CONTENTS

PAGE

LIST OF TABLES

LIST OF FIGURES

FIGURE PAGE

INTRODUCTION

People perceive and evaluate the likelihood of events containing risk on a daily basis. Perception may influence the manner in which people evaluate and respond to situations that contain risk (Otten & van der Pligt, 1992). Accurate perception of risk may influence people to respond appropriately. Inaccurate perception of risk may lead to inappropriate responses that result in a variety of negative consequences.

Rationale and Research Questions

Considerable research has investigated how people make judgments or predictions given uncertain evidence. Although these findings are robust with respect to the general category of decision making under uncertainty, researchers have largely failed to address a sub-category of decision making under uncertainty called perceived risk (Kahneman, Slovic, & Tversky, 1982).

Risk is a perceptual or subjective response to an environmental event that involves uncertain danger or the possibility of suffering harm or loss (Milburn & Billings, 1976). Decision making tasks do not necessarily contain perceived risk. For example, predicting future grades of fictitious people contains little or no perceived risk. Perceived risk tasks involve some type of tradeoff between outcomes that are negative and outcomes that are positive. For example, predicting the risk of a person acquiring AIDS from heterosexual intercourse involves a tradeoff between the possibility of death and sexual satisfaction. The current study examines people's perceived risk characteristics by manipulating various variables concerning AIDS. It is important to understand how people integrate AIDS information so that information concerning AIDS can be presented more appropriately. Hopefully, improved presentation of AIDS information will yield lower rates of infection because people will integrate AIDS information more accurately.

This study asks four questions designed to determine if the robust findings affecting the general category of decision making under uncertainty apply to the specific category of perceived risk. Experiment 1 addresses the following question: (a) What relationship exists between various behaviors that may cause the acquisition of AIDS and the perceived risk of acquiring

AIDS? Experiment 2 addresses the following questions: (b) How do people integrate the presence or absence of risk behavior in a decision making task that involves the perceived risk of acquiring AIDS? (c) How do people integrate consistent and inconsistent evidence in decisions regarding the risk of acquiring AIDS? (d) How do people integrate various levels of perceived risk. Answering these questions will increase knowledge concerning perceived risk and assist public officials in distributing AIDS information effectively.

General Research Background

A review of the research background of investigations pertaining to decision making under uncertainty is beneficial to answering the questions posed by this study. This paper begins with general research background pertaining to causality, temporal setting, heuristics, and perceived risk. Reviewing these topics is important for understanding the general topic of decision making under uncertainty. Following the general research background is a presentation of specific research findings related to two topics: the presence or absence of risk behavior and consistent and inconsistent evidence.

Causality. For centuries, philosophers have considered the perception of causality, but only relatively recently have empirical investigations studied this phenomenon. The review of the philosophical background of causality focuses on the philosophy of Kant. Kant's philosophy concerning causality rests on one fundamental idea: perception (Kant, 1787/1965). According to Kant (1787/1965), people perceive a cause and effect relationship when they perceive an event being altered. The perceived event does not spontaneously generate itself nor does it cease to exist due to the cause and effect relationship. The event merely changes from one appearance to a successive appearance. For the perception of causality to occur, Kant (1787/1965) reasoned that there must be a temporal ordering from the condition of the unaltered event to the condition of the altered event.

Systematic investigations into the perception of causality began with the work of Heider and Simmel (1944) outlining attribution theory (Ross & Anderson, 1982). The interest of these

investigators is causal judgment and social inference. Causal judgment is the attribution task of a person seeking to find the cause or causes of a particular effect. Social inference is the act of a person inferring particular attributes to people based on the manner in which people respond to a situation. Attribution theory outlines three consistent attribution biases: the fundamental attribution error, the availability bias, and the false consensus or egocentric attribution bias (Ross & Anderson, 1982). The fundamental attribution error is the propensity of people to overestimate the influence of dispositional factors and underestimate the influence of situational factors in controlling the behavior of other people. People tend to attribute the cause of a person's behavior to personal characteristics rather than to environmental control. The availability bias is the tendency of people to attribute more weight to evidence that is salient. Weighting refers to the degree of importance given a particular piece of evidence when making decisions. People do not make causal and social inferences based on all available evidence, but rather on the piece or pieces of evidence that are most salient, accessible, or available. The false consensus or egocentric attribution bias concerns people's judgments of their behavior compared to the behavior of other people in similar circumstances. People judge their own behavior as appropriate and normal while judging other people's different behavior in similar situations as inappropriate and abnormal.

Outside attribution theory, investigators examined the relationship between evidence and the perception of causality (Ajzen, 1977; Matthews & Sanders, 1984). This research focused on how people perceive and utilize causal evidence. Ajzen (1977) investigated the type of evidence subjects use when making predictions. Subjects read brief vignettes containing a variety of evidence people perceive as either the cause of an effect (causal evidence) or not the cause of an effect (non-causal evidence). The manipulation of the vignettes provided subjects with more accurate statistical evidence based either on the perception of causal or non-causal evidence. Subjects relied more heavily on causal evidence even when non-causal evidence was statistically more accurate.

Matthews and Sanders (1984) investigated the relationship between predictions and the perception of causal and non-causal evidence. Subjects examined identical win/loss records labeled as representing either football teams (perception of causal evidence) or coin toss betting success (perception of non-causal evidence). Subjects predicted how likely the next outcome would be a win. If subjects based their predictions on a statistical analysis of the available evidence, there would have been no difference in the predicted outcomes between causal and non-causal evidence. That is, subjects would have ignored the causal and non-causal labels and based their predictions solely on the win/loss record. However, subjects did not use this approach. Instead, subjects predicted a winning football team would win their next game and that a losing football team would lose their next game. Conversely, subjects predicted a person with a winning coin toss betting record would lose their next bet and that a person with a losing coin toss betting record would win their next bet. How evidence is labeled affects the perception and evaluation of evidence.

Further research pertaining to the use of causal evidence investigated the utilization of base-rates in the decision making process. Base-rates refer to the actual occurrence of a target event in some applicable parent population, such as the number of United States citizens employed as librarians. Base-rate neglect is the failure to use base-rate evidence properly in the decision making process (Tversky & Kahneman, 1982b). Base-rate neglect is augmented when multiple judgments are based on one base-rate. For example, estimating the proportion of United States citizens employed in 100 occupations given the base-rate that one percent of United States citizens are employed as librarians. Base-rate neglect is attenuated when multiple judgments are based on multiple base-rates. For example, estimating the proportion of United States citizens employed in 100 occupations given a different occupational base-rate with which to compare each of the 100 occupations.

In addition to the failure to use base-rate evidence that is not perceived as causally linked to a decision, people utilize causal schemas to assist them in making decisions (Tversky &

Kahneman, 1982a). A causal schema is an arrangement of events in a cause and effect relationship. In a general sense, people make judgments with greater ease and with more confidence when they reason from cause to effect rather than from effect to cause (Tversky & Kahneman, 1982a). When no direct cause-effect link is evident, people infer from what seems most natural in the environment which piece of evidence is the cause and which is the effect. For example, people are more likely to infer that a man is heavy because he is tall rather than infer that a man is tall because he is heavy. However, there is no statistical reason to make such an assumption. Furthermore, people fail to accommodate new evidence into existing schemas, that is, people are unlikely to change their current schema to incorporate new evidence (Tversky & Kahneman, 1982a). Instead, people assimilate new evidence into existing schemas, that is, people integrate new evidence so as to maintain the validity of their current schema. Revisions made to schemas to accommodate new evidence are often minute in magnitude and restricted in features.

Temporal Setting. Temporal setting is the second general background topic. Temporal setting refers to when evidence is presented in time. For instance, evidence can be presented as having occurred recently or a long time preceding an event being predicted. People respond differently to tasks involving making decisions depending on (a) when evidence is presented in time (contiguous versus noncontiguous) and (b) the type of decision making task people perform (predictive versus postdictive). A task which is predictive involves making decisions about events that have not occurred; a task which is postdictive involves making decisions about events that have occurred.

Investigating subject responses to evidence, Matthews and Hunt (1985) required subjects to predict or postdict grade point averages (GPAs) based on GPAs from four semesters. Regardless of whether subjects predicted or postdicted GPAs, evidence temporally contiguous to the GPA predicted or postdicted received greater weight than evidence temporally noncontiguous to the GPA predicted or postdicted. This tendency to ignore evidence temporally noncontiguous

to an event is another example of how people fail to utilize all the available evidence when making decisions. That is, there is no reason to believe that temporally contiguous evidence and temporally noncontiguous evidence are differentially valid.

Heuristics. The third general background topic is a discussion of heuristics. A heuristic is a rule of thumb that usually, but not always, results in a correct solution to a problem (Tversky & Kahneman, 1982c). Generally, heuristics serve people very well; allowing them to quickly make appropriate decisions and avoid serious negative consequences. However, people routinely ignore certain critical aspects of evidence when using heuristics. Several decision making downfalls are associated with the representativeness, availability, and anchoring and adjustment heuristics.

Representativeness Heuristic. The representativeness heuristic places samples into categories, such as bananas in the category called fruit (Tversky & Kahneman, 1982c). Using the representativeness heuristic, people classify all individual samples that are typical of fruit into the fruit category. A problem arises, however, when people encounter a sample that is not typical of fruit, for example, a tomato. People using the representativeness heuristic conclude that a tomato is more typical of a vegetable than a fruit and make an incorrect classification. Use of the representativeness heuristic leads to several errors in decision making. (a) Subjects ignore evidence about base-rates in favor of useless secondary evidence (Tversky & Kahneman, 1982c). Consider the following description: “Steve is very shy and withdrawn, invariably helpful, but with little interest in people, or in the world of reality. A meek and tidy soul, he has a need for order and structure, and a passion for detail” (Tversky & Kahneman, 1982c, p. 4). Although there are many more people employed as farmers or salesmen than as librarians, people identified Steve’s occupation as a librarian, rather than a farmer or salesman. Occupational base-rates were ignored in favor of stereotypical descriptions. (b) People are overconfident in decisions based on representativeness due to an illusion of validity (Tversky & Kahneman, 1982c). For example, given the evaluation of Steve’s occupation as a librarian in the previous example,

people are likely to believe this evaluation as true in spite of evidence indicating that the description is fallible. The contrary evidence might include information which suggests that the basis for the evidence is questionable. (c) People misperceive the reliability of sample sizes that are small as more representative of the population and more easily replicated than the small size warrants (Edwards, 1982; Tversky & Kahneman, 1982c; Slovic & Lichtenstein, 1971). For example, people determined whether a larger or smaller hospital is more likely to have more days on which greater than 60 percent of babies born are boys. The actual proportion of male to female births is approximately 1:1. People chose the larger and smaller hospitals equally. However, the smaller hospital is more likely to have more such days because the larger hospital with a larger sample size is less likely to deviate from the actual proportion of 1:1. (d) Subjects view chance events as self-corrective, that is, the probabilities of successive chance events change so that the expected probability conforms to the chance probability of the entire set of events (Tversky & Kahneman, 1982c; Matthews & Sanders, 1984). For example, people evaluating the outcomes of coin tosses view an outcome such as H H H H T H as unlikely and are more likely to predict the next toss to be a tail, even though there exists no statistical reason to do so. (e) People fail to recognize that events regress toward the mean and allow representative samples to belong to multiple classifications at different times (Tversky & Kahneman, 1982c). For example, flight instructors recognized that criticizing a rough landing resulted in improved performance on the subsequent landing. Conversely, praising a good landing resulted in decreased performance on the subsequent landing. The flight instructors decided to discontinue the use of praise because it resulted in poorer performance on subsequent landings. Recognizing the role regression plays in performance would have been a more accurate conclusion.

