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Original Articles

Life history variables and risk-taking propensity

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Abstract

We examined the effects of life-history variables on risk-taking propensity, measured by subjective likelihoods of engaging in risky behaviors in five evolutionarily valid domains of risk, including between-group competition, within-group competition, environmental challenge, mating and resource allocation, and fertility and reproduction. The effects of life-history variables on risk-taking propensity were domain specific, except for the expected sex difference, where men predicted greater risk-taking than women in all domains. Males also perceived less inherent risk in actions than females across the five domains. Although the age range in the sample was limited, older respondents showed lower risk propensity in both between- and within-group competition. Parenthood reduced risk-taking propensity in within- and between-group competitions. Higher reproductive goal setting (desiring more offspring) was associated with lower risk-taking propensity. This effect was strongest in the risk domains of mating and reproduction. Having more siblings reduced risk-taking propensity (contrary to our initial prediction) in the domains of environmental challenge, reproduction, and between-group competition. Later-born children showed a higher propensity to engage in environmental and mating risks. Last, shorter subjective life expectancy was associated with increased willingness to take mating and reproductive risks. These results suggest that life-history variables regulate human risk-taking propensity in specific risk domains.
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1. Introduction

In this study, we examined individual risk-taking propensity within a framework of evolutionary psychology and life-history theory. Evolutionary psychology assumes that human decision making and risk-taking propensities should be domain specific for evolutionarily relevant risks as manifested in contemporary contexts (e.g., Cosmides & Tooby, 1996; Gigerenzer & Selten, 2001; Tooby & Cosmides, 1992; Wang 1996a, 2007). The recurrent and enduring risks in the environments of evolutionary adaptedness are viewed as the main selective factors in the evolution of human risk-taking propensity. A short list of evolutionary tasks investigated by evolutionary psychologists, biologists, and anthropologists includes social exchange, mating, parental investment, within-group competition, between-group competition, foraging, dealing with kin, and parenting (for reviews, see Barrett, Dunbar, & Lycett, 2002; Buss, 2004, 2005; Pinker, 1997).

In addition to recognizing the evolutionary domain specificity of risks, life-history theory assumes that individuals make specific tradeoffs at different times in life (e.g., Kaplan & Gangestad, 2005; Stearns, 2004). "The general life history problem" is how to optimize the allocation of resources to growth, reproduction, and survival from birth to death (Schaffer, 1983). We see two connections between evolutionary psychology and life-history theory: (1) People make risky choices in different task domains, and (2) people make risky choices at different stages of life. In the current study, we investigated how life-history variables affect and predict risk-taking propensity when evolutionarily typical risks are presented in modern contexts.

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1.1. Evolutionary risk domains

The risk perception and propensity literature has been largely dominated by the assumption that one's tendency for risk-taking is a stable personality trait, and thus, individuals can be categorized as having risk-seeking or risk-averse styles (for a review, see Bromiley & Curley, 1992). However, domain-general behavioral risk scales, in general, do not consistently predict real risk behaviors. In recent years, an increasing number of empirical findings have challenged this unidimensional conceptualization of risk-taking propensity. For instance, perceptions of risk have been shown to vary by content domain (e.g., Blais & Weber, 2001; Mellers, Schwartz, & Weber, 1997). Weber, Blais, and Betz (2002) developed a domain-specific risk-taking scale that covers five domains (i.e., financial risk-taking, health/safety risk-taking, ethical risk-taking, recreational risk-taking, and social risk-taking). Hanoch, Johnson, and Wilke (2006) focused on specific subsamples of risk takers and found that individuals who exhibit high levels of risk-taking behavior in one content area (e.g., bungee jumpers taking recreational risks) can exhibit moderate (or low) levels in other risky domains (e.g., financial).

