

# Risk Tolerance: Beware When Clients Are in a Bad Mood

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## ABSTRACT

Financial risk-tolerance questionnaires and tests are generally developed with the assumption that investors primarily use analytical processes to weigh risk-and-return outcomes. This research aimed to test this assumption by determining whether an investor's mood prior to completing a risk-tolerance test affects the outcome. Conceptually, mood should have no relationship with resulting risk-tolerance scores. In this study, however, mood was found to be positively associated with investors' willingness to take financial risk. The results from this study add support to the "risk-as-feelings" hypothesis that states investors formulate risk preferences using a combination of analytical and emotional inputs. Findings suggest that financial service professionals should take care to evaluate measures of client risk tolerance and risk aversion with consideration given to client emotional characteristics.

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## Introduction

Financial service professionals work in a world in which the success or failure of recommendations often hinges on accurately assessing a client's feelings and attitudes. An important attitudinal construct is financial risk tolerance. Financial risk tolerance, which can broadly be defined as an investor's willingness to engage in a behavior in which the outcome is unknown and potentially negative, is used to guide numerous household financial planning recommendations.<sup>1</sup> For example, Mayo noted that asset allocation choices depend on an accurate assessment of an investor's "willingness to bear risk."<sup>2</sup> Whereas a risk-tolerant investor should be willing to invest more aggressively, a risk-averse investor should prefer investments that generate less price volatility.

Nearly all risk-tolerance questionnaires and risk-aversion tests are built on the assumption that investors are economically rational when making risk-and-return trade-offs. Consider assessments that are based on the concept of constant relative risk aversion (CRRA). It is easy to identify a CRRA test. CRRA tests employ choice scenarios that require an investor to choose between two options, each with a 50 percent chance of success or failure. When CRRA measures are applied in a modern portfolio theory framework (MPT), trade-offs between risk and return are thought to be purely analytical, with the re-

sulting assessment score providing a direct pathway to portfolio selection.

The notion that an investor's risk attitude can be measured in an emotion-free context is, of course, seldom true in practice. Financial service professionals know that the assumption of rationality is problematic.<sup>3</sup> As noted in the psychological and sociological literature, the assessment and use of investor financial risk-tolerance questionnaires and tests is potentially subject to assessment bias, often as the result of investor emotions.<sup>4</sup>

The original concept of risk tolerance and risk aversion emerged from work based on the notion of expected utility. Pratt was among the first researchers to systematically test how consumers adjust consumption based on changes in wealth over time.<sup>5</sup> What emerged from studies that followed Pratt's analyses was the concept of CRRA or the thought that investors can be classified as risk-avoiding, risk-neutral, or risk-seeking based on a linear trade-off between risks and returns. It is important to note, however, that over the past two decades, there has been a shift away from accepting the assumption of generalized rationality in relation to risk-return trade-offs. Research by Guiso, Sapienza, and Zingales provides one reason for questioning the assumption that investors make valid risk-and-return trade-offs.<sup>6</sup> They provided evidence that investors tend to be more risk-averse during periods of low investment returns. Guiso and associates asserted that risk aversion is, at minimum, time-varying rather than stable or constant. Others have argued that the way in which an investor conceptualizes his or her tolerance for financial risk is based on a combination of rational (i.e., analytical) and experiential subjective systems. Loewenstein, et al. called this the "risk-as-feelings" hypothesis.<sup>7</sup> Loewenstein et al. hypothesized that investors evaluate the possibility of obtaining gains and losing principal using both cognitive and affective processes. Slovic, et al. added support to the hypothesis by noting that "affect influences judgment directly and is not simply a response to a prior analytic evaluation."<sup>8</sup> Regardless of these arguments, there is still a widely held belief

among some researchers and many financial advisors that the manner in which someone defines his or her willingness to take financial risk can and should be measured analytically, with little meaningful attempt to account for emotional influences.

The purpose of this study was to determine whether an investor's mood prior to completing a risk-tolerance test affects the outcome. As framed in this study, financial risk tolerance was defined as the inverse of risk aversion. It was thought that if such an association exists, then it is likely that Loewenstein et al.'s risk-as-feelings hypothesis may be a more appropriate description of the way investors formulate risk preferences compared to a purely analytical model. Further, if an association between mood and financial risk tolerance is found to exist, this means that financial service professionals should take care to evaluate measures of client risk tolerance and risk aversion with greater consideration given to client emotional characteristics.