Availability Heuristic. The availability heuristic estimates the probability of the occurrence of an event based on the facility with which people perceive similar examples (Tversky & Kahneman, 1982c). Rather than estimating the probability of acquiring AIDS based

on statistical data, people using the availability heuristic estimate the probability by considering the number of acquaintances they have with AIDS. Reliance on the frequency of similar examples yields several decision making biases. (a) If a particular example is not retrievable, people underestimate the frequency of occurrence of that example (Tversky & Kahneman, 1982c). Low retrievability could be due to familiarity with the subject area, salience of the example, or how recently a particular example occurred. For example, subjects listened to one of two lists of names of well-known personalities. Each list contained an equal number of male and female personalities. In one list, the female personalities were more well known than the male personalities. In another list, the male personalities were more well known than the female personalities. Subjects judged whether more females or males were named in each list. Subjects erroneously judged the list with more well known females than males to contain more females. Similarly, subjects judged the list with more well known males than females to contain more males. (b) When searching for related examples, the search itself may not be effective (Tversky & Kahneman, 1982c; Galbraith & Underwood, 1973). For example, people estimate that there are more words that begin with the letter r than words that have the letter r as the third letter. In actuality, many more words contain the letter r as the third letter. People find it easier to retrieve examples of words that begin with the letter r than words that have the letter r as the third letter. (c) People view examples that are easier to imagine as more probable than difficult to imagine examples (Tversky & Kahneman, 1982c). (d) Subjects tend to overestimate the frequency of occurrence of events perceived to co-occur (Chapman & Chapman, 1969, Tversky & Kahneman, 1982c). For example, subjects overestimate the frequency of occurrence of events that seem to naturally co-occur, such as suspiciousness and peculiar eyes--events for which there exists little empirical evidence to draw the conclusion that they co-occur. Subjects perceive examples that co-occur as stronger and more easily retrieved than examples that do not co-occur.

Anchoring and Adjustment Heuristic. The anchoring and adjustment heuristic involves revising probability estimates (adjustment) based upon how evidence is presented (anchoring) (Tversky & Kahneman, 1982c). For example, subjects estimate a higher product of a set of descending numbers (8 x 7 x 6 x 5 x 4 x 3 x 2 x 1) than the product of an identical set of ascending numbers (1 x 2 x 3 x 4 x 5 x 6 x 7 x 8). Subjects anchored with initially higher values adjusted their product higher than subjects anchored with initially lower values. Two basic errors in judgment occur with the use of this heuristic. (a) People provided with high or low anchors adjust their probability estimates toward the actual value, but fail to adjust sufficiently (Slovic & Lichtenstein, 1971). Given the previous example, neither the subjects anchored with descending values ($\underline{M}$ = 2,250) nor ascending values ($\underline{M}$ = 512) came close to the actual product of the set of numbers (actual product = 40,320). (b) People have a tendency to prefer conjunctive events over disjunctive events. Subjects given the choice to gamble on two events, one conjunctive and one disjunctive, usually choose the conjunctive event, although the disjunctive event may have a higher probability of occurrence (Bar-Hillel, 1973). Conjunctive events are combinations of two or more events; disjunctive events are separate events.

Perceived Risk. The fourth general background topic is perceived risk. Discussion focuses on two aspects of perceived risk: the assessment of risk and the perceived risk of acquiring AIDS.

The Assessment of Risk. The assessment of risk involves appraising the degree of risk present in a situation. Past participation in behaviors considered high in risk is correlated with a higher assessment of risk and continued risk-taking behavior (Otten & van der Pligt, 1992). Subjects with a history of behavior considered to be high in risk evaluated their probability of receiving negative consequences for their behaviors as more likely than subjects without a history of behavior considered to be high in risk. Despite their heightened assessment of risk, subjects with a history of behavior considered to be high in risk indicated that they were likely to participate in similar behaviors in the future.

People are generally optimistic concerning the risk of future events; that is, people perceive distant future events as containing less risk than near future events (Milburn & Billings, 1976). For example, people perceive negative outcomes which are in the distant future as less probable and perceive positive outcomes which are in the distant future as more probable than their near future counterparts. Moreover, people perceive decisions made in circumstances where the opportunity for decision reversal is unlikely as containing more risk than circumstances affording the opportunity for decision reversal.

The Perceived Risk of Acquiring AIDS. Apart from the assessment of risk, group members differ in their perception of risk for acquiring AIDS as a function of behaviors common to their group (Campbell & Stewart, 1992). Campbell and Stewart (1992) compared the perceived risk of acquiring AIDS in homosexuals, intravenous drug users, and college students. The three groups displayed widespread underestimation of risk compared to expert ratings, but college students were most accurate in their perceived risk of acquiring AIDS. Intravenous drug users significantly underestimated the risk of acquiring AIDS from needle sharing and sexual contact with other intravenous drug users, compared with homosexuals and college students. Homosexuals significantly underestimated the risk of acquiring AIDS from sexual contact with homosexual or bisexual men, women having sexual contact with bisexual men, and sexual partners of people with AIDS, compared with intravenous drug users and college students. Perceived risk was most inaccurate for those behaviors for which one was at risk, that is, intravenous drug users and homosexuals primarily underestimated the risk of acquiring AIDS from activities characteristic of their respective group.

Specific Research Background

The specific research background reviews the presence or absence of risk behavior and consistent and inconsistent evidence with respect to the integration of evidence. Integration of evidence refers to the process by which people combine several pieces of information to formulate a decision. The etiology of this process is unknown, however, numerous studies

describe how people integrate evidence. Most research has focused on descriptions of integration of evidence as applied to decision making under uncertainty. The focus of the current study is to extend two of these findings to a sub-category of decision making under uncertainty called perceived risk. Two specific topics related to perceived risk are examined in this study: the presence or absence of risk behavior and consistent and inconsistent evidence. These two topics are reviewed with specific relevance to the manipulations conducted in this study.

Presence or Absence of Risk Behavior. The presence of a risk behavior indicates a person is engaging in some activity that involves uncertain danger or the possibility of suffering harm or loss. For example, engaging in a behavior that may cause a person to acquire AIDS involves the presence of risk because acquiring AIDS is fatal. The absence of a risk behavior indicates a person is not engaging in some activity that involves uncertain danger or the possibility of suffering harm or loss. For example, not engaging in a behavior that may cause a person to acquire AIDS involves the absence of risk because not acquiring AIDS is fortunate. People respond to situations containing risk in different ways. Levin, Snyder, and Chapman (1987) presented equivalent gambles phrased either in terms of winning or losing. Subjects responded more favorably to gambles phrased in terms of winning than gambles phrased in terms of losing.

Consistent and Inconsistent Evidence. Consistency of evidence refers to the degree to which all evidence leads to the same conclusion. Consistent evidence contains pieces of evidence congruent with each other piece of evidence. For example, consistent AIDS evidence would list only behaviors that may cause or only behaviors that may prevent the acquisition of AIDS. Inconsistent evidence contains pieces of evidence incongruent with one another. For example, inconsistent AIDS evidence would list both behaviors that may cause and behaviors that may prevent the acquisition of AIDS. Reece and Matthews (1993) provided subjects with either consistent (all above or all below average) or inconsistent (a combination of above and below average) GPA evidence. Subjects utilized consistent evidence more accurately than

inconsistent evidence, that is, subjects provided with inconsistent GPA evidence made the greatest overestimation in predicting future grades.

Inconsistent evidence contains more uncertainty than consistent evidence. For example, some inconsistent evidence led to the conclusion of below average GPAs while other inconsistent evidence led to the conclusion of above average GPAs. Evidence yielding contradictory conclusions leaves the person making a decision uncertain as to what to decide. Consistent evidence contains less uncertainty. For example, all consistent evidence led to the conclusion of either below average GPAs or above average GPAs. Evidence yielding non-contradictory conclusions leaves the person making a decision more certain as to what to decide. Subjects provided with inconsistent GPA evidence ignored the below average GPAs and overestimated GPAs, that is, subjects predicted higher GPAs than was indicated by the evidence. The uncertainty in the inconsistent evidence may have led to the overestimation of GPAs.

Hypotheses

Experiment 1 was designed to assess how people perceive the risk of acquiring AIDS from various behaviors which may or may not cause the acquisition of AIDS. From this assessment, nine risk behaviors were selected for use in Experiment 2: three behaviors that subjects consistently rate as high in risk, three behaviors that subjects consistently rate as medium in risk, and three behaviors that subjects consistently rate as low in risk.

Experiment 2 assessed how people integrate the presence or absence of risk behavior, how people integrate consistent and inconsistent evidence, and how people integrate various levels of perceived risk. Three independent variables are manipulated: presence or absence of risk behavior, consistent and inconsistent evidence, and high, medium, and low levels of perceived risk.

Hypothesis One. The presence of risk behavior is integrated differently than the absence of risk behavior. The presence or absence of risk behavior refers to whether or not a person is engaging in a risk behavior. The presence of a risk behavior is a statement of behavior

that indicates a person is engaging in a behavior that may cause the acquisition of AIDS. The absence of a risk behavior is a statement of behavior that indicates a person is not engaging in a behavior that may cause the acquisition of AIDS. Previous research indicates that people respond differently to evidence depending on how risk evidence is presented (Levin et al., 1987). This research indicates that people integrate the presence or absence of risk behavior differently by not integrating the presence of a risk behavior to the same extent as the absence of a risk behavior.