Building on these developments, we sought to provide a stronger theoretical basis for risk-domain specificity over and above the experiential classification of risks. In an earlier study (Kruger, Wang, & Wilke, 2007), we initially identified seven domains of risk from the literature of evolutionary psychology: within-group competition (WGC), between-group competition (BGC), environmental challenge (E), foraging (F), resource allocation (RA), mating (M), and reproduction (R). Specifically, environmental challenge refers to physical and survival risks that exist in one's living environment (e.g., predation, potential physical accidents, and injuries). Factor analyses identified mating and RA for mate attraction as one domain rather than the predicted two and no items from the initially presumed foraging domain made to this final list. Thus, we reduced the number of risk domains to five, with three items in each domain. The evolutionary domains used in the current study were WGC, BGC, E, M (mating and RA for mate attraction), and R (fertility and reproduction). The 15 items that had highest factor loading scores (three in each of the five risk domains, see Appendix A) from the initial 43 items of the seven-domain scale were used in the current study to examine the effects of life-history variables on risk perception and risk propensity. The 15 items in this scale were supported by exploratory and validated by confirmatory factor analyses (see Kruger et al., 2007, for a more detailed discussion of the development of the domain-specific risk scale).

1.2. Life-history variables and risk-taking propensity

In the current study, we examined the effects of seven life-history traits (i.e., sex, age, birth order, number of siblings, parental status, reproductive goal, and subjective life expectancy) on risk-taking propensity. Hill, Ross, and Low (1997) were among the first to examine the costs and benefits of risk-taking from a life-history perspective. Their analysis shows that the costs and benefits of actions, in terms of survival and reproduction, can be evaluated based on a trade-off between present and future values.

Conventional explanations for sex and age differences in risk-taking have usually focused on cultural socialization or physiological–hormonal mechanisms (reviewed by Campbell, 1999). However, evolutionary theory suggests that a crucial difference between the sexes lies in the role of risk-taking in reproductive competition, which is typically more intense for young men than for women or older men (e.g., Daly & Wilson 1997; Low, 2000; Wilke, Hutchinson, Todd, & Kruger, 2006).

Age and life expectancy also serve as key life-history reference points in risky decision making. Wang (1996b) found that in hypothetical life-or-death situations, people automatically use their own age to evaluate the reproductive values of risky choices regarding saving old versus young relatives. Wilson and Daly (1997) found that average life expectancy across 77 neighborhoods in Chicago correlated highly with community homicide rates. Mathematical analysis (e.g., Rogers, 1994) also suggests that risky behavior is a function of a person's life course and life-span expectancy.

In our view, age, reproductive goal, and subjective life expectancy as temporal reference points in life history and birth order and the number of siblings as indexes of family resources should all have specific effects on human risk-taking propensity. Differences in these life-history variables render some clear predictions for decision making in risky situations.

1.3. Hypotheses and predictions: domain specificity in risk-taking propensity

We predicted that effects of a given life-history variable on risk-taking propensity, as measured by the subjective likelihoods of engaging in different risky behaviors, would not manifest equally across risk domains but would be stronger in some domains than others. We took an exploratory and empirical approach to the question of how the seven life-history traits (variables) differentially affect and predict risk-taking propensity in each of the five risk domains.

1.3.1. Sex effects

The greater variance in reproductive success among males selects for greater acceptance of risk to facilitate male–male competition. In addition, a shorter life-span for men can make their goals and deadlines in life more imminent and risk-taking more beneficial. In contrast, for women with internal fertilization and prolonged gestation and lactation, reproductive success and personal survival are more interdependent. According to the "staying alive" account of Campbell (1999), natural selection would favor relative risk avoidance in females because infant survival depends more on maternal than on paternal care and defense. This type of analysis has been useful in clarifying the average differences between men and women in risk-taking behavior across multiple risk domains.

1.3.2. Age (life-history stage)

One of the most common life-history tradeoffs is between survival and reproduction. When the environment is unstable and uncertainty is high for health and wealth, it would be adaptive for both men and women to take survival risks at an early stage of life for reproductive gains (Wilson & Daly, 1997). We predicted that younger individuals would be more willing to take risks to gain resources.

1.3.3. Parental status

Risky actions may yield the most benefits at the life stage of competing for mates. After a mate is obtained and effort turns to parenting, risking survival may be too costly, as it might leave existing offspring vulnerable. In fact, the amount of parenting is positively correlated with the life-span of caretakers in anthropoid primates (e.g., Allman, Rosin, Kumar, & Hasenstaub, 1998). We predicted that parental status—that is, being a parent—would reduce the likelihood of risk-taking.