## **Background**

Classical economic theory assumes that a rational, utility-maximizing investor will base his or her portfolio choice on the utility function that maximizes his or her level of welfare or satisfaction.<sup>9</sup> This absolute level of investor utility reflects an investor's CRRA, or rate at which an investor will give up a higher expected return in exchange for less volatility. Nearly all traditional investment and household economic models generally assume the existence of a utility function that represents an investor's preference(s).<sup>10</sup> In the context of financial risk tolerance, risk preference is most often described as CRRA.

According to Hanna and Lindamood, "the only rigorous theoretical analyses relating risk tolerance to optimal portfolios are based on the economic concept of risk aversion."<sup>11</sup> Economic theorists, such as Barsky, et al.<sup>12</sup> and Holt and Laury,<sup>13</sup> have developed ways to measure an investor's risk-aversion coefficient through a series of hypothetical 50-50 wealth gambles. Imbedded within utility maximizing mod-

els is the notion that investors systematically weigh potential returns against real and anticipated risks.<sup>14</sup> Implementation of investment and financial recommendations, within this context, becomes more problematic when risk-and-return evaluations are subject to short-term emotional influences.

Methods used to measure CRRA have historically minimized an investor's emotional state as an element in the risk-and-return trade-off calculus. Loewenstein and associates argued that the assumption that investors rely primarily on rational and analytical processes when making risk-and-return compromises is unrealistic.<sup>15</sup> Loewenstein et al. noted that investors are just as likely to utilize affective insights, in addition to cognitive appraisals, when making risky choices. They called this the risk-as-feelings hypothesis. Within the hypothesis, an investor's mood is linked with the types of feelings an investor may experience when thinking about risk-taking behavior.

An investor's mood can be conceptualized as a transient generalized affective state.<sup>16</sup> Although similar to the concept of emotion, mood is a form of "affect" that can be defined as "...the specific quality of goodness or badness (1) experienced as a feeling state (with or without consciousness) and (2) demarcating a positive or negative quality of a stimulus."<sup>17</sup> Mood can be classified on a continuum of negative to positive feelings. Emotions are different. Emotions (e.g., anger, fear, envy, etc.), according to Bagozzi, Gopinath, and Nyer, are feelings about a particular circumstance or an event that arise from cognitive appraisals of circumstances.<sup>18</sup> A mood, which is a different construct, is a generalized nonspecific state that is not directed at any particular target.<sup>19</sup> Furthermore, moods tend to have a longer duration than emotions.<sup>20</sup>

Whereas some researchers continue to consider affect, including investor mood, as noise or random error in the assessment of an investor's preference for taking risk, psychologists have found contradictory relationships between mood state and willingness to take risk. The affect infusion model (AIM) states that those who report being in a neutral or negative

mood will exhibit a risk tolerance that is lower than those who report being in a good mood.<sup>21</sup> However, a competing model, the mood maintenance hypothesis (MMH) proposes that the relationship between mood state and risk tolerance is negative. Isen and Geva argued that being in a negative mood prompts a willingness to take risk as a mechanism to improve one's situation.<sup>22</sup> While either the AIM or MMH may be plausible—in addition to the possibility that no relationship exists between mood and risk tolerance—it was thought in this study that patterns of mood and risk tolerance exhibited by study participants would be positively related.

## Methods

### Sample

This exploratory study used data collected with the Qualtrics survey platform in late 2017. The survey was used as a screening tool for a financial risk-taking experiment. The experiment required that participants be 21 years of age or older and knowledgeable about personal finance concepts and issues. Additionally, an attempt was made to match the sample to the one used by Hanna and Lindamood in their study, which introduced the risk-tolerance measure applied in the current study. After removing participants based on these restrictions, the final sample included 164 participants. Those in the sample were relatively young and well educated. Approximately 60 percent of participants were female. The average age of participants was nearly 26 years. The majority of participants were unmarried (56 percent), with others being married (13 percent), divorced (2 percent), or other, including widowed or not married but living with a significant other (29 percent). Seventy-five percent of participants were currently employed, with others being students or retired. Over 75 percent of participants classified their racial background as Caucasian/White; 10 percent of participants indicated being Asian or Pacific Islander; with other racial/ethnic categories being African-American/Black (6 percent),

Hispanic (6 percent), and Native American (1 percent). The median personal income of participants fell between \$30,001 and \$40,000. Median household income fell between \$40,001 and \$50,000. The majority of participants held a college degree or higher level of education.