Hypothesis Two. Consistent evidence is integrated differently than inconsistent evidence. Consistent or inconsistent evidence refers to the pattern of behavior presented in each vignette. There are two types of vignettes that contain descriptions of consistent evidence in the current study: (a) vignettes that contain the presence of risk behaviors and (b) vignettes that do not contain the presence of risk behaviors. Consistent patterns of behavior refer to vignettes in which the described person is engaging in behaviors that may cause the acquisition of AIDS or engaging in behaviors that may prevent the acquisition of AIDS. There are two types of vignettes that contain descriptions of inconsistent evidence in the current study: (a) vignettes that contain the presence of two risk behaviors and the absence of one risk behavior and (b) vignettes that contain the presence of one risk behavior and the absence of two risk behaviors. Inconsistent patterns of behavior refer to vignettes in which the described person is engaging in both behavior(s) that may cause the acquisition of AIDS and engaging in behavior(s) that may prevent the acquisition of AIDS. Previous research indicates that people respond differently to consistent evidence than to inconsistent evidence (Reece & Matthews, 1993). The uncertainty contained within inconsistent evidence may cause people to neglect or minimize the effect of the inconsistent evidence when making decisions.

Hypothesis Three. Behaviors perceived high in risk, medium in risk, and low in risk are integrated differently. The level of risk was determined by ratings from Experiment 1. Previous research indicates that people integrate unpleasant and pleasant evidence differently (Matlin &

Stang, 1978). That is, people avoid unpleasant evidence and attend to pleasant evidence. The presence of a risk behavior may be considered unpleasant evidence. The absence of a risk behavior may be considered pleasant evidence. Since high-risk behavior contains more unpleasantness than low-risk behavior, people may avoid, neglect, or minimize high risk behavior more than low-risk behavior.

EXPERIMENT 1

Method

Subjects. Seventy-one students from introductory psychology courses at the Idaho State University participated in Experiment 1. Participation was voluntary and subjects received extra credit for their involvement. Twenty-three males and 48 females participated. Only subjects between the ages of 18 and 24 were allowed to participate, in order to generalize results to a traditional college population and decrease subject variance. The median age was 19. The mean number of college credits subjects had earned was 35.9. Sixty subjects were single/never been married, nine subjects were married, two subjects were separated/divorced. Seventy subjects reported a sexual orientation of heterosexual, no subject reported a sexual orientation of homosexual, one subject reported a sexual orientation of bisexual.

Design and Procedure. A paper-pencil questionnaire was developed to assess the perceived risk of acquiring AIDS (see Table 1). The questionnaire consisted of 31 items targeting various behaviors that contain some degree of risk for acquiring AIDS (Centers for Disease Control and Prevention: HIV/AIDS Prevention, 1994). The order in which questions were presented was randomly determined and counterbalanced across subjects. Subjects were instructed to rate the risk of acquiring AIDS from the behaviors using the following scale: 1 = **minimum** risk, 2 = **low** risk, 3 = **medium** risk, 4 = **high** risk, and 5 = **maximum** risk. Complete instructions are presented in Appendix A. Subjects provided information concerning their age, gender, total number of college credits taken since high school (including current enrollment), present relationship status (single/never been married, married, separated/divorced), and sexual orientation (heterosexual, homosexual, bisexual). Subjects were given the opportunity to list any additional behaviors or conditions they could think of that they believed may cause a person to acquire AIDS. Subjects required approximately 25 min to complete the task.

Results

Ratings to questions were collected for each subject. Means and standard deviations were calculated for each of the 31 questions; data are presented in Table 1. Nine questions from Experiment 1 were transformed into statements of behavior and used in Experiment 2. The nine questions were chosen on the basis of three criteria: mean, standard deviation, and the necessity of logically combining the statements of behavior. Three questions were chosen that had an overall mean rating of 4.672; these questions were perceived to be high in risk. Three questions were chosen that had an overall mean rating of 3.032; these questions were perceived to be medium in risk. Three questions were chosen that had an overall mean rating of 1.606; these questions were perceived to be low in risk. The nine questions are presented in Table 2.

Table 1

Means and Standard Deviations for each Question in Experiment 1, N = 71

Question	M	SD
1. What is the risk of acquiring AIDS through sharing intravenous drug needles without first cleaning the needle with bleach?	4.817	0.425
2. What is the risk of acquiring AIDS through sharing intravenous drug needles after cleaning the needle with bleach?	2.845	1.091
3. What is the risk of a baby acquiring AIDS from its AIDS infected mother before birth?	4.465	0.771
4. What is the risk of a baby acquiring AIDS from its AIDS infected mother during birth (assuming the baby did not acquire AIDS before birth)?	3.366	1.174
5. What is the risk of a baby acquiring AIDS from its AIDS infected mother through breast feeding (assuming the baby did not acquire AIDS before or during birth)?	3.211	1.264
6. What is the risk of acquiring AIDS from closed-mouth kissing?	1.324	0.650
7. What is the risk of acquiring AIDS from open-mouth kissing?	1.972	1.082
8. What is the risk of acquiring AIDS through unprotected (no condom use) heterosexual intercourse?	4.500	0.681
9. What is the risk of acquiring AIDS through protected (proper condom use) heterosexual intercourse?	2.648	0.958
10. What is the risk of acquiring AIDS through unprotected (no condom use) homosexual intercourse?	4.669	0.567
11. What is the risk of acquiring AIDS through protected (proper condom use) homosexual intercourse?	3.014	1.049
12. What is the risk of acquiring AIDS through saliva entering an open cut or mucus membrane?	2.423	1.272
13. What is the risk of acquiring AIDS through tears entering an open cut or mucus membrane?	1.775	1.031
14. What is the risk of acquiring AIDS through sweat entering an open cut or mucus membrane?	1.901	1.071

Table 1 (continued)

Means and Standard Deviations for each Question in Experiment 1, N = 71

Question	M	SD
15. What is the risk of a health care worker acquiring AIDS from fluid containing AIDS entering an open cut (assuming the health care worker was wearing protective gear)?	3.620	1.269
16. What is the risk of a health care worker acquiring AIDS from fluid containing AIDS entering an open cut (assuming the health care worker was not wearing protective gear)?	4.338	0.844
17. What is the risk of a health care worker acquiring AIDS from fluid containing AIDS entering a mucus membrane (assuming the health care worker was wearing protective gear)?	3.014	1.236
18. What is the risk of a health care worker acquiring AIDS from fluid containing AIDS entering a mucus membrane (assuming the health care worker was not wearing protective gear)?	3.873	1.081
19. What is the risk of a patient acquiring AIDS from an AIDS infected health care worker (assuming the health care worker was wearing protective gear)?	1.915	0.858
20. What is the risk of a patient acquiring AIDS from an AIDS infected health care worker (assuming the health care worker was not wearing protective gear)?	2.901	1.161
21. What is the risk of a health care worker acquiring AIDS from an accidental needle stick (assuming the health care worker was wearing protective gear)?	3.056	1.120
22. What is the risk of a health care worker acquiring AIDS from an accidental needle stick (assuming the health care worker was not wearing protective gear)?	3.803	0.856
23. What is the risk of acquiring AIDS from receiving a blood transfusion?	3.028	1.230
24. What is the risk of acquiring AIDS from receiving an organ or tissue transplant?	2.901	1.209
25. What is the risk of acquiring AIDS from tattoo needles?	3.141	1.099
26. What is the risk of acquiring AIDS from acupuncture needles?	3.028	1.219
27. What is the risk of acquiring AIDS from ear-piercing equipment?	1.873	0.861
28. What is the risk of acquiring AIDS from biting insects?	1.577	0.856

Table 1 (continued)

Means and Standard Deviations for each Question in Experiment 1, N = 71

Question	M	SD
29. What is the risk of acquiring AIDS from eating food processed by an AIDS infected food service worker?	1.775	1.301
30. What is the risk of acquiring AIDS from working in an industrial setting?	1.465	0.693
31. What is the risk of acquiring AIDS through coming in contact with an environmental surface (this includes telephones, toilets, drinking glasses, work-out equipment, etc.)?	1.254	0.527

Table 2

Questions taken from Experiment 1 and used in Experiment 2, N = 71

Risk	Question	M	Overall M
H	What is the risk of acquiring AIDS through unprotected (no condom use) heterosexual intercourse?	4.500	
H	What is the risk of acquiring AIDS through unprotected (no condom use) homosexual intercourse?	4.669	4.672
H	What is the risk of acquiring AIDS through sharing intravenous drug needles without first cleaning the needle with bleach?	4.817	
M	What is the risk of a health care worker acquiring AIDS from fluid containing AIDS entering a mucus membrane (assuming the health care worker was wearing protective gear)?	3.014	
M	What is the risk of a health care worker acquiring AIDS from an accidental needle stick (assuming the health care worker was wearing protective gear)?	3.056	3.032
M	What is the risk of acquiring AIDS from receiving a blood transfusion?	3.028	
L	What is the risk of acquiring AIDS from biting insects?	1.577	
L	What is the risk of acquiring AIDS from eating food processed by an AIDS infected food service worker?	1.775	1.606
L	What is the risk of acquiring AIDS from working in an industrial setting?	1.465	

Question perceived high (H), medium (M), or low (L) in risk.

EXPERIMENT 2

The purpose of Experiment 2 is to test three hypotheses.

Hypothesis One. The presence of a risk behavior is integrated differently than the absence of a risk behavior.

Hypothesis Two. Consistent evidence is integrated differently than inconsistent evidence.

Hypothesis Three. Behaviors perceived high in risk, medium in risk, and low in risk are integrated differently.

Method

Subjects. Seventy-five students from introductory psychology courses at the Idaho State University participated in Experiment 2. Participation was voluntary and subjects received extra credit for their involvement. Thirty males and 45 females participated. Only subjects between the ages of 18 and 24 participated in order to generalize results to a traditional college population and decrease subject variance. The median age was 20. The mean number of college credits subjects had earned was 46.17. Fifty-seven subjects were single/never been married, 17 subjects were married, one subject was separated/divorced. Seventy-two subjects reported a sexual orientation of heterosexual, two subjects reported a sexual orientation of homosexual, one subject reported a sexual orientation of bisexual.

Design and Procedure. All subjects received all experimental conditions. The independent variables included the presence or absence of a risk behavior, consistent or inconsistent vignettes, and high, medium, and low perceived risk behaviors within mixed or non-mixed sets. An outline of the design is presented in Table 4. A set refers to a group of eight vignettes. Mixed sets contain vignettes with behaviors perceived to be high in risk, medium in risk, and low in risk. Non-mixed sets contain vignettes with behaviors perceived to be either all high in risk, all medium in risk, or all low in risk. Each vignette describes a fictitious individual engaging or not engaging in three risk behaviors. The presence of a risk behavior is a statement

about engaging in a behavior that may cause the acquisition of AIDS. The absence of a risk behavior is a statement about not engaging in a behavior that may cause the acquisition of AIDS. There are two types of consistent vignettes: (a) vignettes that contain the presence of three risk behaviors and the absence of zero risk behaviors and (b) vignettes that contain the presence of zero risk behaviors and the absence of three risk behaviors. There are two types of inconsistent vignettes: (a) vignettes that contain the presence of two risk behaviors and the absence of one risk behavior and (b) vignettes that contain the presence of one risk behavior and the absence of two risk behaviors.

