aps ASSOCIATION FOR PSYCHOLOGICAL SCIENCE

Current Directions in Psychological Science
20(4) 211–216

DOI: 10.1177/0963721411415790
http://cdps.sagepub.com
SAGE

Who Takes Risks When and Why? Determinants of Risk Taking

Bernd Figner and Elke U. Weber
The Center for Decision Sciences, Columbia University, and Department of Psychology, University of Amsterdam

Abstract

Life is full of risky decisions, from the mundane to matters of life or death. Individuals differ in the risks they accept (or even deliberately embrace). However, risk taking is not a single trait but is a behavior influenced by characteristics of the situation (what the decision is about and to what extent it engages affect vs. deliberation), the decision maker (age and gender), and interactions between situation and decision maker. Understanding the mechanisms behind risk taking—or *who* takes risks *when* and *why*—is particularly important when the goal is to influence and modify the behavior.

Keywords

risky decision making, domain-specific risk taking, individual differences, deliberative versus affective processes, Columbia Card Task, DOSPERT scale, adolescence, gender differences

We constantly face situations that require us to decide between actions that differ in level of risk. On your morning commute, you can switch lanes to pass slower-moving vehicles at an elevated chance of an accident or stay in the safer right-hand lane. Filing your income tax return, you decide whether or not to claim a questionable deduction that would reduce your taxes but could lead to an audit. Your nephew wants to know whether or not you will go bungee jumping with him. On a night out, you have to decide whether or not to use a condom that would reduce the probability of an STD infection but might interrupt the passionate moment.

These examples make five important points. First, decisions between options that vary in risk occur in different domains, from recreational choices to financial, social, health/safety, and ethical decisions (Weber, Blais, & Betz, 2002). Second, risky decisions involve different psychological processes. For some, "hot" affective processes are prominent (e.g., condom decision), while others involve mainly "cold" deliberative processes (e.g., tax decision; Figner, Mackinlay, Wilkening, & Weber, 2009a). Third, options that carry higher risk typically come with greater returns. Selecting riskier options—because they promise higher returns—is sometimes described as a tradeoff between risk and return. Risk attitude reflects the relative weight a person gives to these two motivators. Fourth, the least attractive outcome in riskier options is typically worse than the one in the safer options. Formally more important, however, is that the riskier options involve greater uncertainty about the resulting outcome: The term *risk taking* refers to choosing the option with the higher outcome variability—that is, with the wider range of possible outcomes. None of these outcomes needs to be negative, although in real-world risky decisions they often are. Fifth and finally, risk taking is neither a unitary phenomenon nor a single personality trait, and it can be motivated by various processes, not just risk attitudes (i.e., an "appetite for risk").

Much is known about how risky decisions are generally made in laboratory studies, in which participants are typically faced with a choice between a sure amount of money and a lottery paying different amounts of money with specified probabilities (Tversky & Kahneman, 1992; Weber & Johnson, 2008). However, risk taking also varies as a function of the characteristics of the decision maker and the decision domain and context—that is, of *who* takes risks *when* (Figner et al., 2009a; Weber et al., 2002). *Who*? refers to individual differences in risk taking, among them age and gender differences. *When*? addresses situational differences, among them the decision domain (Weber et al., 2002) and the extent to which the decision is emotionally charged (Figner et al., 2009a; Loewenstein, Weber, Hsee, & Welch, 2001). Additionally, individual differences may interact with situational characteristics such that different *who*s react differently to different *when*s.

