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Risk Taking in Late Adolescence: Relations between Socio-Moral Reasoning,

Risk Stance and Behavior

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Abstract

This study explored relations among older adolescents' socio-moral reasoning about risk taking, risk stance and behavior. One-hundred-thirty-two participants aged 18- to 20-years-old were surveyed about their own risk stance (*Avoidant*, *Opportunistic*, *Curious*, *Risk Seeking*) and behavior in three realms (*Alcohol Use, Drug Use, Reckless Driving*), and socio-moral reasoning about hypothetical risk taking in an initial baseline scenario with no social domain information and a final scenario that highlighted the moral (i.e., harmful consequences for others), conventional (i.e., socio-legal consequences), personal (i.e., personal choice and prerogative), and prudential (i.e., harmful consequences for the self) domains bearing on risk taking. The final scenario elicited more negative evaluations and justifications referring to more social domains than the baseline. Furthermore, risk stance and behavior were correlated but varied by realm, and were differentially correlated with socio-moral reasoning. Findings highlight the importance of understanding adolescents' own risk stance and socio-moral reasoning about risk taking.

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Adolescents are particularly vulnerable for engaging in behaviors associated with an

increased probability of undesirable or unhealthy results (Boyer, 2006; Steinberg, 2007). A

majority of teenagers in national samples of high school students reported seeing other teens

drive distracted (94%), fatigued (75%), or too fast (50%) (Koplin Winston et al., 2007), and have

themselves tried alcohol (75%) or an illicit drug (50%) by the end of high school (Johnston,

O'Malley, & Bachman, 2003). In addition, Duberstein-Lindberg, Boggess, Porter, and Williams

(2000) reported that one-third of older teens engage in multiple risk behaviors. Intervention

programs designed to reduce the incidence of risk taking have proven largely unsuccessful in

various risk realms (Ennett, Tobler, Ringwalt, & Fleming, 1994; Kirby, 2002; Lynam et al.,

1999; Koplin Winston et al., 2007), leading some to conclude that risk taking may be the

inevitable consequence of adolescent immaturity (Steinberg, 2004; 2007) (for an alternative

account of the causes of risk taking, see Reyna & Farley, 2006).

Beyond the practical concern, the ubiquitous and persistent nature of adolescent risk

taking has posed a theoretical quandary. It has been difficult to theoretically square the view of

adolescents as engaging in risky behavior with the view that they are also acquiring sophisticated

logical (Moshman, 2004), socio-moral (Smetana & Turiel, 2003), and metacognitive (Kuhn,

2002) reasoning abilities. To address this quandary, researchers (e.g., Amsel, Close, Sadler, &

Klaczynski, 2009; Figner, Mackinlay, Wilkening, & Weber, 2009; Gerrard, Gibbons, Haulihan,

Stock, & Pomery, 2008; Mills, Reyna, Estrada, 2008; Reyna & Farley, 2006; Rivers, Reyna, &

Mills, 2008; Steinberg, 2008; Steinberg, Albert, Cauffman, Banich, Graham & Woolard, 2008)

have recently appealed to dual-process models, which propose that competing automatic and

effortful systems underlie judgment and behavior. Automatic processes give rise to spontaneous, emotional, and global impressions of risk situations that push some toward and others away from risk taking. Automatic processes are difficult to inhibit, particularly among younger adolescents with less mature neurocognitive control systems (Steinberg et al., 2008) and metacognitive processes (Amsel, Klaczynski, Johnston, Bench, Close, Sadler, & Walker, 2008). By contrast, effortful processes, which may occur in parallel to automatic processes, give rise to more controlled and systematic analyses of the details of a risk situation. Effortful processing is rule governed and may result in the kinds of systematic responses typically prescribed as normative for reasoning and decision-making. Although adolescents are able to engage in effortful processing and to make rationally coherent and consistent health-related decisions, this does not guarantee decisions to avoid risk taking because some adolescents may make appraisals of the situation that justify taking risks (Fischoff, 2008).

While our presentation of dual process theory is an amalgamation of theoretically distinct models, a dual process approach suggests two reasons why adolescents take risks: 1) they have difficulty inhibiting automatically activated tendencies to take risks, and 2) they rely on effortful processes which provide a justification for risk taking given their appraisals. Either of these processes may explain adolescents' tendency to engage in risk behaviors in a particular context, despite the acquisition of sophisticated logical, socio-moral, and metacognitive abilities.

Although dual process accounts of adolescent risk taking have theoretical value, a number of questions remain. Dual process models have examined in only limited ways adolescents' own understanding of the meaning of risk taking for themselves, others, and the broader society, in spite of calls for the importance of such analyses (Lightfoot, 1997; Sunstein, 2008). In the present study, we explored how older adolescents' socio-moral reasoning about risk

taking was related to their spontaneous reactions to and effortful analyses of risk taking contexts and to their risk stance and behavior. This exploration was based on a social domain perspective, which asserts that adolescents actively construct and are regulated by their understanding of the moral, conventional, personal and prudential aspects of risk taking (Flanagan, Stout, & Gallay, 2008; Killen, Leviton, & Cahill, 1991; Nucci, Guerra, & Lee, 1991). The moral domain bears on prescriptive and universal concerns with fairness, justice, rights, and the prevention of harm to others. The moral aspects of risk taking pertain to its harmful or unjust consequences for others. The conventional domain is comprised of behavioral uniformities determined by the social system in which individuals live that regulate their social interactions and legitimately varies across people and contexts. The conventional aspects of risk taking thus pertain to the norms and rules of individuals' social groups (e.g., peers, friends) and the broader social context (e.g., legal system) that regulate and may promote or prohibit such risk behavior. The personal domain is psychologically necessary for maintaining a sense of agency and autonomy and bears on matters of personal preference and prerogative entailing aspects of one's private life. Personal concerns are salient in risk taking because risk behavior may be considered a matter of personal freedom and choice outside of justifiable social regulation. Finally, the prudential domain entails aspects of the moral and personal domains inasmuch as it bears on concerns with the prevention of harm to the self and upholding one's own safety and health. Thus, prudential aspects of risk taking pertain to concerns with one's own welfare and health.