1.3.4. Reproductive goal setting

The studies of behavioral decision making over the last 30 years have shown that risky choice is primarily situational and reference-point-dependent (e.g., Kahneman & Tversky, 2000; Slovic, 1972; Tversky & Kahneman, 1981; Wang, 2002). From a life-history perspective, people perceive risks and make risky choices in accordance with the goals and deadlines in life. Thus, risk perception and risky choice are bound to specific task goals and deadlines (e.g., having three children before age 40). We predicted that a higher reproductive goal would reflect a higher reproductive potential of an individual and would highlight the need to stay alive until that goal was reached. Thus, a higher reproductive goal, measured by how many offspring one is expecting to have, would reduce the propensity of risk-taking.

1.3.5. Number of siblings (sibship size)

In previous studies of life-history traits, the number of siblings has been largely considered as a predictor of parental strategy (e.g., see Stearns, 2004) rather than a causal factor that shapes the risk-taking behavior of siblings themselves. In this study, we considered the number of siblings as not only a result of parental strategy but also as part of the family or kinship environment in which siblings interact. Based on the life-history analysis that having more siblings in a family increases sibling rivalry and mortality (e.g., Stearns, 2004), we predicted that a larger sibship size would intensify within-group resource competition among siblings and, thus, increase their risk-taking propensity.

1.3.6. Birth order

From a Darwinian point of view, birth order is an important factor affecting psychological development. Buss (1995) noted that birth-order involves "recurrent adaptive problems" that should foster individual differences. A striking phenomenon of birth-order effect has been that siblings, although having higher biological relatedness and environmental similarity, differ in personalities and risk preferences as much as strangers. According to Sulloway (1995, 1996), birth order is a proxy for parental resource competition among siblings. Firstborns would on average have more family and parental resources available than later-born siblings, whereas lastborns would be under greater pressure to actively pursue available family resources. The more family and parental resources available, the less risk-taking is needed to get the resources. We predicted that lastborns would be more risk seeking than their older siblings. Although not every study on birth order finds the predicted patterns (e.g., Freese, Powell, & Steelman, 1999), there is adequate empirical evidence to justify inclusion of this hypothesis for falsification (e.g., Rohdea et al., 2003; Sulloway, 2002).

1.3.7. Subjective life expectancy

Risk-taking may be more effective than risk avoidance when the future is unpredictable or life expectancies are short; such a state may lead to discounting the future when making decisions (Wilson & Daly, 1997). Subjective life expectancy in our view serves as the horizon of a person's life history or a temporal framework in which people set and adjust their goals and deadlines in life. A shorter subjective life expectancy makes these life goals and deadlines more imminent and risks worth taking. Therefore, we predicted that subjective life expectancy would be negatively correlated with likelihood of engaging in risky activities.

2. Methods

2.1. Participants

A total of 448 participants (316 females, 132 males) from the University of South Dakota were recruited. Participants received course credit for their participation. The age of the participants ranged from 18 to 50 years, with an average age of 20.6±4.3 years.

2.2. Materials and procedure

All participants responded online to a set of questionnaire items and rated each in terms of the likelihood of engaging in (very unlikely, unlikely, not sure, likely, very likely), perceived riskiness of (not at all risky, moderately risky, extremely risky), and attractiveness of (very unattractive, unattractive, not sure, attractive, very unattractive) the stated risky behavior on a bipolar scale. These questionnaire items were presented in a random order.

The participants were also asked to provide information concerning the following seven (independent) life-history variables: sex, age, birth order, number of siblings, parental status, reproductive goal (the minimum and maximum number of biological offspring participants wanted to have), and subjective life expectancy.

We adopted the life-expectancy measure from an instrument developed by Hill et al. (1997). The question used was, “How likely is it that you will be alive at these ages?” Eight age categories were listed (20–29, 30–39, 40–49, 50–59, 60–69, 70–79, 80–89, and ≥90 years), with blanks below them to fill in the estimated likelihood (ranged from 0 to 100%) of being alive in each of the eight age categories. One example was given to illustrate how to fill in the blanks.

Based on our exploratory and confirmatory factor analyses (see Kruger et al., 2007), we found five evolutionary risk domains to use in the present study (see the Appendix A for the 15 items in the five domains and their factor loadings). These items reflect evolutionarily meaningful risks but were presented in a modern context.