### **Outcome Variable**

Financial risk tolerance was measured using a risk-tolerance test developed by Hanna and Lindamood (moving forward, referred to as the H&L test). Scores from the H&L test were used as a proxy for each participant's willingness to engage in a risky financial activity. Scores were used as the outcome variable in the analyses. The H&L test, which shares many features with other CRRA measures (e.g., the Barsky et al. measure), is based on choice scenarios that require participants to choose between pensions with 50-50 answer options.<sup>23</sup> The questions and scoring system are shown below:

1. Suppose that you are about to retire, and have two choices for a pension. Pension A gives you an income equal to your preretirement income. Pension B has a 50 percent chance your income will be double your preretirement income, and a 50 percent chance that your income will be 20 percent less than your preretirement income. You will have no other source of income during retirement, no chance of employment, and no other family income ever in the future. All incomes are after-tax. Which pension would you choose? If A, go to #2. If B, go to #5.
2. Suppose that you are about to retire, and have two choices for a pension. Pension A gives you an income equal to your preretirement income. Pension C has a 50 percent chance your income will be double your preretirement income, and a 50 percent chance that your income will be 10 percent less than your preretirement income. You will have no other source of income during retirement, no chance of employment, and no other family income ever in the future. All incomes are after-tax. Which pension would you choose? If A, go to #3. If C, your subjective risk tolerance is moderate.
3. Suppose that you are about to retire, and have two choices for a pension. Pension A gives you an income equal to your preretirement income. Pension D has a 50 percent chance your income will be double your preretirement income, and a 50 percent chance that your income will be 8 percent less than your preretirement income. You will have no other source of income during retirement, no chance of employment, and no other family income ever in the future. All incomes are after-tax. Which pension would you choose? If A, go to #4. If D, your subjective risk tolerance is low.
4. Suppose that you are about to retire, and have two choices for a pension. Pension A gives you an income equal to your preretirement income. Pension E has a 50 percent chance your income will be double your preretirement income, and a 50 percent chance that your income will be 5 percent less than your preretirement income. You will have no other source of income during retirement, no chance of employment, and no other family income ever in the future. All incomes are after-tax. Which pension would you choose? If A, your subjective risk tolerance is extremely low. If E, your subjective risk tolerance is very low.
5. Suppose that you are about to retire, and have two choices for a pension. Pension A gives you an income equal to your preretirement income. Pension F has a 50 percent chance your income will double your preretirement income, and a 50 percent chance that your income will be one third less than your preretirement income. You will have no other source of income during retirement, no chance of employment, and no other family income ever in the future. All incomes are after-tax. Which pension would you choose? If A, your subjective risk tolerance is moderately high. If F, go to #6.
6. Suppose that you are about to retire, and have two choices for a pension. Pension A gives you

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an income equal to your preretirement income. Pension G has a 50 percent chance your income will be double your preretirement income, and a 50 percent chance that your income will be half your preretirement income. You will have no other source of income during retirement, no chance of employment, and no other family income ever in the future. All incomes are after-tax. Which pension would you choose? If A, your subjective risk tolerance is very high. If G, your subjective risk tolerance is extremely high.

Among participants, 7 percent, 3 percent, 7 percent, 45 percent, 26 percent, 8 percent, and 4 percent, respectively, exhibited extremely low, very low, low, moderate, moderately high, very high, and extremely high risk-tolerance scores. Risk-tolerance scores for most participants fell in the moderate to moderately high range.