Previous research has examined adolescents' judgments of the social domains that bear on risk taking. High-school-aged teens' forced choice judgments about various risky drug behaviors revealed that they negatively evaluated the use of illegal and dangerous drugs, such as crack, for moral reasons, but more positively evaluated the use of less dangerous drugs, such as

caffeine, for reasons bearing on personal choice (Killen et al., 1991). Nucci et al. (1991) had high-school-aged teens rate the frequency they engaged in various risky drug behaviors, and provide forced-choice evaluations of and justifications for those behaviors. Teenagers who frequently used drugs tended to view a wide variety of drug types to be matters of personal choice, judged fewer drug types to be prudentially unacceptable, and differed in their judgments of wrongfulness and harm from teens who indicated a low frequency of drug use. Finally, Flanagan et al. (2008) showed that by late adolescence, teens understand drug, alcohol and tobacco use in terms of an individual's personal right and the state's responsibility to legally regulate such behavior to protect public welfare. Taken together, these findings suggest that teens' evaluations of risky drug use and the frequency that they engage in risky drug use are systematically related to their understandings of whether the behavior entails harm to others, harm to the self, violates social rules or norms, or pertains to personal choice.

The present study extended research on adolescent risk taking from a social domain perspective in four ways. First, we used a different methodology to assess adolescents' socio-moral reasoning about risk taking. Participants in previous research have had to make forced choice judgments about the extent to which risky alcohol and drug behaviors pertained to one domain or another (Flanagan et al., 2008; Killen et al., 1991; Nucci et al., 1991). This procedure precludes teens from reasoning about risk taking in terms of multiple social domains. For example, adolescents who seek out and frequently engage in risky drug use may readily grasp the personal but perhaps not the conventional, moral, or prudential aspects of risky drug use. In this study, we used an open-ended format that allowed adolescents to reason about risk taking in terms of multiple social domains in a baseline scenario that entailed no explicit references to social domains, and in a final scenario that highlighted all four social domains. Although either

scenario may elicit automatic or effortful processes, we assumed effortful processes would be elicited in the final scenario as teens reflect on, distinguish between, and coordinate among the multiple social domains. Thus, we expected older adolescents in the final, as compared to the baseline, scenario to more negatively evaluate risk taking and to refer to more social domains (especially conventional, moral, and prudential which justify not taking risks) in their justifications.

The second extension of research on adolescent risk taking from a social domain perspective was that we examined socio-moral reasoning about risky drug use, as well as alcohol use and reckless driving. We were particularly interested in whether there would be variability in socio-moral reasoning across risk realms. Killen et al.'s (1991) finding of more negative evaluations for more dangerous drugs suggests there may be variation in evaluations and justifications across risk realms based on the perceived consequences of the behavior.

Third, we differed methodologically from Nucci et al. (1991) by employing a measure of how adolescents represent their own risk taking to themselves and others in addition to adolescents' frequency ratings (e.g., "never" to "often"). Although frequency measures are commonly used in risk taking research, they are not sensitive to differences in adolescents' *reasons* for taking risks. To address this concern, we developed a measure of stances on risk taking that distinguishes two stances for taking and two stances against taking risks (Leadbeater, Foran & White, 2008; Shaw, Amsel, Schillo, Bosgieter, Garner, & Thorne, 2007). Adolescents with a *Risk Seeking* stance actively plan to engage in certain risk behaviors, consistent with characterizations of teens with high risk taking expectations. Alternatively, adolescents with a *Curious* stance take risks because they were presented with the opportunity and interested in having the experience. Such curiosity may be related to a positive social image of and

willingness to engage in risk behavior but without explicit planning to engage in the behavior (Gerrard et al., 2008; Gibbons, Gerrard, Blanton, & Russell, 1998). A similar distinction is made among adolescents who do not take risks, which in some national surveys are a sizable proportion of the sample (Duberstein-Lindberg et al., 2000). Adolescents with an *Avoidant* stance do not take risks because they fear endangering their health or violating personal values. They differ from adolescents with an *Opportunistic* stance who do not take risks simply because they lack the opportunities or resources to do so.

The fourth and final extension of research on adolescent risk taking from a social domain perspective was that we sampled young college students (18-20-year-olds) rather than high school students (15-18-year-olds) as did Nucci et al. (1991) and Killen et al. (1991). Our interest in older adolescents is threefold. First, because they are older and more mobile, older adolescents are more likely to find themselves in or actively seek out potentially risky contexts. This underscores the need for exploring relations among their risk behavior, risk stance, and socio-moral reasoning about risk taking. Second, research (Casey et al., 2008; Steinberg, 2008) has suggested that the prefrontal cortex and its connections to the limbic systems are further developed by late adolescence, which may better enable older teens to regulate their thinking and make decisions not dominated by the reward system. Variation in stances for or against taking risks therefore would be assumed to reflect differences in older teens' personal values and decisions about their behavior rather than any neurological limitation. Finally, older teens may be better able than younger teens to coordinate among the multiple socio-moral aspects of risk taking (e.g., Nucci, 2001), which our open-ended methodology allowed them to demonstrate.