3. Results

3.1. Overall effects of life-history variables

Of the three dependent measures (likelihood of engaging in, perceived riskiness of, and attractiveness of the 15 stated risky behaviors), perceived riskiness was affected by only one life-history variable: sex. The overall perceived riskiness score of the male participants was significantly lower than that of the female participants, $F(1,446)=14.08$, $p<.0001$, $\eta^2=.028$. The participants had high agreement about how risky a behavior or activity is irrespective of their age, parental status, number of siblings, birth order, and subjective life expectancy. In marked contrast, the effects of life-history variables were evident on the other two dependent measures: attractiveness of and likelihood of engaging in a risky behavior. The effects on these two measures were consistent and comparable across the five risk domains and within each of the risk domains. Given the focus of this study on risk-taking propensity, we use only the likelihood of engagement for our analysis and discussion in the rest of the paper.

Regression analysis using the overall risk propensity score across the five risk domains as the dependent variable showed that the seven life-history variables accounted for a total of 15.6% variance in risk-taking propensity, with the top three predictors being sex, subjective life expectancy, and reproductive goal.

3.2. Sex effects

Sex was the only life-history variable that had a consistent effect across all five risk domains. Table 1 shows the mean risk propensity scores (±S.D.) across the five risk domains for men and women separately and their overall means. A multivariate analysis of variance (ANOVA) using the scores of the likelihood of engagement in the five risk domains as the dependent variables showed that men were more likely to engage in the stated risky actions than were women [$F(1,446)=12.83$, $p<.0001$].

Table 1
Mean (±S.D.) risk-propensity scores across the five risk domains for men and women and overall means

Risk Domain	Men	Women	Overall
WGC	7.88±2.68	6.91±2.44	7.19±2.55
BGC	12.24±4.10	10.55±3.55	11.05±3.79
E	10.01±2.36	8.79±2.25	9.15±2.34
M	6.49±2.42	5.61±2.13	5.87±2.25
R	6.23±2.49	4.79±2.00	5.21±2.25

Separate ANOVAs for the five risk domains using the likelihood (risk-taking propensity) score in each risk domain as the dependent variable yielded the following results: the F values were 14.01 for the WGC, 19.20 for the BGC, 26.36 for the E, 14.62 for the M, and 41.35 for the R domain; all reached a significance level of $p<.0001$. The η^2 values were .030, .041, .056, .032, and .085, respectively.

3.3. Age effects

We conducted a linear regression predicting the total likelihood of engagement. Age was entered as a continuous variable. The overall age effect across all five domains was not significant. However, the domain-specific analysis showed that the age effects were significant in the domains of WGC and BGC—$F(1,446)=7.41$, $p<.007$, and $F(1,446)=13.36$, $p<.000$, respectively, but insignificant in the domains of E, R, and M.

3.4. Effects of parental status

In this study, only 31 participants had offspring of their own. However, their parenthood, as predicted, significantly reduced their rated likelihood of engaging in risky behaviors when we controlled for age. The mean likelihood score for them was 33.94±9.34 compared to 38.82±9.34 for the participants who were childless [$F(1, 444)=5.83$, $p<.016$, $\eta^2=.016$]. This effect of parental status was also domain specific and significant in the domains of WGC [$F(1, 444)=6.76$, $p<.01$, and BGC, $F(1, 444)=6.37$, $p<.012$].

3.5. Effects of reproductive goal

We measured reproductive goal by asking for the maximum (M=3.6±1.6) and the minimum (M=1.7±1.2) number of offspring desired. A linear regression analysis showed that the maximum reproductive goal, rather than the minimum desired offspring, was a significant predictor of overall risk-taking propensity [$F(1,446)=19.28$, $p<.0001$, $\eta^2=.041$]. These results suggest that the higher one's reproductive goal is, the less likely one would be to engage in risky activities.

The effects of reproductive goal setting were most significant in the domains of R and M—$F(1,446)=69.41$, $p<.0001$, and $F(1,446)=6.84$, $p<.009$, respectively; significant in the domains of WGC and BGC—$F(1,446)=5.15$, $p<.024$, and $F(1,446)=6.74$, $p<.01$, respectively; and insignificant in the domain of E.