### Mood Variable

The working proposition underlying this research project was that scores derived from the H&L test were reasonable indicators of true risk tolerance

across the sample. For this to be true, participants in the study were assumed to use, as described by Hanna and Lindamood, primarily an analytical system to evaluate risk-and-return trade-offs.<sup>24</sup> To test the possibility that participants might have been making risk-taking choices based in part on the risk-as-feeling hypothesis, each participant was asked to indicate his or her mood prior to answering the test questions. In this study, each study participant's mood was evaluated with the following question: "How would you describe your current mood?" A 10-point scale was used as an answer choice, with 1 meaning bad mood and 10 meaning good mood. The mean and standard deviation of scores was 6.54 and 1.95, respectively. In general, participants reported being in a relatively good mood; however, 16 percent of participants reported being in a less than average mood.

### Demographic Controls

The demographic profile of participants is shown in Table 1. The sex of participants was assessed by asking each participant to self-identify as either male (coded 1) or female (coded 2). The majority of participants were female. Age was measured by asking each participant to indicate his or her age in years. Educational attainment was measured using the following six categories: (1) some high school or less, (2) high school graduate, (3) some college/trade/vocational training, (4) associate's degree, (5) bachelor's degree, and (6) graduate or professional degree. The majority of participants held at least a college degree. Based on sample size restrictions and for analytical purposes, the education variable was recoded into three categories: (1) some college or less, (2) bachelor's degree, and (3) graduate or professional degree. In the models, some college or less was used as the reference group.

### Attitudinal Controls

The H&L test used in this study placed a relatively high cognitive load on participants to answer the questions quickly and honestly. It was hypothesized that participants with more investing

**TABLE 1**  
Demographic Characteristics of Participants

Variable	Frequency	Mean	S.D.
Male	40 Percent	n.a.	n.a.
Female	60 percent	n.a.	n.a.
Current Age		25.93	6.48
Attained Education			
High School or Less	5 percent	n.a.	n.a.
Some College or Associate's Degree	13 percent	n.a.	n.a.
Bachelor's Degree	60 percent	n.a.	n.a.
Graduate or Professional Degree	22 percent	n.a.	n.a.
Investing Knowledge		4.71	2.46
Experience Making Financial Decisions		5.70	2.30
Current Mood		6.54	1.95

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knowledge might have been in a better position to understand the complexity of the questions when answering items in the H&L test. As such, the following question was asked of participants to account for this possibility: “Rate your investing knowledge.” A 10-point scale, with 1 suggesting the lowest level and 10 indicating the highest level, was provided. The mean and standard deviation of responses were 4.71 and 2.46, respectively. Experience making financial decisions was evaluated by asking, “How much experience do you have making financial decisions?” Another 10-point scale was used, with 1 indicating very little experience and 10 suggesting a great deal of experience. The mean and standard deviation of responses were 5.70 and 2.30, respectively.

### Analytical Method

In addition to an analysis of descriptive data, a hierarchical ordinary least squares (OLS) regression was used to evaluate the association between financial risk-tolerance scores and mood, controlling for sex, age, education, financial knowledge, and financial experience.<sup>25</sup> The “some college or less” level of education was used as the omitted category in the regression analysis.

### Results

Demographic data for the variables used in the study are shown in Table 1. The hierarchical regression findings are shown in Table 2.

As shown in Table 2, the independent variables from the study were entered into the regression in four blocks. The first block of variables included participant sex, age, education (i.e., bachelor’s and graduate/professional degree). Females were found to exhibit lower risk-tolerance scores, while the risk-tolerance scores for those holding a bachelor’s degree level of education were surprisingly lower than scores for those who had attained some college or less education. These variables explained approximately 6.50 percent of the variance in risk-tolerance scores.

Investing knowledge was added into the second block of variables. The inclusion of investing knowledge reduced the significance of sex in the model. Holding a bachelor’s level of education remained negatively associated with risk-tolerance scores; however, the inclusion of investing knowledge increased the level of explained variance in risk-tolerance scores to approximately 8.30 percent.