This review integrates a very rich and exciting literature on risk taking by using examples from our own work to illustrate

Corresponding Author:
Bernd Figner, Department of Psychology; Developmental Psychology, University of Amsterdam, Roetersstraat 15, 1018 WB Amsterdam, The Netherlands; or Elke U. Weber, Graduate School of Business, Columbia University, 310 Uris Hall, 3022 Broadway, New York, NY 10027
E-mail: bf2151@columbia.edu or euw2@columbia.edu

the importance of individual differences, contextual influences, and their interaction in determining whether or not an individual will engage in risky behavior. As to *when*s, we discuss the domain specificity of risk taking and the difference it makes as to whether or not the situation triggers affective processes. These lead us into considering the question of two *who*s, namely gender differences for domain specificity and developmental differences for affective processes. We describe empirical data and measures of risk taking, with less discussion of underlying theory (see Weber, 2010; Weber & Johnson, 2008). (The literature on risk taking discusses many other *who*s, from genetic to cultural differences, and *when*s, from framing to psychopathology; however, such a wide range of topics is beyond the scope of this review.)

When: Domain-Specific Risk Taking

Risk taking is often domain specific, meaning that somebody's recreational risk taking may not predict his or her financial or social risk taking. Weber et al.'s (2002) Domain-Specific Risk-Taking (DOSPERT) scale assesses risk taking in six domains: gambling, investing, ethical choices, and behaviors relating to health/safety, social interaction, and recreation (with an updated scale in Blais & Weber, 2006, and child/adolescent versions being created). Importantly, it measures not only risk taking but also expected benefits and perceived risks of the described activities. The DOSPERT scale has been translated into multiple languages and its identification of different degrees of risk taking in these six domains (rather than a single, trait-like, risk-taking factor) replicates in a wide range of populations and real-world settings (see www.dospert.org). Documented risk takers in one domain (e.g., skydivers) tend to score highly on the relevant DOSPERT subscale (e.g., recreational) but may have average risk-averse scores in other domains (e.g., investing; Hanoch, Johnson, & Wilke, 2006). Comparing many risk-taking scales used in applied settings, Harrison, Young, Butow, Salkeld, and Solomon (2005) recommended the DOSPERT for its ability to assess risk taking in different everyday domains and to separate perceptual and attitudinal reasons for taking risks (Weber, 2010). Thus, an important advantage of DOSPERT is that it assesses not just risk-taking propensities but also two important motivators of such behavior, namely perceived risks and benefits. Research with the DOSPERT has demonstrated that, in many cases, individual differences in risk taking are less driven by differences in the appetite for risk itself (the risk attitude) but by individual differences in the *perception* of risks and returns. The next section discusses this for gender differences.

Who: Gender Differences

Gender differences in risk taking are well documented. A meta-analysis of 150 studies (Byrnes, Miller, & Schafer, 1999) found that males take more risks than females do in the vast majority of tasks (but see Weller, Levin, & Bechara, 2010). Field studies of investing behavior report similar results (Jianakoplos & Bernasek, 1998). A more controversial question is why these differences exist. Contrary to popular belief, behavioral decision research suggests that gender differences in risk taking (and cultural differences in risk taking more generally) are often mediated by culturally conditioned differences in the perceptions of risk and benefit (Weber & Johnson, 2008; Weber, 2010), rather than by differences in risk attitude. Observed levels of risk taking can be seen as the result of a tradeoff between the *expected return* of an option and the *perceived risk* of an option: Greater expected return makes an option more attractive and thus typically leads to greater approach, while greater perceived risk of an option typically makes it less attractive and thus leads to greater avoidance (somewhat metaphorically, this tradeoff is sometimes referred to as a tradeoff between "greed" and "fear," especially in the finance literature). Importantly, observed differences in risk-taking levels can be driven by individuals' differences (a) in the perceptions of the expected benefits, (b) in the perceptions of the risks, and (c) in how much risk they are willing to accept in exchange for a specific return. The latter is a person's risk attitude. As a simple example, most people are willing to invest in relatively riskier stocks instead of relatively more predictable bonds only when they think that the higher volatility of stocks (i.e., their greater riskiness) is compensated by greater returns (i.e., their higher expected benefits). In the DOSPERT framework, the coefficients in a regression that measures the effects of perceived risks and benefits on risk taking (typically positive for expected benefits and negative for perceived risks) serves as a measure of a person's risk attitude, indicating how many units of perceived risk he or she is willing to trade off against units of expected benefits. These coefficients vary between individuals (although most people like benefits and dislike risk), but there are typically no systematic gender differences—appetite for risk itself does not differ between genders.