3.6. Effects of number of siblings

A linear regression analysis revealed that the sibling size variable (M=2.12±1.7) was negatively related to the likelihood of engaging in risky activities [F(1,446)=8.78, p<.003, η^2=.019]. The effects of the number of siblings on the likelihood measure were significant in three of the risk domains: BGC, F(1,446)=4.52, p<.034; E, F(1,446)=8.59, p<.004; and R, F(1,446)=4.21, p<.041.

3.7. Birth-order effects

One participant was not included in the analysis due to missing birth-order data. Birth order had a significant effect on the likelihood measure. The means of the overall score of likelihood of engaging in risky activities for the firstborns (n=185), middle children (n=135), and lastborns (n=127) were 38.44±9.11, 36.33±9.43, and 40.66±9.12, respectively; F(2, 444)=7.02, p<.001, η^2=.031. The lastborn participants were most likely to engage in risky activities followed by the firstborns and the middle children. This result is consistent with the argument that greater risk-taking of lastborns reflects their greater need to fight for a family niche in sibling competition. Further analysis in each of the five risk domains revealed that the effects of birth order were significant in the domains of E [F(2,444)=7.93, p<.0001) and M, F(2, 444)=5.29, p<.005] but not significant in the domains of WGC, BGC, and R.

3.8. Effects of subjective life expectancy

The subjective life expectancy for each participant was calculated using the formula of [20+sum of (P_i×10)]. That is, starting from age 20 years, add each of the next 10 years discounted by the subjective likelihood of being alive in the next 10 years. For example, if a participant was 25 years old and felt pretty sure he would live to be 70 but unsure about 80 and confident he would not see 90, he might fill in the eight blanks with the following likelihood estimates: 100%, 100%, 98%, 95%, 90%, 80%, 50%, and 5%. According to the above formula his subjective life expectancy would be (20+10+10+9.8+9.5+9+8+5+0.5)=81.6 years. The subjective life expectancy ranged from 48 to 100 years of age, with an average of 81.0±9.6 years. Using the above calculation, women on average estimated that they would live to 81.8±9.5 years of age, while men estimated they would live to 79.1±9.8 years of age [F(1,446)=7.09, p<.008].

The difference of these subjective estimates minus the scientific estimates from the national data of the same age cohort (21 year-olds) from the Centers for Disease Control and Prevention was +1.1 years for the female participants and +3.5 years for the male participants. Thus, compared to the female participants, males were more likely to overestimate their life-span. This result is consistent with an earlier finding that women tended to be more realistic about their lifespan than men (Tolor & Murphy, 1967).

The subjective life expectancy scores predicted overall scores of risk-taking propensity [F(1,446)=13.59, p<.0001, η^2=.03]. Participants with a shorter subjective life expectancy were more likely to engage in risky activities. Further analysis showed that the effects of subjective life expectancy on the likelihood measure were also risk-domain-specific. The effects were most evident in the M domain of mating risks [F(1,446)=15.97, p<.0001] and the R domain of reproductive risks [F(1,446)=13.51, p<.0001]. The effects were also significant in the domain of BGC [F(1,446)=5.81, p<.016] but not significant in the domains of WGC and E.

Table 2 shows the Pearson correlations between the seven life-history traits and the risk-propensity scores across the five risk domains. Table 3 summarizes the effects of the life-history traits on the risk-propensity scores.

Table 2
Pearson correlation matrix of life-history predictors and risk-propensity scores

	Risk-propensity score in the five risk domains				
Predictor	WGC	BGC	E	M	R
Sex	.174[b]	.203[b]	.236[b]	.178[b]	.291[b]
Age	−.131[b]	−.139[b]	.061	−.022	.056
Reproductive goal	.−107[a]	−.122[b]	−.033	−.123[b]	−.367[b]
Parental status	−.176[b]	−.178[b]	−.055	−.035	−.041
Number of siblings	−.074	−.100[a]	−.137[b]	−.088	−.097[a]
Birth order	.032	.061	.043	.104[a]	.133[b]
Life expectancy	−.079	−.113[a]	−.077	−.186[b]	−.171[b]

[a] Correlation is significant at the 0.05 level (two-tailed).
[b] Correlation is significant at the 0.01 level (two-tailed).