Subjects were presented six sets of eight vignettes each; 48 vignettes in all. Vignettes are presented in Appendix C. Three of the sets were mixed; three of the sets were non-mixed. Each vignette was a different orthogonal permutation of three statements of behavior. The orthogonal permutations used to create each set of vignettes is presented in Table 3. The presentation order of the vignettes and the behaviors within each vignette were randomly determined and counterbalanced. Next to each vignette appeared a scale for rating the risk of the described person acquiring AIDS: 1 = **minimum** risk, 2 = **low** risk, 3 = **medium** risk, 4 = **high** risk, or 5 = **maximum** risk. Subjects were tested individually and stimuli were presented via a Hypercard software program on a Macintosh 6100 computer.

The computer program instructed subjects to enter their rating using numbers representing the risk of an individual acquiring AIDS. Complete instructions are presented in Appendix B. Subjects also provided information concerning their age, gender, total number of college credits taken since high school (including current enrollment), present relationship status (single/never been married, married, separated/divorced), and sexual orientation (heterosexual, homosexual, bisexual). Subjects required approximately 35 min to complete the task.

Table 3

Orthogonal Permutations of Vignettes, N = 75

Vignette	Behavior X	Behavior Y	Behavior Z
1	Presence	Presence	Presence
2	Presence	Presence	Absence
3	Presence	Absence	Presence
4	Presence	Absence	Absence
5	Absence	Presence	Presence
6	Absence	Presence	Absence
7	Absence	Absence	Presence
8	Absence	Absence	Absence

Results

Initial Analysis. Ratings to vignettes were collected for each subject. Means and standard deviations were calculated for each of the 48 vignettes. These analyses are presented in Appendix C and in Table 4. Heterogeneity of variance was significant, $F_{max} = 19.67$, $\underline{p} < .01$ (Winer, 1971). Heterogeneity of variance has been shown to increase Type I error (Keppel, 1991). All analyses were evaluated using a significance level of $\underline{p} < .01$ to compensate for the increased Type I error (Keppel, 1991).

Analysis of Mean Ratings. The analysis of mean ratings focused on how subjects integrate the presence or absence of risk behaviors. There are six sets of eight vignettes (see Table 4). Within each vignette in the three mixed sets there is one high-risk behavior, one medium-risk behavior, and one low-risk behavior. Each vignette in the three non-mixed sets contains three behaviors of the same risk level. That is, one set contains vignettes with three high-risk behaviors, one set contains vignettes with three medium-risk behaviors, and one set contains vignettes with three low-risk behaviors.

Ratings to the three vignettes containing the presence of two risk behaviors and the absence of one risk behavior (two-present) were averaged for each subject. Ratings to the three vignettes containing the presence of one risk behavior and the absence of two risk behaviors (one-present) were averaged for each subject. Only one vignette contained the presence of three risk behaviors

Table 4

Design Outline and Mean Ratings of Experiment 2, N = 75

	Mixed sets				Non-mixed sets			
Vignettes	Set 1 H M L	Set 2 H M L	Set 3 H M L	Row M	Set 1 H H H	Set 2 M M M	Set 3 L L L	Row M
1	P P P	P P P	P P P		P P P	P P P	P P P	
M	4.360	4.520	4.187	4.356	4.907	4.147	1.933	3.662
2	P P A	P P A	P P A		P P A	P P A	P P A	
M	4.147	4.040	4.253	4.147	4.373	3.640	1.840	3.284
3	P A P	P A P	P A P		P A P	P A P	P A P	
M	3.640	3.973	3.827	3.813	4.560	3.000	1.307	2.956
4	P A A	P A A	P A A		P A A	P A A	P A A	
M	3.520	3.880	3.867	3.756	3.493	2.187	1.307	2.329
5	A P P	A P P	A P P		A P P	A P P	A P P	
M	3.307	2.747	2.040	2.698	4.747	3.787	1.600	3.378
6	A P A	A P A	A P A		A P A	A P A	A P A	
M	3.320	2.720	1.987	2.676	3.787	3.373	1.520	2.893
7	A A P	A A P	A A P		A A P	A A P	A A P	
M	1.507	1.787	1.120	1.471	3.880	2.360	1.253	2.498
8	A A A	A A A	A A A		A A A	A A A	A A A	
M	1.213	1.267	1.133	1.204	1.053	1.240	1.147	1.147
Column M	3.127	3.117	2.802	3.015	3.850	2.967	1.488	2.768

Behavior perceived high (H), medium (M), or low (L) in risk.

Presence (P) or absence (A) of a risk behavior.

and the absence of zero risk behaviors (three-present). Only one vignette contained the presence of zero risk behaviors and the absence of three risk behaviors (zero-present). Therefore, each subject yielded four ratings for each of the six sets: zero-present, one-present, two-present, and three-present.

Each vignette within the mixed sets contained one high-risk behavior, one medium-risk behavior, and one low-risk behavior. Each vignette within the non-mixed sets contained either all high-risk behavior, all medium-risk behavior, or all low-risk behavior. The vignettes were constructed in this manner in order to compare how subjects perceive the risk of acquiring AIDS from differing levels and combinations of behavior. The mixed sets contain three behaviors perceived to be different in risk for acquiring AIDS. Each non-mixed set contains three behaviors each perceived to be similar in risk for acquiring AIDS.

Mixed Sets of Evidence. The four ratings to each mixed set (zero-present, one-present, two-present, and three-present) were averaged across the three mixed sets for each subject. Thus, there were four ratings for the mixed sets. Mean ratings were calculated. Mean ratings are presented in Table 5.

Non-Mixed Sets of Evidence. Mean ratings were calculated on the four ratings (zero-present, one-present, two-present, and three-present) for each non-mixed set. Thus, there were four mean ratings for each non-mixed set--four mean ratings for the high-risk set, four mean ratings for the medium-risk set, and four mean ratings for the low-risk set. Mean ratings are presented in Table 6.

Table 5

Mean Ratings and Standard Deviations for the Mixed Sets, N = 75

	Number of Present-Risk Behaviors within each Vignette			
	Zero	One	Two	Three
M	1.204	2.634	3.553	4.356
SD	0.520	0.915	0.942	0.749

Table 6

Mean Ratings and Standard Deviations for each Non-Mixed Set, N = 75

	Number of Present-Risk Behaviors within each Vignette			
	Zero	One	Two	Three
Vignettes with all Behaviors Perceived High in Risk				
M	1.053	3.720	4.560	4.907
SD	0.280	0.910	0.632	0.293
Vignettes with all Behaviors Perceived Medium in Risk				
M	1.240	2.640	3.476	4.147
SD	0.612	1.141	1.040	0.968
Vignettes with all Behaviors Perceived Low in Risk				
M	1.147	1.360	1.582	1.933
SD	0.392	0.582	0.740	0.827

Analysis of Trends. The analysis of trends focused on how subjects integrate the presence and absence of risk behavior. These analyses evaluate how subjects integrate AIDS evidence when vignettes contain zero-present, one-present, two-present or three-present risk behaviors.

Mixed Sets of Evidence. Ratings to zero-present, one-present, two-present, and three-present vignettes were analyzed for linear and quadratic trends. Mean ratings are presented in Figure 1. The linear trend component was significant, $F(1, 74) = 1352.264$, $p < .001$. The idealized linear relationship between evidence and ratings of risk was calculated. The r^2 value was .981. The quadratic trend component was significant, $F(1, 74) = 79.337$, $p < .001$. The idealized quadratic relationship between evidence and ratings of risk was calculated using a log function (see Figure 1). The r^2 value was .996.

Non-Mixed Sets of Evidence. A 3 x 4 repeated measures ANOVA was conducted; the independent variables were the risk level of the behaviors (all high-risk, all medium-risk, or all low-risk) and the presence or absence of behaviors within each vignette (zero-present, one-present, two-present, three-present). Mean ratings are presented in Figure 2. A significant interaction was observed, $F(6, 444) = 192.249$, $p < .001$. A significant main effect for the risk level of the behaviors was observed, $F(2, 148) = 486.813$, $p < .001$. A significant

Figure 1.

Observed mean ratings and idealized quadratic relationship for the mixed sets.