In sum, the goal of this study was to examine older adolescents' socio-moral reasoning about risk taking and its relation to their risk behavior and stance across risk realms. The study

examined three central questions. The first question addressed the relationship between risk frequency and risk stance within and across risk realms. Consistent with our previous research (Shaw et al., 2007), we expected risk frequency and stance to vary across risk realms. We further expected the overall frequency of risk behavior to be negatively correlated with older adolescents' tendency to report holding Avoidant or Opportunistic stances. We anticipated stronger correlations for the Avoidant than the Opportunistic stance due to the greater willingness of those who identify as Opportunistic to engage in select risks. Similarly, we expected the overall frequency of risk behavior to be positively correlated with older adolescents' tendency to report holding Risk Seeking or Curious stances. Again, we anticipated stronger correlations for the Risk Seeking than the Curious stance due to a greater tendency to pursue a range of risk behavior among those who identify as Risk Seeking.

The second question concerned the nature of older adolescents' socio-moral reasoning about hypothetical risk taking in the baseline and final scenarios. We expected older adolescents in the final, as compared to the baseline, scenario to make more negative evaluations of risk taking and to refer to more social domains (especially conventional, moral, and prudential which justify not taking risks) in their justifications.

The third and final question focused on the relations between socio-moral reasoning about hypothetical risk taking and older adolescents' actual risk stance and frequency of risk behavior. We expected older adolescents who reasoned about hypothetical risk taking in terms of multiple social domains to judge it more negatively, to take fewer risks, and to characterize their risk stance more often as Avoidant and less often as Risk Seeking. Specifically, we expected those who identify more often as Risk Seeking across risk realms to take more risks overall and to evaluate risk taking more positively based on appeals to personal choice. This finding would

replicate and extend Nucci et al.'s (1991) findings by showing that adolescents who seek risks across realms do so despite being exposed to and considering social domains other than the personal. By contrast, we expected older adolescents who identify more often as Avoidant across risk realms to take fewer risks overall and to judge that risk taking has negative consequences bearing on multiple domains.

Method

Participants

Participants were 132 undergraduates (66 males and 66 females) attending a public open-enrollment university in the Western United States. Participants were recruited through their classes or the participant pool and received course credit or the chance to be entered into a lottery to win $100. The majority of participants (89%) were college freshmen and were on average 18.38-years-old ($SD = 0.60$, range 18 to 20 years). The undergraduate population is primarily Caucasian (78.1%), with few ethnic or racial minority group members like the community it serves. Consent was obtained for all participants.

Design and Assessments

Participants completed a questionnaire online to facilitate the subjective experience of anonymity. The questionnaire first solicited demographic information (e.g., age, sex). Participants were then asked about hypothetical risk taking in three risk realms that were presented in a fixed order (i.e., alcohol use, drug use, reckless driving). In each realm, participants were presented with a hypothetical actor (e.g., Peter) who was thinking about taking a risk in each of 6 scenarios presented in a fixed order (see Appendix). In the *baseline scenario,* the event was merely set up and no explicit social domain information was given; in the *personal scenario*, the actor's personal choice and prerogative were highlighted; in the *conventional*

scenario, the actor's consideration of the social and legal consequences of the risk behavior was highlighted; in the *moral scenario,* the actor's consideration for the potentially harmful consequences of the risk behavior for others was highlighted; in the *prudential scenario,* the actor's consideration for the potentially harmful consequences of the risk behavior for himself was highlighted; and in the *final scenario,* all four previously presented social domains were highlighted. Two aspects of participants' socio-moral reasoning about the behavior in each scenario were assessed. Participants selected one of five options to reflect their evaluation of the behavior (e.g., "Based only on this information, if Peter drinks until he is drunk, do you think that is okay or not okay?") and they provided open-ended, written justifications for the actor's behavior in each scenario (e.g., "Why? Explain why you think that it is okay or not okay for Peter to drink until he gets drunk under these conditions."); only the baseline and final scenario data were coded and analyzed for this study.

Participants' representation of their own risk taking to themselves and others was assessed with the *Risk Stance Scale.* Participants were asked to read the following four stances on risk taking and to select the one that best characterized them when it came to risk behaviors in that risk realm over the past year:

Avoidant: "I did not and I never would have engaged in any of these risk behaviors because I felt that these behaviors were very dangerous for my health, welfare and violated my sense of values."

Opportunistic: "I did not engage in any of these risky behaviors, but I might have if the timing or circumstances had been different. I didn't really think about the consequences of these behaviors, and I wasn't too worried about them anyway."

Curious: "I tried these risky behaviors a few times because I was curious and the opportunity presented itself. I did not brag about it to my friends and I wasn't trying to look cool or anything, I just wanted to know what it felt like."

Risk Seeking: "I was a person who participated in these behaviors and I hung out with others who also did so as well. I wanted to engage in these behaviors and I never hid having done them from those who I wanted to know."

Leadbeater et al. (2008) predicted risk taking among teens with the Risk Stance Scale.

Risk behavior was assessed with the *Risk Frequency Scale.* Participants selected one of five frequency options to reflect how often they had engaged in three risky behaviors in each realm (e.g., "In the past year, how many times did you drink alcohol alone; did you engage in binge drinking; did you try to buy alcohol and/or get someone to buy alcohol for you?").