Because risk–return trade-off models originally come from the field of finance, expected benefits and risk are objective measures in these models (usually expected value and variance, respectively). In contrast, psychological models of risk–return tradeoffs make risk and return psychological constructs and, accordingly, the perception of risks and returns can be subjective and vary across decision makers and situational contexts. Multiple studies using the DOSPERT and other tasks have shown group (including gender and cultural) differences in the perceptions of risks (Weber et al., 2002; Weber & Hsee, 1998) and benefits (Hanoch et al., 2006). Importantly, observed gender differences in risk taking across domains—namely women's lower risk taking in financial, recreational, and ethical decisions as well as their greater risk taking in social decisions—can be explained by their risk perceptions. Women, compared to men, perceive risks in financial, recreational, and ethical domains to be higher but perceive risks to be lower than males do in the social domain, which explains apparent gender differences in risk taking. Risk perception, in turn, is

influenced by familiarity, both with risk taking in these domains and with the available choice options (Weber, Siebenmorgen, & Weber, 2005). Once the differences in perceptions are taken into account, the trade-off coefficient—that is, the risk attitude—does not differ between genders, underscoring that it is often worth looking beyond observed risk-taking levels into the motivators for such behaviors (however, risk-taking differences cannot always be explained solely by differences in perceptions; one such example is adolescents—see below).

When: Affective and Deliberative Risk Taking

Risky decisions differ not only by domain but also in the psychological processes they involve. Whether decisions are based on cold, deliberative calculus or hot, affective processes (Metcalfe & Mischel, 1999) is of interest in decision-making research (Weber & Johnson, 2009), particularly in the context of risk taking. Affective processes and emotions can influence decisions via multiple pathways, for example (a) by directing attention to different characteristics of choice options (Weber et al., 2005); (b) by influencing the translation of probabilities and outcomes into subjective values (Tversky & Kahneman, 1992); and (c) by influencing the choice process itself more directly, for example, when resisting temptation or succumbing to it (Figner et al., 2010). Affect can be integral or incidental, with integral affect deriving from the decision or choice options at hand (e.g., excitement when putting all money on red in roulette, or anger after losing), and incidental affect deriving from a source unrelated to the decision (e.g., sadness over a friend's death may influence investment decisions, or the joy over a bonus may lead to speeding on the highway). Risk-taking domains differ in the extent to which they involve hot or cold processes (e.g., gambling and recreational risk taking typically is hotter than investment risk taking), potentially explaining domain differences at least in part. The next section discusses the role of integral affect and its role in risk taking by adolescents.

Who × *When*: Adolescent Risk Taking

Adolescents are known for taking great risks in many domains (e.g., substance use, dangerous driving, unsafe sex). However, surprisingly, in many laboratory tasks they do *not* show greater risk taking than children or adults do (Byrnes et al., 1999; Figner et al., 2009a). We hypothesized that adolescents show increased risk taking only when affective processes are centrally involved, with no substantial age differences for risky decisions made under mostly cold/deliberative conditions. To test this, we created a hot and a cold version of a risky-decision-making task, the Columbia Card Task (CCT; Figner et al., 2009a; Figner & Voelki, 2004), shown and described in Figure 1.