The third block of variables included the addi-

**TABLE 2**  
Hierarchical Regression Showing Relationship between Mood and CRRA

	Model 1			Model 2			Model 3			Model 4				
	B	S.E.	β	B	S.E.	β	B	S.E.	β	B	S.E.	β	t	Sig.
(Constant)	4.997	.682		4.480	.688		4.497	.686		3.338	.795		4.197	.000
Sex (1=Male; 2=Female)	-.506*	.236	-.188	-.382	.248	-.142	-.381	.248	-.141	-.315	.243	-.117	-1.299	.196
Current Age	.006	.018	.028	.003	.018	.016	.013	.019	.065	.017	.019	.083	.891	.375
Bachelor’s Degree	-2.120*	.948	-.198	-1.938*	.950	-.181	-1.955*	.948	-.182	-1.876*	.925	-.175	-2.027	.045
Graduate or Professional Degree	-.150	.231	-.057	-.097	.233	-.036	-.100	.232	-.038	-.034	.228	-.013	-.148	.882
Investing Knowledge				.076	.049	.143	.119	.060	.224	.132*	.059	.248	2.229	.028
Fin. Dec. Making Experience							-.084	.069	-.143	-.114	.068	-.195	-1.671	.097
Current Mood										.158**	.058	.232	2.698	.008
Model	F <sub>4,125</sub> =2.19, p=.074			F <sub>5,124</sub> =2.25, p=.053			F <sub>6,123</sub> =2.13, p=.055			F <sub>7,122</sub> =2.96, p=.007				
R <sup>2</sup>	.065			.083			.094			.145				

Note: \*p < .05; \*\*p < .01



tion of the experience making financial decisions variable. No changes in variable significance were noted; however, explained variance in the overall model increased to approximately 9.40 percent.

In addition to the demographic controls, investing knowledge, and experience variables, the fourth model included the mood variable. The addition of mood to the model increased the overall model's level of explained variance to 14.50 percent. Mood was found to be positively and significantly associated with financial risk tolerance. Additionally, a statistically positive relationship between investing knowledge and risk-tolerance scores was noted in the fourth model. Holding a bachelor's level of education remained negatively related to risk-tolerance scores.<sup>26</sup>

## Discussion

Results from this study mirror findings from other research designed to assess the relationship between mood and financial risk tolerance. In earlier work, Grable and Roszkowski, for example, noted that transient states, such as mood, can have a bearing on an investor's risk tolerance.<sup>27</sup> As shown in Table 2, a study participant's mood was found to be positively associated with his or her financial risk-tolerance score. Specifically, those who reported being in a good mood exhibited higher risk-tolerance scores, holding other factors constant. The addition of mood in the regression model added approximately 5 percent to the amount of explained variance in the model. Investing knowledge was also positively associated with financial risk-tolerance scores, whereas holding a bachelor's degree level of education, compared to those with some or no college level of education, was negatively associated with scores from the risk-tolerance questionnaire.

Although the sample and data used in this study were exploratory, findings do provide support for the risk-as-feelings hypothesis. This hypothesis suggests that the manner in which risk tolerance (or risk aversion) is shaped and measured depends on a combination of affect and analytical calculations. This, in

turn, implies that constraints imbedded in classical decision-making models, based on economic theory, may need to be loosened in order to fully capture an investor's or decision maker's attitude and/or preference. Jackson summarized the situation this way: "Cognitive and affective appraisals may interact; feelings about a risk object may infuse more formal and numeric appraisals," meaning that cognitive and experiential processes can operate side-by-side when an investor or his or her financial advisor evaluates questions used to derive estimates of financial risk tolerance.<sup>28</sup> This does not mean that models of risk-taking based on expected utility are always incorrect. Instead, results from this study simply show that psychological constructs add a dimension of understanding to the way investors make decisions.

## Conclusion

The findings from this study have practice management implications for financial service professionals. First, results from this study provide support for the risk-as-feelings hypothesis and the AIM. The association between mood and financial risk-tolerance was positive. Based on this result, financial service professionals should use caution when interpreting estimates of risk tolerance (aversion) when a traditional CRRA measure is used in isolation. While many clients will engage in rational estimates of risk-and-return trade-offs when answering 50-50 probability choice scenarios, it is also likely that feelings and mood states (i.e., affect) will play a role in shaping how clients answer questions. Given these results, a financial professional ought to be cautious when a client takes an assessment while in a particularly good or bad mood because this may bias the results. Efforts should be taken to administer a risk-tolerance assessment while the client is in a neutral affective state, whenever possible.