Scoring and Reliability

Two aspects of participants' socio-moral reasoning about the behavior in the baseline and final scenario were scored. Evaluations of the behavior were scored on a 5-point Likert scale (1 = really not okay to 5 = really okay). Justifications were scored in two ways. First, justifications were scored using categories adapted from previous scoring systems (e.g., Davidson, Turiel, & Black, 1983), including personal (e.g., "He is curious and it's his body and his choice if he wants to experience something new"), conventional (e.g., "That's illegal so he shouldn't risk getting caught and going to jail for a very long time and having a criminal record"), moral (e.g., "It's not fair for one person's actions to endanger another person, he has no right to risk other's lives"), and prudential (e.g., "His own health is at risk and his judgment is impaired by doing that"). Multiple justifications were allowed and were scored in terms of the proportional use of each category. Second, justifications were scored according to the number of social domains reported

to yield a complexity score from 0, given to unelaborated justifications (e.g., "It's just bad," "What a stupid idea"), to 4, given to justifications that acknowledged all four social domains (e.g.,"Peter could harm someone else or himself by drinking like this. While it is his choice to drink, it's also against the law for minors to drink alcohol").

Responses to the *Risk Stance Scale* were scored as 1=Avoidant, 2=Opportunistic, 3=Curious, 4=Risk Seeking. Because we characterized this as a nominal scale, responses were summed over realms to convey the overall tendency to endorse a particular risk stance. Responses to the nine items (i.e., three risky behaviors in each of three risk realms) on the *Risk Frequency Scale* were scored on a 5-point Likert scale (1 = "Never" to 5="Frequently"). Because we characterized this as an interval scale, responses were averaged within and across realms in order to ascertain their prevailing frequency of risk behavior.

Scoring reliability was assessed through recoding of 20% of the questionnaires. Inter-judge agreement was 92.5% for the baseline justifications (Cohen's κ = .890), 78.2% for the final justifications (Cohen's κ = .73), 97.4% for baseline complexity (Cohen's κ = .95), and 89.7% for final complexity (Cohen's κ = .86).

Results

The results are presented in three sections, each addressing a central research question: (a) What is the relationship between risk frequency and stance within and across risk realms?, (b) what is the nature of participants' socio-moral reasoning about hypothetical risk taking and does it vary from the baseline to the final scenario?, and (c) what is the relationship between socio-moral reasoning about hypothetical risk taking and participants' actual risk stance and frequency?

Relations between Risk Frequency and Stance within and across Risk Realms

The first research question explored the relationship between participants' risk frequency and stance. Almost all participants (91%) had engaged in at least one of the nine risk behaviors across realms. Frequency ratings of the three risk behaviors were averaged in each risk realm and analyzed by means of a 3 (Risk Realm) by 2 (Sex) repeated measures ANOVA, with Risk Realm as a repeated measure. *Post hoc* comparisons using Bonferroni *t*-tests were performed to test significant within-subjects effects. Across realms, participants engaged in some risk taking, although they did so infrequently ($M = 1.45$, $SD = .35$). A main effect of Risk Realm, $F(2, 260) = 93.72$, $p < .001$, $\eta_p^2 = .42$, indicated that rates of reckless driving ($M = 1.97$) were higher than alcohol use ($M = 1.32$), which was higher than drug use ($M = 1.13$). A main effect for Sex, $F(1, 130) = 13.62$, $p < .001$, $\eta_p^2 = .10$, revealed that males ($M = 1.60$) engaged in risk behavior more than females ($M = 1.35$).

The frequency of using alcohol was significantly and positively correlated with the frequency of using drugs ($r = .46$, $N = 132$, $p < .001$), and driving recklessly ($r = .21$, $N = 132$, $p < .05$). The frequency of using drugs was positively but not significantly correlated with driving recklessly ($r = .14$, $N = 132$, $p = .11$). The Cronbach's *alpha* for the nine risk behaviors across realms was .79 (standardized), indicating good internal consistency and suggesting the measure assesses a single risk taking dimension. In contrast to the consistency of the risk frequency measure, the distribution of risk stances across risk realms revealed little consistency (see Table 1). Only a minority (23%) of participants reported the same stance across realms, a majority (87%) of whom endorsed Avoidant. By comparison, 15% of participants showed no consistency in stance across realms, and 55% of participants had a stance not to take risks in one realm and a stance to take risks in another. A Cronbach's *alpha* of .58 (standardized) reveals a relative lack

of internal consistency in risk stances across realms, which suggest that the measure does not assess a single risk taking dimension.

A hypothesized pattern of results emerged when each risk stance was summed over the risk realms and correlated (removing sex) with risk frequency. The frequency of Avoidant ($r = -.65$, $N = 126$, $p < .001$) and Opportunistic ($r = -.18$, $N = 126$, $p < .05$) stances predicted lower risk frequency, but the latter correlation coefficient was much weaker than the former. Similarly, the frequency of Risk Seeking ($r = .62$, $N = 126$, $p < .001$) and Curious ($r = .41$, $N = 126$, $p < .001$) stances predicted higher risk frequency, but the latter correlation coefficient was weaker than the former.

In sum, participants took some risks and the frequency of doing so in one realm was related to the frequency of doing so in another. In contrast to their risk frequency, participants' risk stances were more variable across realms. Risk frequency and stance were related in predicted ways. Findings highlight the value of distinguishing the risk stance of those who take risks and those who do not take risks across various risk realms.