The hot CCT is designed to trigger integral affect, using a dynamic risk-taking task. In dynamic situations, decisions are incremental and risks can increase over time, such that the risk of an initial action (e.g., smoking the first cigarette) may be relatively low but increases over repeated choices. While other dynamics exist (risk may decrease or stay constant over time), the increasing-risk dynamic is specifically interesting, as it likely contributes to the difficulty to stop further risk taking. In many dynamically increasing risky-choice situations, the decision maker will typically first experience mostly positive outcomes (as the probability for a negative outcome is relatively low in the beginning, hence the term *increasing-risk dynamic*). Thus, at least initially, choosing the risky option is likely to be rewarded and therefore reinforced, which in turn can contribute to the difficulty of stopping when the risks increase to a point where—without the earlier positive outcomes—the decision maker otherwise would not be willing to take these risks. In the hot CCT, such a risk-increasing dynamic is set into motion by having participants turn over cards sequentially with immediate outcome feedback provided after each card. Across different rounds of the game, gain amount, loss amount, and number of loss cards differ. Variation on these three crucial components in risk taking is an advantage the CCT has over other dynamic risk tasks, because it allows for the assessment of whether and how the components influence the risky decisions and enables us to distinguish between different motivations for risk taking—for example, gain sensitivity, loss sensitivity, and probability sensitivity (see Schonberg, Fox, & Poldrack, 2010).

The cold CCT is similar to the hot version but reduces involvement of affective processes by employing a single-time decision and by delaying outcome feedback until all game rounds have been played (see Fig. 1). Self-reports and skin conductance, a physiological measure of emotional arousal (Figner & Murphy, 2011), verify that the hot CCT triggers stronger affective processes than does the cold CCT, which triggers more deliberative decision processes (Figner et al., 2009a).

As predicted, adolescents take more risks than children and adults only in the hot CCT. In the cold CCT, adolescents take similar risks as children and adults (Figner et al., 2009a; Figner, Mackinlay, Wilkening, & Weber, 2009b). Risk taking in the hot (but not cold) CCT is accompanied by diminished information use. Participants who take greater risks neglect relevant information—that is, fail to appropriately adjust the number of cards they turn over—particularly in response to changes in the magnitude of the loss. Adolescents' risk-taking in the hot (but not cold) CCT is also related to a measure of cognitive control. Those better able to inhibit prepotent responses in a so-called Go/No-Go task take less risk in the hot CCT (Figner et al., 2009b).

These results are consistent with recent neurodevelopmental data showing that brain networks involved in different psychological functions mature at differential speeds (e.g., Gladwin, Figner, Crone, & Wiers, in press; Somerville, Jones, & Casey, 2010; see also Ernst & Fudge, 2009; Steinberg, 2010; for an alternative model, see Reyna & Farley, 2006; for a general developmental overview of risk taking, see Boyer,