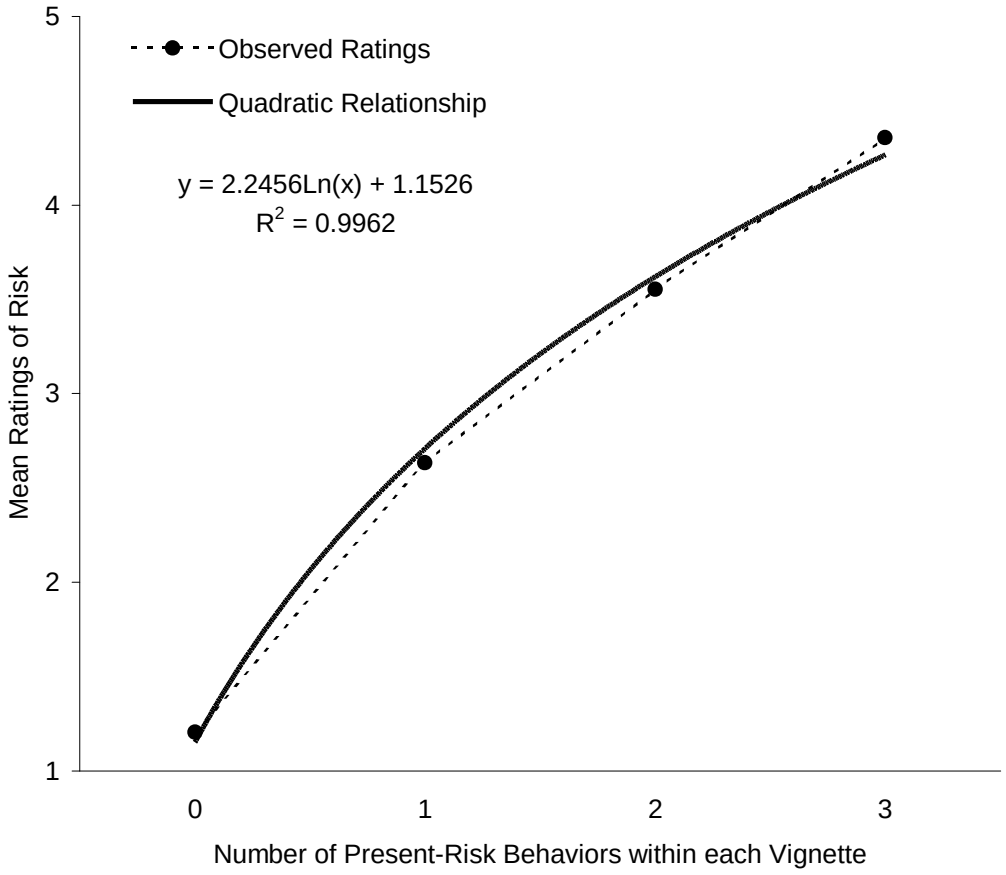
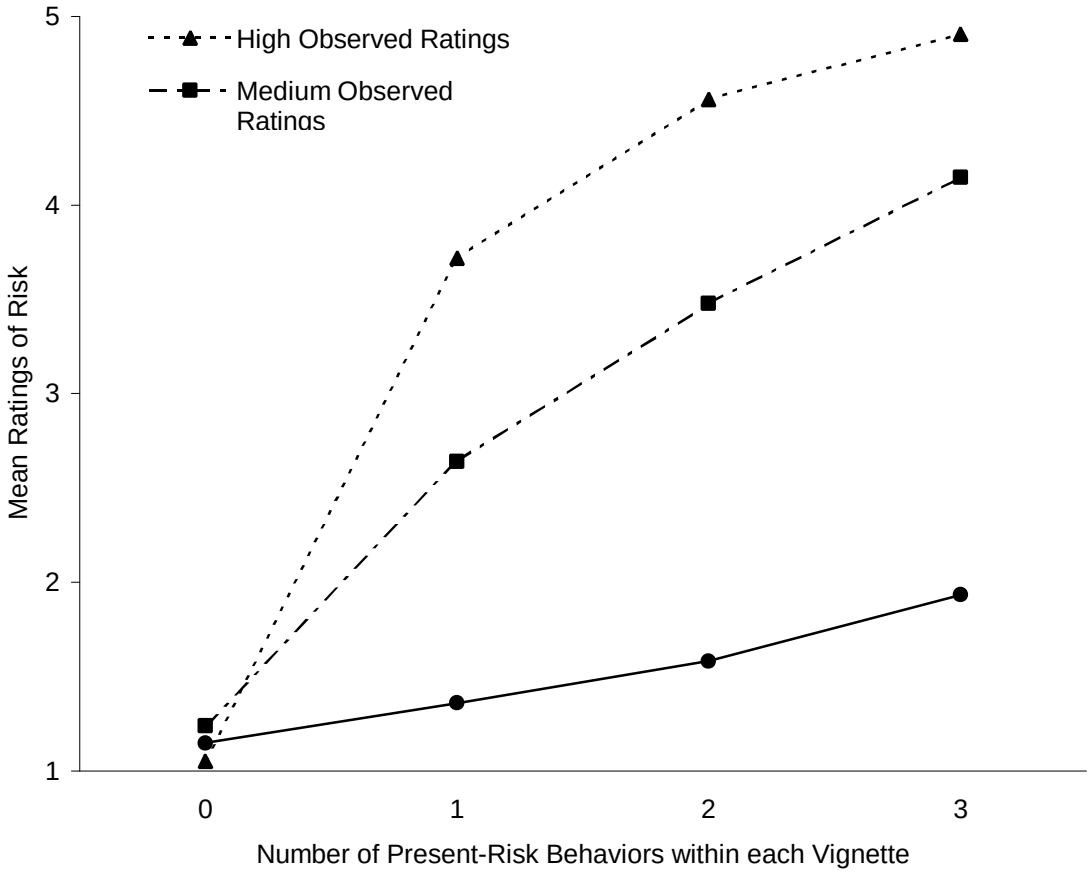


Figure 2.

Observed mean ratings for the non-mixed sets.



main effect for the presence or absence of behaviors was observed, $F(3, 222) = 909.038$, $p < .001$.

Ratings to zero-present, one-present, two-present, and three-present vignettes were analyzed for linear and quadratic trends. These analyses were performed separately on each of the three non-mixed sets: all high-risk behaviors, all medium-risk behaviors, and all low-risk behaviors.

Analysis of High-Risk Behaviors. The linear trend component was significant, $F(1, 74) = 6821.854$, $p < .001$. The idealized linear relationship between evidence and ratings of risk was calculated. The r^2 value was .843. The quadratic trend component was significant, $F(1, 74) = 351.807$, $p < .001$. The idealized quadratic relationship between evidence and ratings of risk was calculated using a log function (see Figure 3). The r^2 value was .957.

Analysis of Medium-Risk Behaviors. The linear trend was significant, $F(1, 74) = 453.828$, $p < .001$. The idealized linear relationship between evidence and ratings of risk was calculated. The r^2 value was .970. The quadratic trend was significant, $F(1, 74) = 38.482$, $p < .001$. The idealized quadratic relationship between evidence and ratings of risk was calculated using a log function (see Figure 4). The r^2 value was .999.

Figure 3.

Observed mean ratings and idealized quadratic relationship for the non-mixed set with all high-risk behaviors.

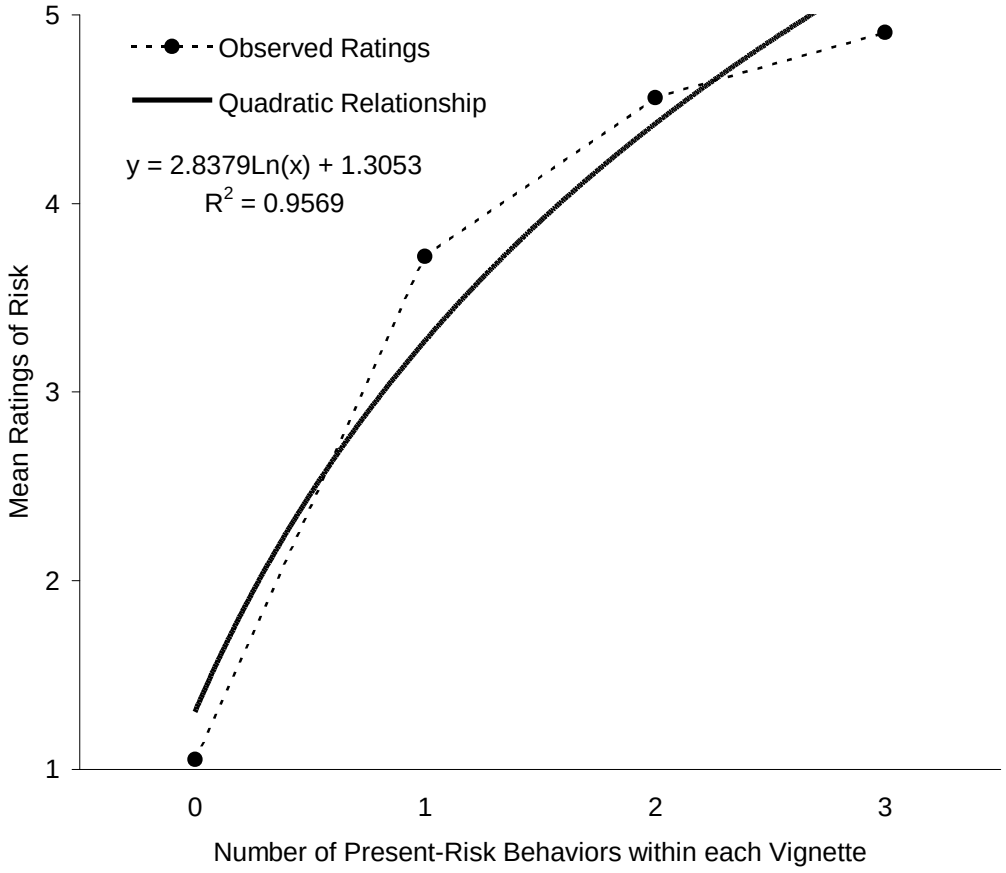
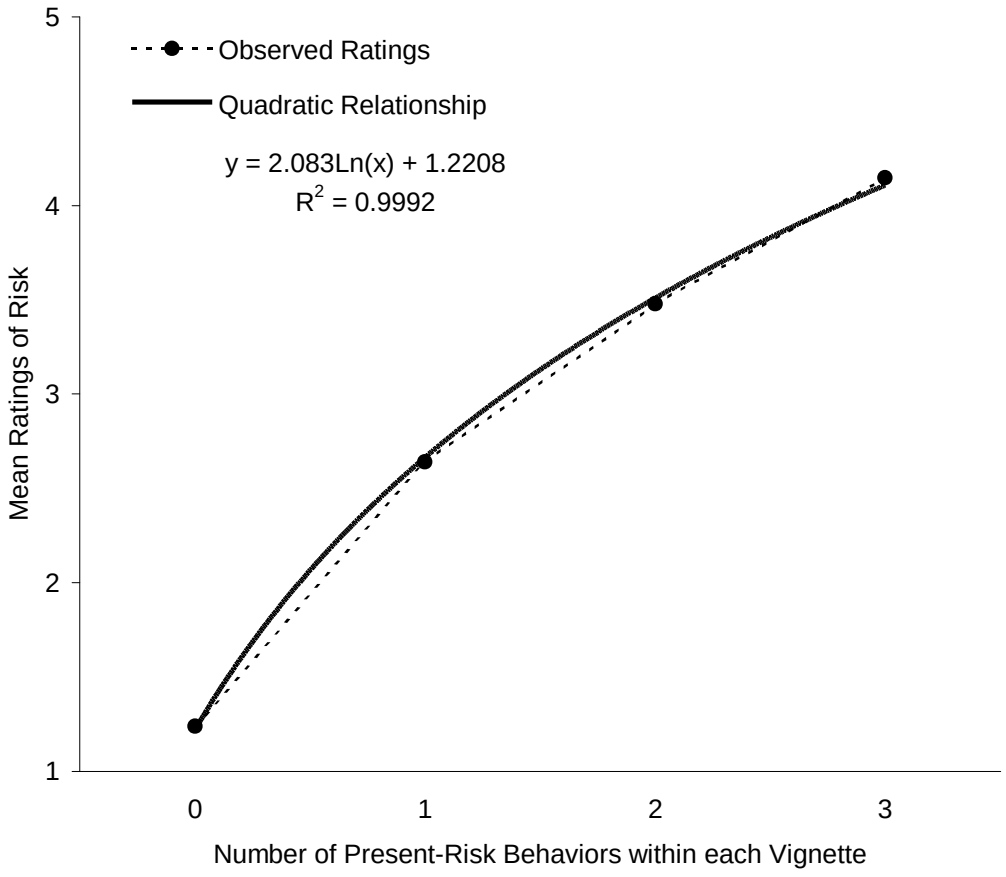


Figure 4.

Observed mean ratings and idealized quadratic relationship for the non-mixed set with all medium-risk behaviors.