Socio-moral Reasoning about Risk Taking in the Baseline and Final Scenarios

Mean baseline and final evaluations by risk realm and sex are presented in Table 2. Evaluations were analyzed by means of 3 (Risk Realm) x 2 (Scenario) by 2 (Sex) repeated measures ANOVA, with Risk Realm and Scenario as repeated measures. *Post hoc* comparisons using Bonferroni *t*-tests were performed to test significant within-subjects effects. Overall, participants evaluated hypothetical risk taking negatively, although as expected, evaluations varied by Risk Realm, $F(2, 260) = 6.64$, $p < .01$, $\eta_p^2 = .05$, and Scenario, $F(1, 130) = 91.06$, $p < .001$, $\eta_p^2 = .41$. Overall, participants judged reckless driving ($M = 1.66$) more positively than drug use ($M = 1.36$); judgments about alcohol use ($M = 1.49$) were no different from judgments

about reckless driving or drug use. In addition and as expected, baseline evaluations ($M = 1.83$) were more positive than final evaluations ($M = 1.17$). A main effect for Sex, $F(1, 130) = 23.40$, $p < .001$, $\eta_p^2 = .15$, revealed that males ($M = 1.73$) judged hypothetical risk taking more positively than females ($M = 1.27$). These main effects were qualified by interactions for Scenario by Sex, $F(1, 130) = 12.77$, $p < .001$, $\eta_p^2 = .09$, and Scenario by Risk Realm $F(2, 260) = 5.93$, $p < .01$, $\eta_p^2 = .04$. Males showed a greater discrepancy between baseline ($M = 2.18$) and final ($M = 1.28$) judgments than females (baseline $M = 1.47$; final $M = 1.07$). Finally, although participants in the baseline more positively evaluated reckless driving than alcohol or drug use, their final evaluations were equally negative across risk realms.

The distribution of justifications for hypothetical risk taking by Scenario and Risk Realm is shown in Table 3. Overall, 84% of justifications made reference to at least one social domain, 10% made reference to general negative consequences, and 6% were unelaborated. Justifications, scored as proportions and arcsine transformed, were analyzed initially with a 3 (Risk Realm) by 2 (Scenario) by 2 (Sex) MANOVA. This analysis (Wilks' lambda) yielded significant main effects for Risk Realm ($p < .001$), Scenario ($p < .001$), and Sex ($p < .001$), and significant interactions for Risk Realm by Scenario ($p < .005$) and Risk Realm by Scenario by Sex ($p < .05$). Follow-up repeated measures ANOVAs by Risk Realm (3), Scenario (2), and Sex (2), with Risk Realm as a repeated measure, were conducted on the proportional use of each justification category. Findings from these analyses are presented for each justification category in turn.

Personal: Main effects for Scenario, $F(1, 130) = 37.92$, $p < .001$, $\eta_p^2 = .23$, and Sex, $F(1, 130) = 18.78$, $p < .001$, $\eta_p^2 = .13$, were found for the proportional use of the personal category. Participants referred to personal more in the baseline, than the final, scenario, and males referred to personal more than females. These main effects were qualified by a Scenario by Sex

interaction, $F(1, 130) = 7.38$, $p < .01$, $\eta_p^2 = .05$, which revealed a greater decrease from baseline to final scenario in the proportion of personal justifications among males than females.

Conventional: A main effect for Risk Realm, $F(2, 260) = 15.00$, $p < .001$, $\eta_p^2 = .10$, was found for the proportional use of the conventional category. Participants referred to conventional more often in drug use than in alcohol use and reckless driving. A Risk Realm by Scenario interaction, $F(2, 260) = 6.76$, $p < .01$, $\eta_p^2 = .05$, showed that participants referred to conventional more often in the final than the baseline scenario for alcohol use but not the other realms.

Moral: Main effects for Risk Realm, $F(2, 260) = 95.07$, $p < .001$, $\eta_p^2 = .42$, and Scenario, $F(1, 130) = 15.54$, $p < .001$, $\eta_p^2 = .11$, were found for the proportional use of the moral category. Participants referred to moral more often in reckless driving than in alcohol and drug use, and more in the final than the baseline scenario. These main effects were qualified by a Risk Realm by Scenario interaction, $F(2, 260) = 3.35$, $p < .05$, $\eta_p^2 = .03$, indicating that participants referred to moral more in the final than the baseline scenario in the risk realms of alcohol and drug use, but not reckless driving.

Prudential: A main effect for Risk Realm, $F(2, 260) = 35.73$, $p < .001$, $\eta_p^2 = .22$, was found for the proportional use of the prudential category. Participants referred to prudential more in alcohol and drug use than in reckless driving. In addition, there was a Risk Realm by Scenario interaction, $F(2, 260) = 9.70$, $p < .001$, $\eta_p^2 = .07$, that revealed that participants referred to prudential more in the baseline scenario for alcohol use, and in the final scenario for reckless driving (there was no significant difference between the baseline and final scenario for drug use).

Negative Consequences: A main effect for Scenario, $F(1, 130) = 9.04$, $p < .005$, $\eta_p^2 = .07$, was found for the proportional use of the negative consequences category: Participants referred more to negative consequences in the baseline than the final scenario.

Unelaborated[1]: A main effect for Sex, $F(1, 130) = 12.08$, $p < .001$, $\eta_p^2 = .09$, and a

marginal effect for Scenario, $F(1, 130) = 3.81$, $p = .053$, $\eta_p^2 = .03$, was found for the

unelaborated category. Males gave more unelaborated justifications than females and there was

a general trend to make such justifications in the baseline more than the final scenario.

The number of social domains participants used to justify their evaluations was indexed

by a complexity score (from 0 to 4) and mean complexity scores by Scenario and Risk Realm are

presented in Table 4. Complexity scores were analyzed by a 3 (Risk Realm) x 2 (Scenario) by 2

(Sex) repeated measures ANOVA, with Risk Realm and Scenario as repeated measures. *Post hoc*

comparisons using Bonferroni *t*-tests were performed to test significant within-subjects effects.