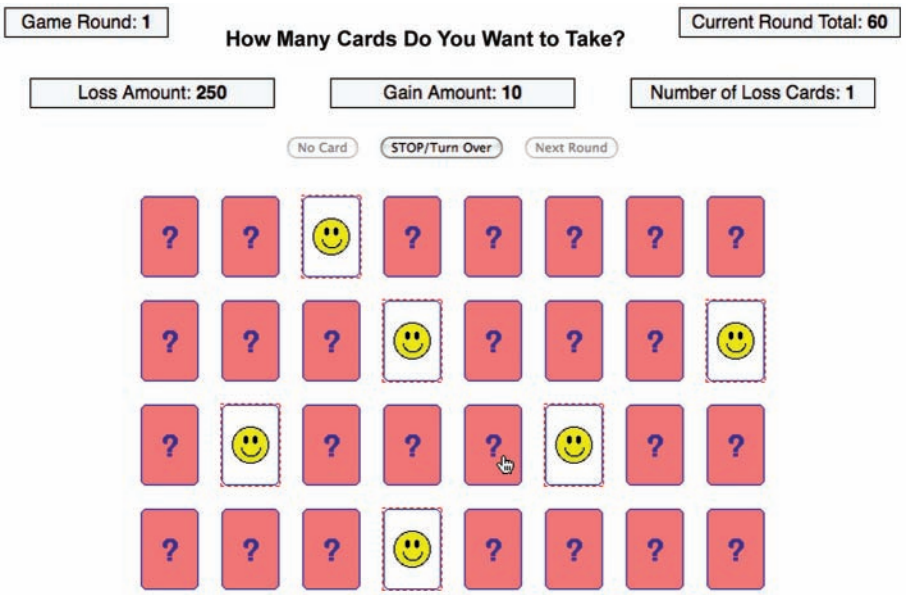

Fig. 1. Screenshot of the hot version of the Columbia Card Task (CCT; for more information, see www.columbiacardtask.org). Each new game round starts with a score of 0 points and all 32 cards shown back (i.e., question mark) side up. Participants turn over one card after the other and receive feedback after each card (whether the turned card was a gain card—one with a smiley face—or a loss card). A game round continues (and points accumulate) until the player decides to stop or until he or she turns over a loss card, which leads to a large loss of points and automatically ends the current game round. The main variable of interest is how many cards participants turn over before they decide to stop. The number of cards chosen indicates risk taking because each decision to turn over an additional card increases the outcome variability, as the probability of a negative outcome (turning over a loss card) increases and the probability of a positive outcome (turning over a gain card) decreases. Across different rounds of the game, three variables systematically vary, the magnitude of gain (Gain Amount; here 10 points per good card), the magnitude of loss (Loss Amount; here 250 points), and the probability to incur a gain or a loss (Number of Loss Cards; here 1 loss card).

2006): Networks related to reward sensitivity (e.g., how strongly one is tempted by the possible reward in a risky situation) mature early in adolescence, whereas networks related to cognitive control (e.g., the ability to resist such temptations and, instead of taking a dangerous risk, wait a second and think about it twice) mature more slowly in late adolescence and early adulthood. The hypothesized result of these different maturation speeds is an increased tendency to take greater risks during adolescence, but only in situations in which the affective system is involved. Without affective triggers, no strong temptations or prepotent impulses are created, so there is no need for cognitive control (Figner et al., 2010; for another example of an inverted *U*-shape age pattern in risk taking, see Burnett, Bault, Coricelli, & Blakemore, 2010; for hot/cold differences in adolescents' risky choice, similar to what we found with the CCT, see van Duijvenvoorde, Jansen, Visser, & Huizenga, 2010; and for peer presence increasing risk taking in adolescents but not adults, see Gardner & Steinberg, 2005).

Finally, affect is not a unitary phenomenon, and a fascinating question is which aspects of affect—for example, its intensity (degree of arousal) or its valence (positivity or negativity)—lead to differences in risk taking and by what processes. It has recently been proposed that affect in decision making can serve as information ("How do I feel about this choice option?"), common currency (allowing us to compare the value of very different options or attributes—for example, a weak electric shock and doing a boring task for 10 minutes), motivator (for example, choosing options that more likely keep our mood positive), and spotlight (for example, whether we focus on positive or negative aspects of the options; Peters, Vastfjall, Garling, & Slovic, 2006). Future research to investigate the differential contributions of these roles to adolescent (and others') risk taking is needed.

Conclusion

Risk taking is not the expression of a single personality trait. Thus, people's risk attitude cannot be inferred directly from their degree of risk taking in a single situation. Instead, risk taking is influenced by characteristics of the person (*Who*?—e.g., age and gender) and the situation (*When*?—e.g., the decision-domain, whether affect is involved), and often the *who* and the *when* interact (e.g., via the individual's familiarity with a risk domain). Accordingly, it should be no surprise that different measures of risk taking (e.g., general risk-attitude surveys and other self-reports, choices in lottery tasks, real-world decisions) do not always strongly correlate, as the context and the processes in making these decisions matter. However, simply

describing observed levels of risk taking by different individuals in different situations is unsatisfactory. Instead, we think it is important to understand the *Why*? of risk taking, especially when the goal is to help people make better decisions under conditions of risk—for example, with interventions like decision-aiding Web sites or by laws or regulations that may change attention, familiarity, and incentives. As we have seen, differences in observed risk-taking levels can be caused by very different processes—for example, the subjective perceptions of risks and benefits that can differ between genders or, in the case of adolescents, the interplay of strong affective impulses with immature abilities to resist and control temptations. Risk taking is the result of both deliberative and affective evaluations of available choice options, and conflicting motivations (e.g., greed/approach and fear/avoidance) need to be balanced. Risk-taking assessment instruments like the DOSPERT and the hot and cold CCT allow us to evaluate how these different processes contribute to observed risk-taking levels. Better understanding of the causal mechanisms that underlie risk taking in specific situations and specific populations provides us with entry points for the design of interventions that can successfully modify risk taking in situations where decision makers and society desire such behavior change.