Analysis of Low-Risk Behaviors. The linear trend was significant, $F(1, 74) = 68.080$, $p < .001$. The idealized linear relationship between evidence and ratings of risk was calculated (see Figure 5). The r^2 value was .984. The quadratic trend was not significant, $F(1, 74) = 3.159$, $p > .01$.

Analysis of Consistent and Inconsistent Evidence. Consistent and inconsistent evidence was examined by comparing ratings to consistent and inconsistent vignettes within mixed and non-mixed sets. Ratings to vignettes with three-present or zero-present behaviors comprised the consistent evidence. Ratings to vignettes with two-present behaviors or one-present behavior comprised the inconsistent evidence. Mean ratings were calculated. Results of analyses are presented in Table 7.

A 2 x 2 repeated measures ANOVA was conducted, the independent variables were the consistency of vignettes (either consistent or inconsistent) and the mixture of sets (either mixed or non-mixed). A significant interaction was observed, $F(1, 74) = 35.255$, $p < .001$. Inconsistent vignettes were rated significantly higher in risk than consistent vignettes, $F(1, 74) = 152.441$, $p < .001$. Mixed sets were rated significantly higher in risk than non-mixed sets, $F(1, 74) = 109.817$, $p < .001$.

Figure 5.

Observed mean ratings and idealized quadratic relationship for the non-mixed set with all low-risk behaviors.

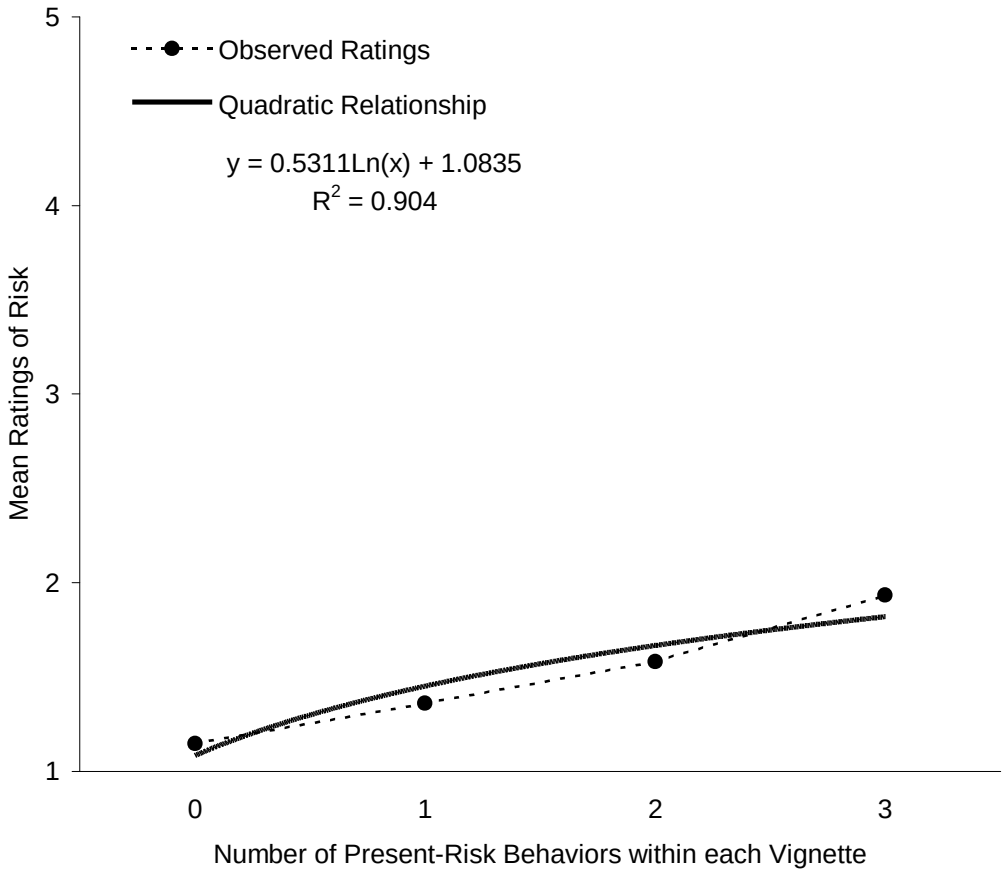


Table 7

Mean Ratings and Standard Deviations to Consistent and Inconsistent Vignettes within Mixed and Non-Mixed Sets, N = 75

Type of Vignette	Mixed Evidence	Non-Mixed Evidence
Consistent		
M	2.780	2.404
SD	0.326	0.309
Inconsistent		
M	3.093	2.890
SD	0.462	0.368

Mixed Sets of Evidence. Ratings to consistent and inconsistent vignettes were examined within the mixed sets. Mean ratings were calculated. Results of analyses are presented in Table 7. Inconsistent vignettes were rated significantly higher in risk than consistent vignettes, $t(74) = 8.907$, $p < .001$.

Ratings to the consistent vignettes within the mixed sets were analyzed further by comparing the standard deviations of vignettes with three-present behaviors to the standard deviations of vignettes with zero-present behaviors. Significantly higher standard deviations were observed for vignettes with three-present behaviors than for vignettes with zero-present behaviors, $t(74) = 4.579$, $p < .001$.

Non-Mixed Sets of Evidence. Ratings to consistent and inconsistent vignettes were examined within each level of the non-mixed sets. Mean ratings were calculated. Results of analyses are presented in Table 8.

Ratings to consistent and inconsistent vignettes were examined within the non-mixed set containing all high-risk behavior (see Table 8). Inconsistent vignettes were rated significantly higher in risk than consistent vignettes, $t(74) = 18.699$, $p < .001$.

Ratings to consistent and inconsistent vignettes were examined within the non-mixed set containing all medium-risk behaviors (see Table 8). Inconsistent vignettes were rated significantly higher in risk than consistent vignettes, $t(74) = 6.212$, $p < .001$.

Ratings to consistent and inconsistent vignettes were examined within the non-mixed set containing all low-risk behaviors (see Table 8). No significant differences were observed, $t(74) = 1.777$, $p > .001$.

Table 8

Mean Ratings and Standard Deviations to Consistent and Inconsistent Vignettes within each Non-Mixed Set, N = 75

	Perceived risk of behavior within each set		
Type of Vignette	Low-Risk	Medium-Risk	High-Risk
Consistent			
M	1.540	2.693	2.980
SD	0.498	0.538	0.209
Inconsistent			
M	1.471	3.058	4.140
SD	0.427	0.694	0.556

DISCUSSION

These results are generally consistent with previous research investigating perceived risk and decision making under uncertainty; except for previous research investigating consistent and inconsistent evidence. The discussion evaluates the results with respect to previous research investigating perceived risk and decision making under uncertainty, and discusses implications for future research.

Perceived Risk

The results of Experiments 1 and 2 support the previous findings of Campbell and Stewart (1992) that different risk behaviors yield different ratings of perceived risk. The ratings of perceived risk generally coincide with how the Centers for Disease Control and Prevention: HIV/AIDS Prevention (1994) regards the risk of acquiring AIDS.

Experiment 2 lends new knowledge to the area of risk perception. Specifically, risk behavior is integrated in a non-additive manner. This finding indicates that perceived risk does not increase in equal increments by adding risk behaviors. Rather, each additional risk behavior adds less to the perceived risk of acquiring AIDS than previous risk behaviors. Additionally, inconsistent vignettes are rated higher in risk than consistent vignettes. This finding demonstrates that inconsistency--or possibly an increase in uncertainty--leads to an increase in perceived risk. Inconsistent vignettes may be more uncertain than consistent vignettes because the risk behaviors within inconsistent vignettes lead to different conclusions. That is, some behaviors within inconsistent vignettes contain the presence of risk while other behaviors contain the absence of risk. Subjects may have perceived the risk of acquiring AIDS as higher in inconsistent vignettes because the described person may have been perceived as being unreliable in their behavior. This unreliability may result in an increase in uncertainty which may increase the perceived risk of acquiring AIDS.

Decision Making Under Uncertainty

The results of Experiment 2 are consistent with previous studies investigating causality, the availability heuristic, and the presence or absence of risk behavior. The results of Experiment 2 are inconsistent with previous research investigating consistent and inconsistent evidence.

Causality. The ratings of perceived risk coincide with Kant's philosophy concerning cause and effect relationships (1787/1965). Although the experimental task did not require subjects to attribute a cause and effect relationship between the behaviors and the risk for acquiring AIDS, the differential ratings to vignettes indicate the possibility that a cause and effect relationship was perceived. Equivalent ratings to all vignettes would have indicated the possibility that no cause and effect relationship was perceived. The cause and effect relationship is most evident when subjects rate medium and high-risk behaviors, that is, ratings to vignettes containing the presence of medium and high-risk behavior are highly dissimilar from ratings to vignettes containing the absence of medium and high-risk behavior. The cause and effect relationship is least evident when subjects rate low-risk behaviors, that is, ratings to vignettes containing the presence of low-risk behavior are similar to ratings to vignettes containing the absence of low-risk behavior.

Availability Heuristic. It is possible that subjects utilized the availability heuristic proposed by Tversky and Kahneman (1982c) to rate the risk of a person acquiring AIDS. Subjects may have assumed that the description of the person's behavior was the only evidence needed for evaluation and relied solely on that evidence. However, the descriptions of behavior provided evidence concerning only three behaviors--making no statement concerning whether the person was involved in additional risk behaviors. For example, subjects rated the risk of a person acquiring AIDS from low-risk behavior as low, even though the described person may also have been involved in high-risk behavior. Subjects may have ignored base-rates concerning the probability of acquiring AIDS and based decisions only on the immediately available evidence.

Presence or Absence of Risk Behavior. The results concerning the presence or absence of risk behavior are consistent with previous findings involving the Pollyanna Principle (Matlin & Stang, 1978). The Pollyanna Principle is similar to hedonism in that people avoid unpleasant and seek pleasant situations (Matlin & Stang, 1978). For example, people take longer to recognize unpleasant evidence, report unpleasant evidence less frequently than equally occurring pleasant evidence, judge pleasant evidence as more likely to occur than unpleasant evidence with equal probabilities, judge pleasant evidence as larger in size than equally sized unpleasant evidence, and show greater accuracy in reporting pleasant life events than unpleasant life events. The presence of risk behavior may be considered unpleasant evidence. The absence of risk behavior may be considered pleasant evidence.