Table 3
Effects of life-history variables on risk-taking propensity across domains

Life-history variable	Prediction	Finding	Risk domain
Sex	Men>women	Men>women	All 5 domains
Age	Younger>older	Younger>older	WGC, BGC
Reproductive goal	Higher, less RT	Higher, less RT	R, M, WGC, BGC
Parental status	Childless>parent	Childless>parent	WGC, BGC
Number of siblings	Higher, more RT	Higher, less RT	BGC, E, R
Birth order	Lastborns more RT	Lastborns more RT	E, M
Life expectancy	Negative correlation	Negative correlation	M, R, BGC

4. Discussion

4.1. Evolutionary domains of risk

Following the empirical tradition of evolutionary psychology (e.g., Cosmides, 1989; Cosmides & Tooby, 1996; Wang, 1996a), we identified evolutionarily recurrent risks and presented them in their corresponding contemporary contexts. We used exploratory and confirmatory factor analyses to select valid risk items and group them into evolutionarily meaningful domains. In the present study, we examined the distinct effects of a set of life-history variables on risk-taking propensity in these evolutionary risk domains.

Our results fit with the observation of Hill and Chow (2002) that both variations in human life-history traits and their effects are much greater than what is usually assumed.

The domain-specific pattern revealed in this study provides insights for future research (see Table 3 for a summary). For example, both age and parental status affected risk-taking propensity only in the domains of WGC and BGC. This suggests a tradeoff between social group risks of WGC and BGC and individual risks regarding E, or a trade-off between social group risks and relational risks regarding M and R. In contrast, birth order had the most significant effect in the domains of M and E but was insignificant in the two social group domains. Another life-history variable, reproductive goal, was most related to the domain of reproduction but was insignificant in the domain of environmental challenge. The effects of subjective life expectancy were largely restricted to M and R, suggesting that subjective life expectancy mainly affects behaviors dealing with mating and reproductive risks rather than physical and environmental challenge.

4.2. Life-history traits and risk-taking propensity

The broad effects of sex on risk-taking propensity are consistent with the fact that sex is a life-history variable that, unlike most of the others, usually remains unchanged throughout life. Men with a shorter life horizon and those living in an environment with a higher variance in wealth and reproductive return are expected to have a higher sense of urgency and to take risks more often.

Age, parental status, reproductive goal, and subjective life expectancy can be used as signals and predictors of reproductive value and can impact risky behaviors in different risk domains. For example, subjective life expectancy is the expectation of how much future is available. Variation in subjective life expectancy should then result in adaptive adjustment in risk-taking propensity. Our results suggest that greater attention should be paid to life-history traits in research on judgment and decision making.

4.3. Alternative explanations for the unexpected sibship size effect

One of our predictions concerning the effects of sibship size was not supported. The finding that the number of siblings was negatively correlated with risk-taking propensity requires more research and new interpretations. In the following, we speculate on several possible factors that may have contributed to the observed relationship between risk-taking propensity and number of siblings.

First, this result suggests that more siblings in a family could dilute sibling competition and foster a more cooperative and risk-averse attitude toward risky activities. Sibling coalition (cooperation) and sibling rivalry (competition) can be viewed as two sides of the same coin, both governed by the Hamiltonian rule of altruism and its mirror rule of selfishness (see Mock & Parker, 1997). Shifting equilibrium between the incentives for selfishness and those for altruism may be determined by factors such as family resources and parental investment (e.g., interbirth interval), which, in turn, affects risk-taking propensity.

Second, siblings often form a coalition to provide extra protection for each other. As suggested by our data, this protection might be particularly important in dealing with environmental challenge and risks associated with between-group competition.

Third, the number of siblings may increase the need for within-group competition due to scarce family resource but reduce the need for between-group competition due to better protection and higher cost to the rival party. However, the items measuring the within-group competition used in this study did not specifically mention siblings. This may be a partial reason for the null effect in the WGC domain.

Lastly, the observed sibship size effect may be mediated by reproductive goal of the siblings. That is, the number of sibs in the natal family would influence the number of offspring desired either due to life-history calibration (i.e., adjust own strategy in light of the strategy that was successfully pursued by one's parents) or transmission of family values by parents or among siblings. If so, the reproductive goal variable should mediate the effects of the sibship size variable on risk propensity. This explanation was largely supported by the data. Table 3 shows that of the three risk domains where sibship size had significant effects (BGC, E, and R), two of them (BGC and R) were also the domains where the reproductive goal variable had significant effects on risk propensity. In addition, the two variables themselves were also positively correlated (r=.127 p<.007). A multiple regression analysis showed that although the effects of reproductive goal remained significant, sibship size was no longer a significant predictor of risk-taking propensity in the two shared (BGC and R) domains when both variables were entered into the regression equation, thus showing a mediation effect of reproductive goal.