Recommended Reading

Figner, B., Mackinlay, R.J., Wilkening, F., & Weber, E.U. (2009a). (See References). The empirical article introducing the CCT.

Somerville, L.H., Jones, R.M., & Casey, B.J. (2010). (See References). A theoretical article discussing the widely adopted neurodevelopmental multiple-process view explaining adolescent risk taking, distinguishing processes of affect and cognitive control.

Weber, E.U., Blais, A.R., & Betz, N.E. (2002). (See References). The empirical article introducing the DOSPERT scale.

Weber, E.U. & Johnson, E.J. (2008). (See References). A book chapter giving an introduction and overview of important formal models of risky decision making, including the historical context of these models.

Winkielman, P., Knutson, B., Paulus, M., & Trujillo, J.L. (2007). Affective influence on judgments and decisions: Moving towards core mechanisms. *Review of General Psychology*, *11*, 179–192. A review article providing an overview and neurobiological perspective on the role of affect in judgment and decision making.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

Writing of this article was supported by a U.S. National Science Foundation grant (SES–0922743) to Figner and Weber.

References

Blais, A.R., & Weber, E.U. (2006). A domain-specific ris-taking (DOSPERT) scale for adult populations. *Judgment and Decision Making*, *1*, 33–47.

Boyer, T.W. (2006). The development of risk-taking: a multi-perspective review. *Developmental Review*, *26*, 291–345.

Burnett, S., Bault, N., Coricelli, G., & Blakemore, S.J. (2010). Adolescents' heightened risk-seeking in a probabilistic gambling task. *Cognitive Development*, *25*, 183–196.

Byrnes, J.P., Miller, D.C., & Schafer, W.D. (1999). Gender differences in risk taking: A meta-analysis. *Psychological Bulletin*, *125*, 367–383.

Ernst, M., & Fudge, J.L. (2009). A developmental neurobiological model of motivated behavior: Anatomy, connectivity, and ontogeny of the triadic nodes. *Neuroscience and Biobehavioral Reviews*, *33*, 367–382.

Figner, B., Knoch, D., Johnson, E.J., Krosch, A.R., Lisanby, S.H., Fehr, E., et al. (2010). Lateral prefrontal cortex and self-control in intertemporal choice. *Nature Neuroscience*, *13*, 538–539.

Figner, B., Mackinlay, R.J., Wilkening, F., & Weber, E.U. (2009a). Affective and deliberative processes in risky choice: Age differences in risk taking in the Columbia Card Task. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *35*, 709–730.

Figner, B., Mackinlay, R.J., Wilkening, F., & Weber, E.U. (2009b, April). *Risky choice in children, adolescents, and adults: Affective versus deliberative processes and the role of executive functions*. Paper presented at the Society for Research in Child Development, Denver, CO.

Figner, B., & Murphy, R.O. (2011). Using skin conductance in judgment and decision making research. In M. Schulte-Mecklenbeck, A. Kuehberger, & R. Ranyard (Eds.), *A handbook of process tracing methods for decision research* (pp. 163–184). New York, NY: Psychology Press.

Figner, B., & Voelki, N. (2004). Risky decision making in a computer card game: An information integration experiment. *Polish Psychological Bulletin*, *35*, 135–139.

Gardner, M., & Steinberg, L. (2005). Peer influence on risk taking, risk preference, and risky decision making in adolescence and adulthood: An experimental study. *Developmental Psychology*, *41*, 625–635.