In the current study, as the presence of risk behavior became more unpleasant (from low-risk to medium-risk to high-risk behaviors), ratings to vignettes became less additive. This move toward a non-additive combining of risk behaviors may indicate an avoidance of unpleasant evidence. The difference in r^2 values of the trend analyses indicates that an idealized quadratic relationship fits the data best for medium and high-risk behaviors. As the number of behaviors medium or high in risk is increased, the perception of risk increases as well. However, each additional medium or high-risk behavior has less of an effect on increasing perceived risk. However, the non-additive combining of risk behaviors is applicable to medium and high-risk behaviors only. As the number of behaviors low in risk is increased, the perception of risk increases in an additive manner. Each additional low-risk behavior has an approximately equal effect on increasing perceived risk. The current study suggests that the effect of adding additional medium or high-risk behaviors asymptotes around two to three behaviors. Future research should investigate the generality of these findings by presenting more than three behaviors.

Consistent and Inconsistent Evidence. The results concerning consistent and inconsistent vignettes fail to support the findings of Reece and Matthews (1993). Reece and

Matthews (1993) found that subjects neglected or minimized the effect of below average GPAs (unpleasant evidence) and relied more on the effect of above average GPAs (pleasant evidence) when integrating inconsistent evidence. This pattern of integration resulted in overestimation of inconsistent evidence, that is, subjects integrating inconsistent evidence were optimistic concerning future GPAs.

The current study indicates that subjects relied more on the effect of the presence of medium and high-risk behaviors (unpleasant evidence) and neglected or minimized the influence of the absence of medium and high-risk behaviors (pleasant evidence) when integrating inconsistent evidence. This pattern of integration resulted in greater perceived risk for inconsistent evidence, that is, subjects integrating inconsistent evidence may have been pessimistic concerning the risk of an individual acquiring AIDS. The current results apply to medium and high-risk behaviors only. There were no significant differences between consistent and inconsistent evidence for low-risk behaviors.

Inconsistent evidence resulted in higher perceived risk than consistent evidence. This result may indicate that the uncertainty of inconsistent evidence affects evidence containing risk differently than evidence that does not contain risk. Future research should investigate the relationship between consistent and inconsistent evidence, level of risk, and the perceived risk of acquiring AIDS. This research should determine at what level of risk inconsistent evidence is no longer perceived as a higher risk than consistent evidence.

Conclusions. The results of Experiment 1 and 2 indicate that different risk behaviors yield different ratings of perceived risk. The results of Experiment 2 indicate four additional findings: (a) As the number of medium and high-risk behaviors is increased, each additional medium or high-risk behavior has less of an effect on increasing perceived risk. (b) As the number of low-risk behaviors is increased, each additional low-risk behavior has an approximately equal effect on increasing perceived risk. (c) Medium and high-risk behaviors that are inconsistent are rated higher in risk than medium and high-risk behaviors that are consistent.

(d) Low-risk behaviors that are inconsistent are rated similarly to low-risk behaviors that are consistent.

Caution should be exercised when generalizing these findings to risk topics other than AIDS. It is possible that there is something unique about the perceived risk of acquiring AIDS that may not be common to other risk topics. Future studies should investigate additional risk topics to determine the extent to which the current findings can be generalized.

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APPENDIX A

Experiment 1 Instructions

Thank you for agreeing to participate in this study. This study will provide you the opportunity to learn about research by participating in a study which seeks to discover how people perceive the risk of getting AIDS from numerous behaviors which contain some degree of risk for acquiring AIDS. The benefits of this study include your becoming familiar with psychological studies and society learning more about how people perceive the risk of acquiring AIDS.

To begin with, we ask that you answer a few questions about yourself. Your answers to these questions will not be identified with your name. Please answer the first five questions provided on the answer sheet at this time.

The questions that follow are designed to assess your personal perception of the risk of getting the acquired immune deficiency syndrome (AIDS). You will be presented with various behaviors or actions. Your task is to give a rating for what you believe is the risk of acquiring AIDS from participating in these behaviors. Please use the following scale:

5 = **maximum** risk

4 = **high** risk

3 = **medium** risk

2 = **low** risk

1 = **minimum** risk

Write only on the answer sheet provided. After reading each question, choose the number corresponding to your choice. Be sure to write the number of your choice on the answer sheet, being careful to write the rating for each question next to the respective number on the answer sheet. There are no right or wrong answers, but please give the rating you honestly believe is most accurate. If you have any questions, please consult the attendant for clarification. Thank you for participating in this study.

APPENDIX B

Experiment 2 Instructions

Thank you for agreeing to participate in this study. This study will provide you the opportunity to learn about research by participating in a study which seeks to discover how people perceive the risk of getting AIDS from numerous behaviors which contain some degree of risk of acquiring AIDS. the benefits of this study include your becoming familiar with psychological studies and society learning more about how people perceive the risk of acquiring AIDS.

To begin with, we ask that you answer a few questions about yourself. Your answers to these questions will not be identified with your name.

To answer each question, move the mouse until the cursor is located over the box. You will notice the cursor changes to a vertical line when it is located in the box. Click the mouse button once and enter your answer from the keyboard. Once you have entered your answer, click the "Next Card" button to continue.

If you enter an incorrect response, use the delete key to erase the mistake and then use the keyboard to enter the correct response.

The task you are about to perform involves making predictions about the likelihood of getting AIDS. You will be presented with information describing various behaviors a particular individual is currently engaged in and asked to make a prediction about what you think the person's risk is of getting AIDS.

For each prediction, move the mouse until the cursor is over the box. You will notice the cursor changes to a vertical line when it is located in the box. Click the mouse button once and enter your prediction from the keyboard using numbers representing the risk of the individual getting AIDS. Please use the scale shown on this card to make your predictions. You may enter only the whole numbers 1, 2, 3, 4, or 5. There are no "correct" answers. But, try to give the prediction you sincerely believe is most accurate.

The following card allows you to practice evaluating behaviors and make predictions.

If you have any questions at this time or at any time during this session, please ask the attendant.

APPENDIX C

Means and Standard Deviations to each Vignette in Experiment 2, N = 75

Statements of Behavior within Vignettes	Risk	P/A
Mixed Set 1, Vignette 1; M = 4.360, SD = 0.816		
Is involved in unprotected (no condom use) heterosexual intercourse.	H	P
Is a health care worker who was wearing protective gear when fluid containing AIDS entered a mucus membrane.	M	P
Does not protect him/herself from biting insects, e.g., does not use insect repellent, mosquito netting, etc.	L	P
Mixed Set 1, Vignette 2; M = 4.147, SD = 0.982		
Is involved in unprotected (no condom use) heterosexual intercourse.	H	P
Is a health care worker who was wearing protective gear when fluid containing AIDS entered a mucus membrane.	M	P
Protects him/herself from biting insects, e.g., uses insect repellent, mosquito netting, etc.	L	A
Mixed Set 1, Vignette 3; M = 3.640, SD = 0.925		
Is involved in unprotected (no condom use) heterosexual intercourse.	H	P
Is not a health care worker who works with fluid containing AIDS.	M	A
Does not protect him/herself from biting insects, e.g., does not use insect repellent, mosquito netting, etc.	L	P

APPENDIX C (continued)

Means and Standard Deviations to each Vignette in Experiment 2, N = 75

Statements of Behavior within Vignettes	Risk	P/A
Mixed Set 1, Vignette 4; M = 3.520, SD = 0.950		
Is involved in unprotected (no condom use) heterosexual intercourse.	H	P
Is not a health care worker who works with fluid containing AIDS.	M	A
Protects him/herself from biting insects, e.g., uses insect repellent, mosquito netting, etc.	L	A
Mixed Set 1, Vignette 5; M = 3.307, SD = 1.230		
Is not involved in heterosexual intercourse.	H	A
Is a health care worker who was wearing protective gear when fluid containing AIDS entered a mucus membrane.	M	P
Does not protect him/herself from biting insects, e.g., does not use insect repellent, mosquito netting, etc.	L	P
Mixed Set 1, Vignette 6; M = 3.320, SD = 1.221		
Is not involved in heterosexual intercourse.	H	A
Is a health care worker who was wearing protective gear when fluid containing AIDS entered a mucus membrane.	M	P
Protects him/herself from biting insects, e.g., uses insect repellent, mosquito netting, etc.	L	A

APPENDIX C (continued)

Means and Standard Deviations to each Vignette in Experiment 2, N = 75

Statements of Behavior within Vignettes	Risk	P/A
Mixed Set 1, Vignette 7; M = 1.507, SD = 0.795		
Is not involved in heterosexual intercourse.	H	A
Is not a health care worker who works with fluid containing AIDS.	M	A
Does not protect him/herself from biting insects, e.g., does not use insect repellent, mosquito netting, etc.	L	P
Mixed Set 1, Vignette 8; M = 1.213, SD = 0.576		
Is not involved in heterosexual intercourse.	H	A
Is not a health care worker who works with fluid containing AIDS.	M	A
Protects him/herself from biting insects, e.g., uses insect repellent, mosquito netting, etc.	L	A
Mixed Set 2, Vignette 1; M = 4.520, SD = 0.665		
Is involved in unprotected (no condom use) homosexual intercourse.	H	P
Is a health care worker who was accidentally stuck with a needle while wearing protective gear.	M	P
Eats food processed by an AIDS infected food service worker.	L	P

APPENDIX C (continued)

Means and Standard Deviations to each Vignette in Experiment 2, N = 75

Statements of Behavior within Vignettes	Risk	P/A
Mixed Set 2, Vignette 2; M = 4.040, SD = 0.779		
Is involved in unprotected (no condom use) homosexual intercourse.	H	P
Is a health care worker who was accidentally stuck with a needle while wearing protective gear.	M	P
Does not eat food processed by an AIDS infected food service worker.	L	A
Mixed Set 2, Vignette 3; M = 3.973, SD = 0.885		
Is involved in unprotected (no condom use) homosexual intercourse.	H	P
Is not a health care worker who works with needles.	M	A
Eats food processed by an AIDS infected food service worker.	L	P
Mixed Set 2, Vignette 4; M = 3.880, SD = 0.788		
Is involved in unprotected (no condom use) homosexual intercourse.	H	P
Is not a health care worker who works with needles.	M	A
Does not eat food processed by an AIDS infected food service worker.	L	A

APPENDIX C (continued)

Means and Standard Deviations to each Vignette in Experiment 2, N = 75

Statements of Behavior within Vignettes	Risk	P/A
Mixed Set 2, Vignette 5; M = 2.747, SD = 0.871		
Is not involved in homosexual intercourse.	H	A
Is a health care worker who was accidentally stuck with a needle while wearing protective gear.	M	P
Eats food processed by an AIDS infected food service worker.	L	P
Mixed Set 2, Vignette 6; M = 2.720, SD = 0.909		
Is not involved in homosexual intercourse.	H	A
Is a health care worker who was accidentally stuck with a needle while wearing protective gear.	M	P
Does not eat food processed by an AIDS infected food service worker.	L	A
Mixed Set 2, Vignette 7; M = 1.787, SD = 0.827		
Is not involved in homosexual intercourse.	H	A
Is not a health care worker who works with needles.	M	A
Eats food processed by an AIDS infected food service worker.	L	P