4.4. Limitations of the present study and implications for future research

As stated earlier, due to limitations of college-age samples, two of the seven life-history traits, age and parenthood, should be viewed with caution. Although the relatively large sample allowed us to conduct analyses by age and parental status (31 parents), the sample largely consisted of young college students. This sampling limitation makes the age and parental status effects on risk-raking propensity only tentative. A larger sample of older participants will be needed to delineate the age effects. Moreover, because most participants, including the older ones, were college students, our results regarding age and parenthood effects may not be representative of older individuals in general. Future research should try to recruit participants of a wider age range and should include parents. Such a sample would be more representative of the general population. In addition, a more consistent pattern may be obtained in future work by using a risk-propensity scale with a larger number of items in each of the risk domains.

Whether life-history traits modify personality traits (such as impulsivity, self-efficacy, and sensation seeking) or vice versa is an interesting question that connects the current work with previous studies on individual differences in risk-taking and personality traits underlying risk-taking behavior. Along the same line of inquiry, future research should also examine the extent to which life-history traits are more or less powerful predictors of risky behavior than personality traits.

4.5. Conclusion

Our study was a first attempt to examine the effects of life-history traits on behavioral risk-taking propensity in different domains of risk. Our findings suggest that subjective life expectancy, age, and reproductive goal can be viewed as temporal reference points that guide risk perception and risk preference. Birth order, number of siblings, and parental status may serve as indices of resource competition and resource requirements. Taken together, the results show that risk-taking propensity is sensitive to variation in life-history traits in a domain-specific pattern.

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Appendix A. Fifteen items of the risk-propensity scale and their factor loadings

	Factor				
Domain and Questionnaire Item	1	2	3	4	5
Within-group competition					
Standing up to your boss in front of coworkers when your boss is being unfair	0.14	0.01	**0.68**	0.06	0.06
Trying to take a leadership role in any peer group you join	−0.03	0.00	**0.80**	0.10	−0.12
Physically intervening between two friends who are aggressively pushing each other, to prevent a fight	−0.04	0.30	**0.39**	−0.16	0.10
Between-group competition					
Adamantly defending the honor of your local team against a fan from a different sporting team even if it might cause a fight	−0.08	**0.66**	0.15	0.15	0.04
Sitting in the section for fans of the opposing team with a group of friends while wearing your team's colors	−0.05	**0.74**	0.05	−0.07	0.05
Driving to a rival university at night and stealing the school's flag from the flagpole at the center of campus	0.04	**0.75**	−0.12	0.10	0.03
Environmental challenge					
Chasing a bear out of your wilderness campsite area while banging pots and pans	0.34	0.19	0.03	−0.17	**0.48**
Swimming far out from shore to reach a diving platform	0.07	0.13	−0.17	0.01	**0.79**
Exploring an unknown city or section of town	−0.15	−0.23	0.31	0.14	**0.66**
Mating and RA **for mate attraction**					
Spending a large portion of your salary to buy a sporty new convertible	0.04	0.15	0.28	**0.53**	0.09
Engaging in unprotected sex during a one-night stand	0.12	0.08	−0.08	**0.73**	0.13
Maintaining long-term romantic relationships with more than one partner	0.06	0.12	−0.15	**0.71**	−0.03
Reproduction					
Getting sterilized so you cannot have children but have more leisure time and more financial flexibility	**0.83**	−0.02	0.06	−0.02	0.07
Exposing yourself to chemicals that might lead to birth defects for a high-paying job	**0.73**	0.03	−0.02	0.07	0.05
Participating in medical research that pays 0,000 but has some chance of making you sterile	**0.80**	−0.10	0.04	0.04	0.01

Note. Bold font indicates highest loading matches intended domain.

Adopted from Kruger et al. (2007). Bold font indicates highest loading matches intended domain.

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