Overall, participants averaged a low-moderate degree of complexity ($M = 1.42$) in their

reasoning about risk taking. As indicated by a main effect for Risk Realm, $F(2, 260) = 8.90$, $p <$

$.001$, $\eta_p^2 = .06$, participants showed greater complexity in their reasoning about reckless driving

($M = 1.30$) and alcohol use ($M = 1.23$) than drug use ($M = 1.13$). As expected, a main effect for

Scenario, $F(2, 260) = 156.57$, $p < .001$, $\eta_p^2 = .55$, revealed that participants showed greater

complexity in their reasoning about the final ($M = 1.83$) than the baseline ($M = 1.02$) scenario.

These main effects were qualified by a Risk Realm by Scenario interaction, $F(2, 260) = 6.65$, $p <$

$.01$, $\eta_p^2 = .05$, indicating that participants showed greater complexity in their reasoning about the

final scenario for alcohol use and reckless driving than for drug use. Multiple justifications

represented 64% of responses in alcohol use and 72% of responses in reckless driving, but only

47% of responses in drug use. Despite differences in complexity scores, a reference to some

combination of prudential, conventional, and moral categories, all of which justify not taking

risks, represented over 88% of the multiple justifications in each realm. It seems prompting

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[1] The Unelaborated category was not included in the initial MANOVA; it was added to the individual analyses of
justifications to provide a fuller picture of the factors that elicited uncodeable responses.

participants with the social domains implicated in risk taking resulted in them integrating those social domains that justify not taking risks.

Partial correlations between baseline complexity scores and final judgments, independent of participants' sex and baseline judgment, showed that higher baseline complexity scores negatively predicted final judgments ($r = -.20$, $N = 128$, $p < .05$). Participants who initially referred to multiple social domains when reasoning about hypothetical risk taking were more likely to make the final judgment that risk taking is unacceptable. This finding highlights the significance of unprompted reference to multiple social domains as those who do so tend to more negatively evaluate risk taking than those who do not, even after exposure to multiple social domains.

Relations between Socio-Moral Reasoning, Risk Stance and Frequency

The final analyses explored the relationship between participants' socio-moral reasoning about hypothetical risk taking and their actual risk stance and frequency. There were positive and significant partial correlations between baseline ($r = .40$, $N = 129$, $p < .001$) and final ($r = .31$, $N = 129$, $p < .001$) judgments and risk frequency, independent of sex. Participants who took more risks judged hypothetical risk taking more positively.

Baseline and final judgments also were correlated with risk stance, independent of sex (see Table 5). As expected, baseline and final judgments were strongly negatively correlated with the tendency for Avoidant stances, but not correlated with the tendency for Opportunistic stances. Similarly, baseline and final judgments were strongly positively correlated with the tendency for Risk Seeking stances, but only baseline judgments correlated (and more weakly so) with the tendency for Curious stances. This pattern of correlations underscores the value of not

lumping together all those who take risks and all those who do not: different risk stances are associated with different patterns of judgments about hypothetical risk taking.

Finally, a series of analyses were performed to assess the relation between justification complexity, risk frequency and stance. Baseline and final complexity scores were unrelated to risk frequency. Baseline complexity scores were negatively correlated, independent of sex, with the tendency to endorse the Risk Seeking stance, $r = -.24$, $N = 126$, $p < .01$. By contrast, final complexity scores were uncorrelated with the tendency to endorse the Risk Seeking stance, r = -.06, $N = 126$, ns. Upon closer examination we found that participants who endorsed Risk Seeking stances tended to justify a majority of their baseline judgments with reference to the personal domain (59%). Thus, an increased tendency to endorse the Risk Seeking stance is related to a narrow focus in the baseline scenario on personal prerogatives.

We had predicted that those who tended to endorse the Avoidant stance would have greater baseline complexity scores. Baseline complexity was positively, but not significantly, correlated to increased avoidance, $r = .12$, $N = 126$, ns. A closer inspection of the minority of participants (20%) who endorsed Avoidant in each risk realm revealed that 39% of them had a baseline complexity score less than 1, reflecting a tendency to refer to less than one social domain in each realm. Another 42% of these participants had a baseline complexity score greater than 1, reflecting a tendency to refer to more than one social domain. Although all of these participants endorsed the Avoidant stance in each realm, there seem to be two subgroups whose avoidance is associated with appeals to more or less than one social domain when justifying their judgments.

<center>Discussion</center>

The present study examined older adolescents' socio-moral reasoning about risk taking and its relation to their risk stance and behavior across risk realms. Specifically, we examined (1) the relationship between risk frequency and stance within and across risk realms; (2) the nature of older adolescents' socio-moral reasoning about hypothetical risk taking in the baseline and final scenarios; and (3) the relations between socio-moral reasoning about hypothetical risk taking and older adolescents' actual risk frequency and stance.

With regard to the first issue, risk frequency and stance were correlated in predicted ways, supporting the claim that older adolescents vary in their stances for taking risks (Risk Seeking or Curious) and for not taking risks (Avoidant or Opportunistic). The analysis of the risk frequency data over realms suggested a single dimension of risk taking, yet this conclusion was not supported by the analysis of the risk stance data. Byrnes (2003) lucidly points out that differences in how risk taking is measured may lie at the center of the controversy among researchers over whether risk taking is a cross-situational trait or more situation-specific. We propose the assessment of risk stance offers a unique and valuable perspective on the nature of adolescent risk taking than does the assessment of risk frequency alone.