APPENDIX C (continued)

Means and Standard Deviations to each Vignette in Experiment 2, N = 75

Statements of Behavior within Vignettes	Risk	P/A
Mixed Set 2, Vignette 8; M = 1.267, SD = 0.577		
Is not a health care worker who works with needles.	M	A
Is not involved in homosexual intercourse.	H	A
Does not eat food processed by an AIDS infected food service worker.	L	A
Mixed Set 3, Vignette 1; M = 4.187, SD = 0.730		
Shares intravenous drug needles without fist cleaning the needle with bleach.	H	P
Receives blood transfusions.	M	P
Works in an industrial setting.	L	P
Mixed Set 3, Vignette 2; M = 4.253, SD = 0.737		
Shares intravenous drug needles without fist cleaning the needle with bleach.	H	P
Receives blood transfusions.	M	P
Does not work in an industrial setting.	L	A

APPENDIX C (continued)

Means and Standard Deviations to each Vignette in Experiment 2, N = 75

Statements of Behavior within Vignettes	Risk	P/A
Mixed Set 3, Vignette 3; M = 3.827, SD = 0.778		
Shares intravenous drug needles without fist cleaning the needle with bleach.	H	P
Does not receive blood transfusions.	M	A
Works in an industrial setting.	L	P
Mixed Set 3, Vignette 4; M = 3.867, SD = 0.741		
Shares intravenous drug needles without fist cleaning the needle with bleach.	H	P
Does not receive blood transfusions.	M	A
Does not work in an industrial setting.	L	A
Mixed Set 3, Vignette 5; M = 2.040, SD = 0.725		
Does not share intravenous drug needles.	H	A
Receives blood transfusions.	M	P
Works in an industrial setting.	L	P

APPENDIX C (continued)

Means and Standard Deviations to each Vignette in Experiment 2, N = 75

Statements of Behavior within Vignettes	Risk	P/A
Mixed Set 3, Vignette 6; M = 1.987, SD = 0.762		
Does not share intravenous drug needles.	H	A
Receives blood transfusions.	M	P
Does not work in an industrial setting.	L	A
Mixed Set 3, Vignette 7; M = 1.120, SD = 0.327		
Does not share intravenous drug needles.	H	A
Does not receive blood transfusions.	M	A
Works in an industrial setting.	L	P
Mixed Set 3, Vignette 8; M = 1.133, SD = 0.380		
Does not share intravenous drug needles.	H	A
Does not receive blood transfusions.	M	A
Does not work in an industrial setting.	L	A

APPENDIX C (continued)

Means and Standard Deviations to each Vignette in Experiment 2, N = 75

Statements of Behavior within Vignettes	Risk	P/A
Non-Mixed Set 1, Vignette 1; M = 4.907, SD = 0.293		
Is involved in unprotected (no condom use) heterosexual intercourse.	H	P
Is involved in unprotected (no condom use) homosexual intercourse.	H	P
Shares intravenous drug needles without fist cleaning the needle with bleach.	H	P
Non-Mixed Set 1, Vignette 2; M = 4.373, SD = 0.749		
Is involved in unprotected (no condom use) heterosexual intercourse.	H	P
Is involved in unprotected (no condom use) homosexual intercourse.	H	P
Does not share intravenous drug needles.	H	A
Non-Mixed Set 1, Vignette 3; M = 4.560, SD = 0.598		
Is involved in unprotected (no condom use) heterosexual intercourse.	H	P
Is not involved in homosexual intercourse.	H	A
Shares intravenous drug needles without fist cleaning the needle with bleach.	H	P

APPENDIX C (continued)

Means and Standard Deviations to each Vignette in Experiment 2, N = 75

Statements of Behavior within Vignettes	Risk	P/A
Non-Mixed Set 1, Vignette 4; M = 3.493, SD = 0.991		
Is involved in unprotected (no condom use) heterosexual intercourse.	H	P
Is not involved in homosexual intercourse.	H	A
Does not share intravenous drug needles.	H	A
Non-Mixed Set 1, Vignette 5; M = 4.747, SD = 0.468		
Is not involved in heterosexual intercourse.	H	A
Is involved in unprotected (no condom use) homosexual intercourse.	H	P
Shares intravenous drug needles without first cleaning the needle with bleach.	H	P
Non-Mixed Set 1, Vignette 6; M = 3.787, SD = 0.963		
Is not involved in heterosexual intercourse.	H	A
Is involved in unprotected (no condom use) homosexual intercourse.	H	P
Does not share intravenous drug needles.	H	A

APPENDIX C (continued)

Means and Standard Deviations to each Vignette in Experiment 2, N = 75

Statements of Behavior within Vignettes	Risk	P/A
Non-Mixed Set 1, Vignette 7; M = 3.880, SD = 0.716		
Is not involved in heterosexual intercourse.	H	A
Is not involved in homosexual intercourse.	H	A
Shares intravenous drug needles without fist cleaning the needle with bleach.	H	P
Non-Mixed Set 1, Vignette 8; M = 1.053, SD = 0.280		
Is not involved in heterosexual intercourse.	H	A
Is not involved in homosexual intercourse.	H	A
Does not share intravenous drug needles.	H	A
Non-Mixed Set 2, Vignette 1; M = 4.147, SD = 0.968		
Receives blood transfusions.	M	P
Is a health care worker who was wearing protective gear when fluid containing AIDS entered a mucus membrane.	M	P
Is a health care worker who was accidentally stuck with a needle while wearing protective gear.	M	P

APPENDIX C (continued)

Means and Standard Deviations to each Vignette in Experiment 2, N = 75

Statements of Behavior within Vignettes	Risk	P/A
Non-Mixed Set 2, Vignette 2; M = 3.640, SD = 1.074		
Receives blood transfusions.	M	P
Is a health care worker who was wearing protective gear when fluid containing AIDS entered a mucus membrane.	M	P
Is not a health care worker who works with needles.	M	A
Non-Mixed Set 2, Vignette 3; M = 3.000, SD = 0.753		
Receives blood transfusions.	M	P
Is not a health care worker who works with fluid containing AIDS.	M	A
Is a health care worker who was accidentally stuck with a needle while wearing protective gear.	M	P
Non-Mixed Set 2, Vignette 4; M = 2.187, SD = 0.911		
Receives blood transfusions.	M	P
Is not a health care worker who works with fluid containing AIDS.	M	A
Is not a health care worker who works with needles.	M	A

APPENDIX C (continued)

Means and Standard Deviations to each Vignette in Experiment 2, N = 75

Statements of Behavior within Vignettes	Risk	P/A
Non-Mixed Set 2, Vignette 5; M = 3.787, SD = 1.094		
Does not receive blood transfusions.	M	A
Is a health care worker who was wearing protective gear when fluid containing AIDS entered a mucus membrane.	M	P
Is a health care worker who was accidentally stuck with a needle while wearing protective gear.	M	P
Non-Mixed Set 2, Vignette 6; M = 3.373, SD = 1.239		
Does not receive blood transfusions.	M	A
Is a health care worker who was wearing protective gear when fluid containing AIDS entered a mucus membrane.	M	P
Is not a health care worker who works with needles.	M	A
Non-Mixed Set 2, Vignette 7; M = 2.360, SD = 0.864		
Does not receive blood transfusions.	M	A
Is not a health care worker who works with fluid containing AIDS.	M	A
Is a health care worker who was accidentally stuck with a needle while wearing protective gear.	M	P

APPENDIX C (continued)

Means and Standard Deviations to each Vignette in Experiment 2, N = 75

Statements of Behavior within Vignettes	Risk	P/A
Non-Mixed Set 2, Vignette 8; M = 1.240, SD = 0.612		
Does not receive blood transfusions.	M	A
Is not a health care worker who works with fluid containing AIDS.	M	A
Is not a health care worker who works with needles.	M	A
Non-Mixed Set 3, Vignette 1; M = 1.933, SD = 0.827		
Does not protect him/herself from biting insects, e.g., does not use insect repellent, mosquito netting, etc.	L	P
Eats food processed by an AIDS infected food service worker.	L	P
Works in an industrial setting.	L	P
Non-Mixed Set 3, Vignette 2; M = 1.840, SD = 0.855		
Does not protect him/herself from biting insects, e.g., does not use insect repellent, mosquito netting, etc.	L	P
Eats food processed by an AIDS infected food service worker.	L	P
Does not work in an industrial setting.	L	A

APPENDIX C (continued)

Means and Standard Deviations to each Vignette in Experiment 2, N = 75

Statements of Behavior within Vignettes	Risk	P/A
Non-Mixed Set 3, Vignette 3; M = 1.307, SD = 0.519		
Does not protect him/herself from biting insects, e.g., does not use insect repellent, mosquito netting, etc.	L	P
Does not eat food processed by an AIDS infected food service worker.	L	A
Works in an industrial setting.	L	P
Non-Mixed Set 3, Vignette 4; M = 1.307, SD = 0.569		
Does not protect him/herself from biting insects, e.g., does not use insect repellent, mosquito netting, etc.	L	P
Does not eat food processed by an AIDS infected food service worker.	L	A
Does not work in an industrial setting.	L	A
Non-Mixed Set 3, Vignette 5; M = 1.600, SD = 0.717		
Protects him/herself from biting insects, e.g., uses insect repellent, mosquito netting, etc.	L	A
Eats food processed by an AIDS infected food service worker.	L	P
Works in an industrial setting.	L	P

APPENDIX C (continued)

Means and Standard Deviations to each Vignette in Experiment 2, N = 75

Statements of Behavior within Vignettes	Risk	P/A
Non-Mixed Set 3, Vignette 6; M = 1.520, SD = 0.685		
Protects him/herself from biting insects, e.g., uses insect repellent, mosquito netting, etc.	L	A
Eats food processed by an AIDS infected food service worker.	L	P
Does not work in an industrial setting.	L	A
Non-Mixed Set 3, Vignette 7; M = 1.253, SD = 0.438		
Protects him/herself from biting insects, e.g., uses insect repellent, mosquito netting, etc.	L	A
Does not eat food processed by an AIDS infected food service worker.	L	A
Works in an industrial setting.	L	P
Non-Mixed Set 3, Vignette 8; M = 1.147, SD = 0.392		
Protects him/herself from biting insects, e.g., uses insect repellent, mosquito netting, etc.	L	A
Does not eat food processed by an AIDS infected food service worker.	L	A
Does not work in an industrial setting.	L	A

H = Statement of behavior perceived high in risk.
M = Statement of behavior perceived medium in risk.
L = Statement of behavior perceived low in risk.
P = Presence of a risk behavior.
A = Absence of a risk behavior.