Gladwin, T.E., Figner, B., Crone, E.A., & Wiers, R.W. (in press). Addiction, adolescence, and the integration of control and motivation. *Developmental Cognitive Neuroscienc*e.

Hanoch, Y., Johnson, J.G., & Wilke, A. (2006). Domain specificity in experimental measures and participant recruitment. *Psychological Science*, *17*, 300–304.

Harrison, J.D., Young, J.M., Butow, P., Salkeld, G., & Solomon, M.J. (2005). Is it worth the risk? A systematic review of instruments that measure risk propensity for use in the health setting. *Social Science & Medicine*, *60*, 1385–1396.

Jianakoplos, N.A., & Bernasek, A. (1998). Are women more risk averse? *Economic Inquiry*, *36*, 620–630.

Loewenstein, G., Weber, E.U., Hsee, C.K., & Welch, N. (2001). Risk as feelings. *Psychological Bulletin*, *127*, 267–286.

Metcalfe, J., & Mischel, W. (1999). A hot/cool-system analysis of delay of gratification: Dynamics of willpower. *Psychological Review*, *106*, 3–19.

Peters, E., Vastfjall, D., Garling, T., & Slovic, P. (2006). Affect and decision making: A "hot" topic. *Journal of Behavioral Decision Making*, *19*, 79–85.

Reyna, V.F., & Farley, F. (2006). Risk and rationality in adolescent decision making: Implications for theory, practice, and public policy. *Psychological Science in the Public Interest*, *7*, 1–44.

Schonberg, T., Fox, C. R., & Poldrack, R. A. (2010). Mind the gap: bridging economic and naturalistic risk-taking with cognitive neuroscience. *Trends in Cognitive Sciences*, *15*, 11–19.

Somerville, L.H., Jones, R.M., & Casey, B.J. (2010). A time of change: Behavioral and neural correlates of adolescent sensitivity to appetitive and aversive environmental cues. *Brain and Cognition*, *72*, 124–133.

Steinberg, L. (2010). A dual systems model of adolescent risk taking. *Developmental Psychobiology*, *52*, 216–224.

Tversky, A., & Kahneman, D. (1992). Advances in prospect theory: Cumulative representation of uncertainty. *Journal of Risk and Uncertainty*, *5*, 297–323.

van Duijvenvoorde, A.C., Jansen, B.R., Visser, I., & Huizenga, H.M. (2010). Affective and cognitive decision-making in adolescents. *Developmental Neuropsychology*, *35*, 539–554.

Weber, E.U. (2010). Risk attitude and preference. *Wiley Interdisciplinary Reviews: Cognitive Science*, *1*, 79–88.

Weber, E.U., Blais, A.R., & Betz, N.E. (2002). A domain-specific risk-attitude scale: Measuring risk perceptions and risk behaviors. *Journal of Behavioral Decision Making*, *15*, 263–290.

Weber, E.U., & Hsee, C.K. (1998). Cross-cultural differences in risk perception but cross-cultural similarities in attitudes towards perceived risk. *Management Science*, *44*, 1205–1217.

Weber, E.U., & Johnson, E.J. (2008). Decisions under uncertainty: Psychological, economic, and neuroeconomic explanations of risk preference. In P. W. Glimcher, C. F. Camerer, E. Fehr & R.A. Poldrack (Eds.), *Neuroeconomics: Decision making and the brain* (pp. 127–144). London: Elsevier Academic Press.

Weber, E.U., & Johnson, E.J. (2009). Mindful judgment and decision-making. *Annual Review of Psychology*, *60*, 53–85.

Weber, E.U., Siebenmorgen, N., & Weber, M. (2005). Communicating asset risk: How name recognition and the format of historic volatility information affect risk perception and investment decisions. *Risk Analysis*, *25*, 597–609.

Weller, J. A., Levin, I. P., & Bechara, A. (2010). Do individual differences in Iowa Gambling Task performance predict adaptive decision making for risky gains and losses? *Journal of Clinical and Experimental Neuropsychology*, *32*, 141–150.