The second issue concerns adolescents' socio-moral reasoning about risk taking. The present findings confirm and augment those from previous studies on risk taking from a social domain perspective (Flanagan et al., 2008; Killen et al., 1991; Nucci et al., 1991). In general, even though most of them had taken some risks, older adolescents negatively evaluated hypothetical risk taking and readily appealed to at least one social domain in their justifications. In addition, evaluations of risk taking varied according to the risk realm and scenario. Older adolescents' judged the realm of risky drug use more negatively than reckless driving, and appealed to conventional concerns with legal and social regulation and prudential concerns with

self-harm when justifying these negative evaluations. As compared to the final scenario, older adolescents judged the baseline scenario more positively and tended to justify these evaluations more narrowly and vaguely. Older adolescents' baseline justifications referred to concerns regarding the self (personal, prudential in the realm of alcohol use) more often than others (moral, conventional in the realm of alcohol use), to multiple social domains less often, and to no social domains (i.e., negative consequences, unelaborated) more often. Our findings do not seem to be experimental artifacts of the repeated measures presentation of risk realm. The tendency in the baseline scenario of a given risk realm toward more positive evaluations of and narrow and vague justifications for risk taking does not seem to be a carryover from the final scenario of the previous risk realm, where older adolescents tended toward more negative evaluations and more complex justifications.

The tendency toward narrow and vague baseline justifications may reflect a reaction to a risk taking scenario based on a *gist* representation, an automatically activated and emotionally tinged coding of global or "bottom line" contextual information (Mills et al., 2008). A gist representation of hypothetical risk taking scenarios may code them as dangerous and to be avoided or as exciting and to be engaged. By contrast, *verbatim* representations encode specific contextual details (Mills et al., 2008) and are associated with an effortful evaluation of whether or not to engage in the action. It would be necessary to rely on effortful processes and verbatim representations of the scenario when reflecting on, distinguishing between, and coordinating among the multiple social domains implicated by the risk scenario. There is evidence that such a process was more often engaged in the prompted final than the initial baseline scenario. Older adolescents' final evaluations were more consistently negative across realms, and justified more often with reference to multiple social domains and less often with reference to no domains.

We are confident that greater justification complexity was the reason for the increasingly negative final evaluations of risk taking (and not vice-versa) because higher baseline complexity scores directly predicted more negative final evaluations, independent of sex and baseline judgments. This finding is noteworthy for two reasons: (1) it suggests that older adolescents with higher baseline complexity were better able to engage in the effortful processing necessary to integrate the multiple social domains implicated in risk taking, and (2) it confirms our prediction about the importance of accounting for multiple social domains in reasoning about risk taking.

Whether our findings about hypothetical risk taking generalize to real-life risk scenarios remains an open question. Although there is no direct evidence that social domains are spontaneously considered by adolescents in real-life risk contexts, the third issue addressed by the research concerns the relations between older adolescents' reasoning about hypothetical risk taking and their actual risk stance and frequency. Older adolescents who evaluated hypothetical risk taking more positively in both baseline and final scenarios took more risks, consistent with the findings of Nucci et al. (1991). One could argue that the correlation between older adolescents' socio-moral reasoning about hypothetical risk taking and their actual risk frequency merely reflects a *post-hoc* justification of their behavior. That is, older adolescents' socio-moral reasoning may merely be a product of the cognitive dissonance resulting from taking risks, rather than a process regulating their decision to take or not to take risks in the first place, an issue which plagues other studies exploring socio-moral reasoning and risk taking (Flanagan et al., 2008; Killen et al., 1991; Nucci et al., 1991). If the correlation is merely due to dissonance-based, *post-hoc* justifications for risk taking with no regulatory impact, then one should expect little to no relation between older adolescents' socio-moral reasoning and their risk stance. If the predictor of socio-moral reasoning about hypothetical risk taking is solely *whether or not* teens

took risks, then such reasoning should be unrelated to differences in *why* they did or did not take

risks.

The data suggest that older adolescents' socio-moral reasoning about risk taking

differentially predicts their stance on taking or not taking risks. As expected, adolescents' stances

to take risks due to curiosity (Curious) or active search (Risk Seeking) are distinguished by their

judgments and justification complexity scores in baseline and final scenarios, independent of sex.

Older teens that more frequently endorse the Risk Seeking stance tend to judge risk taking as

more acceptable and to justify it more narrowly than older teens that more frequently endorse the

Curious stance and tend to consider and integrate the diverse social domains implicated in risk

taking. These findings are consistent with the Prototype Willingness (PW) model of adolescent

risk taking (Gerrard et al., 2008; Gibbons et al., 1998). The older adolescents in our study who

repeatedly endorse the Risk Seeking stance across risk realms are akin to adolescents in the PW

account who hold an explicit behavioral intention to take risks. These teens may plan to take

risks and legitimize such actions by an appeal to their own personal prerogatives. For these teens,

automatic and effortful processes may result in the same behavioral outcome. The PW model

characterizes other teens as being drawn to risk taking because they hold positive prototypes of

risky behaviors (e.g., smoking as sophisticated) and of those who engage in them (e.g., smokers

are popular and cool). These adolescents may be willing to take risks in particular contexts,

although they may not plan to do so. Older adolescents who repeatedly endorse the Curious

stance across realms may be characterized as engaging in this manner of risk taking. Although

capable of reflecting on, distinguishing between and coordinating among the multiple social

domains implicated in risk taking, those who repeatedly endorse the Curious stance may fail to

engage in such effortful processes in social contexts that automatically activate positive prototypes which provide the impetus for taking risks.