Given the numerous variables that are in play during a typical client-advisor meeting, it may be practically impossible to gauge a client's mood prior to an assessment. This does not mean, however, that

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a financial professional should discount the role of a client's mood. It is possible, for example, for a client to complete a risk-tolerance test and, upon hearing the results of the test, state something like: "I did not expect my risk-tolerance score to be as high as what the test indicates." In this scenario, it would be a best practice for the financial advisor to ask about the client's mood and emotional state (at the time the test was administered) as a way to obtain a more accurate picture of the client's true risk tolerance.

Additionally, findings from this study hint at the possibility that a client's financial risk tolerance (aversion) is not a fixed psychological trait. Further research is needed to examine this question, using longitudinal data, but a takeaway from this study is the possibility that answers to risk-tolerance questions likely vary based on the emotional state of a client. As noted by Grable and Roszkowski, clients in good moods may engage in projection bias, which means that when answering risk-tolerance questions, a client may overestimate his or her willingness to take financial risk.<sup>29</sup> Clients in bad moods may underestimate their willingness to take financial risk when answering risk-tolerance questions. This reinforces the importance of moving beyond the numbers side of advice to better understanding how a client's personal experiences and/or knowledge shape perceptions, preference, and expectations. Life events, including the death of a loved one or colleague, divorce, job loss, and interpersonal interactions can impact a client's mood. This implies that it is important for financial service professionals to revisit risk-tolerance test results and questions over time.

Another possibility worth considering in the context of this study's findings is that the basic premise underlying the construction of CRRA tests may be flawed. The assumption that investors are cognitively equipped to make appropriate calculations related to income, wealth, and pension gambles may be inappropriate. It may also be the case that investors, particularly younger investors with less investing knowledge and financial decision-making experience, have a hard time

conceptualizing choice scenario trade-offs. Take, for example, the questions asked in the H&L test. Some participants in this study may not have known what a pension is or how pension benefits are paid. Others may have found the notion of pensions to be somewhat unrelated to day-to-day financial decision-making. The reliability of the questions used in the H&L test, as well as other CRRA measures, may result in the estimation of risk-tolerance scores that lack validity in relation to financial advisory activities. It is also worth noting that results may have been skewed by the sample used in the study. While attempts were made to match the sample to the one used by Hanna and Lindamood, it is possible that the sample did not truly represent the characteristics of those likely to make investment decisions. It could also be that visual representations, rather than narrative descriptions, are the key to accurate assessment. Future studies should consider including visual representations of choice scenarios because it is possible that visualizations influence the way clients answer questions. As with all exploratory studies, findings from this research should be evaluated in the context of these and other potential limitations which may have resulted in sample selection bias. Regardless of these limitations, findings do suggest that clients likely use a combination of emotions and cognitive evaluations when weighing risk-and-return trade-offs and that as described in the AIM, clients who report being in a neutral or negative mood will exhibit a risk tolerance that is lower than those who report being in a good mood.<sup>30</sup> ■

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## Risk Tolerance: Beware When Clients Are in a Bad Mood

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- (24) *Ibid.*
- (25) Given the high correlation between income and education, education was retained in the model, whereas income was omitted.
- (26) Given the ordinal nature of the outcome variable, a robustness check of the fourth model was made using an ordinal regression procedure. As shown below, mood was positively associated with

risk-tolerance scores. Only one change was noted. Specifically, the significance of holding a bachelor's level of education was reduced.

### Ordinal Regression Model Robustness Check

	Parameter Estimate	S.E.	Wald	Sig.
Sex (1=Male; 2=Female)	.415	.359	1.339	.247
Current Age	.024	.028	.723	.395
Bachelor's Degree	2.605	1.427	3.331	.068
Graduate or Professional Degree	-.078	.336	.054	.815
Investing Knowledge	.204	.089	5.295	.021
Fin. Dec. Making Experience	-.159	.101	2.476	.116
Current Mood	.254	.089	8.088	.004
Nagelkerke R <sup>2</sup>	.146			

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