Analogously, older adolescents' stances not to take risks out of principle (Avoidant) or lack of opportunity (Opportunistic) in various realms are distinguished by their judgments and justification complexity scores in baseline and final scenarios, independent of sex. The more older teens endorse the Avoidant stance across realms, the more negative their baseline and final judgments, whereas their tendency to endorse the Opportunistic stance across realms is unrelated to their baseline and final judgments. Surprisingly, older adolescents' frequency of endorsing the Avoidant stance is not correlated with baseline and final complexity scores. Upon closer review, we found some of the older teens who consistently endorse the Avoidant stance appeal in at least one realm to multiple social domains in justifying their initial negative evaluations, whereas others appeal to no social domains at least once. This finding is intriguing because it suggests that some older teens who consistently endorse the Avoidant stance may tend to justify their judgments more automatically, perhaps with gist representations, whereas others may engage in more effortful processing as their justifications integrate multiple social domains. Future research should explore this finding as it suggests there may be even more nuanced discriminations to be made among those older teens not taking risks. Some teens may not take risks based on effortful processing that integrates verbatim representations of multiple social domains, other teens may not take risks based on automatic processing of gist representations of risk taking as unacceptable and generally dangerous, and still other teens may not take risks simply because they lack the opportunity, but would if they could.

This study adds to the growing call to consider a dual process approach to risk taking by suggesting that older adolescents' socio-moral reasoning may be involved in automatic and

effortful processing. Future research should further explore the role of socio-moral reasoning in predicting risk frequency and stance. In particular, research can test which older teens who repeatedly endorse the Avoidant stance are likely to continue to not take risks: Those who judge risk taking as unacceptable based on an effortful integration of verbatim representations of multiple social domains or an automatic gist representation of the dangers of risk taking? Future research also should explore connections among socio-moral reasoning about risk taking, risk stance and behavior in a more diverse sample of adolescents and among younger adolescents who may be less able to coordinate multiple socio-moral considerations when reasoning about risk taking as compared to the older adolescents in our sample. Whatever the findings, this line of research is important because it re-focuses attention on adolescents' own understanding of risk taking and its role in their decisions to take or not to take risks.

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Appendix

Hypothetical Risk Taking Scenarios in the Risk Realm of Alcohol Use

Baseline Scenario: Peter had a stressful day at work and he is going over to his friends'

      apartment to relax. At the apartment, a friend offers Peter a beer and Peter thinks about

      drinking alcohol until he gets drunk.

Personal Scenario: Let's suppose that in making his decision, Peter considers that he is really

      curious to try it out and to see what it feels like. Peter thinks that this is his choice, and he

      wants to know for himself what drinking alcohol and getting drunk is all about.

Conventional Scenario: Let's suppose that in making his decision, Peter considers that the party

      at his friends' apartment could be busted by the police. If this happened, Peter, who is

      not yet 21-years-old, would be cited for MIP (minor in possession), which is a

      misdemeanor with a heavy fine.

Moral Scenario: Let's suppose that in making his decision, Peter considers that while under the

      influence of alcohol, he may be more uninhibited than normal and be more inclined to

      say or do something to his friends that may upset or hurt them.

Prudential Scenario: Let's suppose that in making his decision, Peter considers that drinking until

      he is drunk may have negative consequences for his own mental functioning and physical

      health.

Final Scenario: In the end, explain what you think Peter should do, justifying why you think

      Peter should or should not drink alcohol until he is drunk at this friends' apartment?

Author Notes

Table 1

Risk Stance by Risk Realm (Percentages)

Risk Stance	Alcohol Use	Drug Use	Reckless Driving
Avoidant	63.6	78.8	29.5
Opportunistic	10.6	2.3	14.7
Curious	12.1	15.9	38.8
Risk Seeking	13.6	3.0	17.1

Note. Percentages may not add up to 100 because of rounding.

Table 2

Mean Judgments (and SDs) of Risk Taking, by Scenario, Risk Realm, and Gender

Scenario	Alcohol Use		Drug Use		Reckless Driving	
	Male	Female	Male	Female	Male	Female
Baseline	2.15	1.38	2.00	1.23	2.39	1.85
Judgment	(1.32)	(0.72)	(2.21)	(0.59)	(1.33)	(0.95)
Final	1.35	1.08	1.21	1.03	1.29	1.09
Judgment	(0.69)	(0.36)	(0.54)	(0.25)	(0.58)	(0.38)

Note. Means are based on a 5-point scale (1=really not okay, 3=can't decide, 5=really okay).

Table 3

Justifications for Baseline and Final Scenario, by Risk Realm (Percentages)

Justification	Alcohol Use		Drug Use		Reckless Driving	
	Baseline	Final	Baseline	Final	Baseline	Final
Personal	20.3	8.8	16.5	8.2	25.3	10.5
Conventional	8.5	24.3	26.1	23.0	9.2	13.6
Moral	2.9	15.6	0.8	11.9	30.7	37.6
Prudential	47.5	41.9	34.5	42.6	14.4	29.2
Negative Consequences	14.0	4.9	14.4	9.9	12.9	6.1
Unelaborated	6.8	4.6	7.6	4.6	7.6	3.0

Note. Percentages may not add up to 100 because of rounding.

Table 4

Mean Complexity Scores (and SDs) by Scenario and Risk Realm

Scenario	Alcohol Use	Drug Use	Reckless Driving
Baseline	0.98	0.98	1.11
	(0.64)	(0.69)	(0.71)
Final	1.96	1.55	1.98
	(1.04)	(1.01)	(0.98)

Note. Means are based on a 5-point scale (0 = no domains to 4 = all 4 domains reported).

Table 5

Partial Correlation Coefficients (controlling for Sex) between Judgments for Baseline and Final

Scenarios and Risk Stances

Scenario	Avoidant	Opportunistic	Curious	Risk Seeking
Baseline	-.39***	.03	.20*	.31***
Final	-32***	-.06	.07	.45***

Note: N = 126

*p < .05

*** p < .001