Trait Emotional Intelligence Is Related to Risk Taking when Adolescents Make Deliberative Decisions

Angelo Panno

Department of Education, Experimental Psychology Laboratory, Roma Tre University, Via Milazzo 11B, Rome 00185, Italy; angelopanno@yahoo.it; Tel.: +39-065-733-9819

Abstract: Most forms of risky behavior reach their peak during adolescence. A prominent line of research is exploring the relationship between people's emotional self-efficacy and risk taking, but little is known about this relationship in the cognitive-deliberative domain among adolescents. The main aim of the present study consists in investigating whether trait EI (Emotional Intelligence) is positively related to risk taking under predominantly cognitive-deliberative conditions among adolescents. Ninety-four adolescents played the cold version of the Columbia Card Task one month following an assessment of their trait EI. Results showed that trait EI is associated with risk taking under cognitive-deliberative conditions among adolescents. Moreover, the present research showed that trait EI is related to risk taking through the decision makers' self-motivation. These results provide novel insights into research investigating the connections between emotional intelligence, decision science and adolescence research.

Keywords: emotional intelligence; risk taking; decision making; adolescence; emotion

1. Introduction

In the last three decades research has shown an increasing interest in investigating people's risk taking behavior. Adolescent populations offer a paradigmatic instance to study this phenomenon, as the likelihood of initiating risky behaviors is higher during adolescence than during any other developmental period (i.e., an inverted U-shaped trajectory having a peak in adolescence as well as young adulthood) (e.g., [1–6]). With this regard, recent neurobiological models have provided empirical evidence that two distinct brain systems are involved in adolescents' risky behaviors (e.g., [2,4,6]). Some authors posited that the dual-system theory tends to distinguish between a cognitive control system and a socioemotional system [2,5,6]. The former supports decision-making processes by inhibiting impulsive behavior, whereas the latter may bias decision making because it relies on impulse as well as emotional arousal [1,2,4,6]. It has been postulated that compared to adults, adolescents are more likely to behave in a risky manner, as during this developmental phase an imbalance occurs between the relative maturity of brain areas that are in charge of the socioemotional system (i.e., the amygdala, ventral striatum and nucleus accumbens) and the immaturity of the brain areas involved in cognitive control (i.e., the lateral prefrontal cortex; [1,2,4,6]). This phenomenon of adolescent risk taking has received a lot of attention, but only recently has research begun to identify the conditions and circumstances that contribute to increased risk taking in adolescents under controlled laboratory conditions. Accordingly, the current study is aimed at the investigation of risk taking under cognitive-deliberative conditions in a controlled laboratory experiment, as it seems to be relevant to the understanding of how adolescents behave in this domain (i.e., deliberative-cognitive condition).

The deliberative-cognitive system evaluates behavior from a broad and goal-oriented perspective and it takes into account both short-term and long-term outcomes. Moreover, the deliberative system is driven by moral and ethical principles on how one ought to behave (e.g., [7]). The socioemotional

system can influence the deliberative system through a specific form of emotion, such as anticipated emotion [8]. The anticipated emotion is a component of the expected consequence of the decision [9]. Loewenstein and colleagues [8] pointed out that anticipated emotion could be considered as a 'cognitive' emotion because it is expected to occur when the outcome is experienced [8] (p. 269). In other words, the decision maker simply simulates a future behavior (e.g., taking a safer or a riskier choice) and the subsequent emotional reaction. Thus, how adolescents manage these 'cognitive' emotions occurring in deliberative decision making may be a relevant factor in understanding their behavior under conditions of risk (e.g., [10,11]). According to this view, a recent meta-analysis, which supports the emotion-as-feedback theory, has pointed out that an emotional state is used as information when one is deciding to act [10]. In other words, an individual's ability to appraise an emotional state (e.g., anticipated emotion) enables them to elaborate the potential outcomes of their behavior [10]. Thus, consistent with previous research [11], in the present study a risk task specifically designed to investigate risk taking under deliberative processes has been used. This risk task triggers only anticipated emotions because it does not provide an immediate feedback after the participant's choice has been made (see below for more explanations).

From a different line of research, several researchers are showing how individual differences in the management of decision-related emotions (e.g., trait emotional intelligence, cognitive reappraisal or expressive suppression) are related to decision-making processes under conditions of risk among adults (e.g., [11–13]). Previous research also showed a relationship between cognitive abilities (e.g., IQ) and risk taking (e.g., [14]). These contributions are providing groundbreaking results which allow us to understand how people manage decision-related emotions when making decisions. For instance, good or bad potential outcomes of the decision trigger anticipated emotions and adolescents could differ in their ability to regulate these emotions, thus resulting in different ways of approaching such decisions. Emotional intelligence can provide novel insights into these relationships, explaining why some adolescents take more risk than others under the same conditions. Indeed, trait emotional intelligence (trait EI) is a higher-order personality trait including several facets (adaptability, assertiveness, emotion perception, emotion expression, emotion management, emotion regulation, impulse control, relationships, self-esteem, self-motivation, social awareness, stress management, trait empathy, trait happiness, trait optimism) that could play a mediating role in the relationship between trait EI and risk taking [15]. Empirical evidence pointed out that trait EI provides an array of benefits across various domains in both adolescent and adult populations, such as job performance, academic achievement, career success, goal orientation and mood management behavior, as well as decision making [16–19]. Personality research on trait EI has its roots in Gardner's [20] work on multiple intelligences. Based on Gardner's [20] research, the trait EI can be split into: (i) interpersonal intelligence denoting people's ability to understand the motivations and intentions as well as desires of others, and consequently to work successfully with them; and (ii) intrapersonal intelligence which refers to the ability to understand oneself and have a successful working model of one's own desires, fears, and capacities, which allows individuals to use such information successfully in regulating their own behavior [15,19,20]. Broadly speaking, the construct of EI assumes that people differ in the extent to which they process and utilize emotion-laden stimuli [15,21].

Little is known about the relationship between trait EI and risk taking under cognitive-deliberative processes among adolescents. In this research, trait EI (i.e., a construct "lying at the lower levels of personality hierarchies" [15], p. 283) is expected to be associated with risk taking under such deliberative conditions. The aim of this study was three-fold: First, it was aimed at investigating the relationship between trait EI and risk taking among adolescents. Second, the interest of the study was in testing whether trait EI facets (see below for further explanation) played a mediating role in the relationship between trait EI and risk taking. Third, the current research was interested investigating whether trait EI is associated with risk taking even when adolescents make deliberative decisions using a behavioral paradigm.

Previous research has shown a positive effect of some successful emotion-regulation strategies (e.g., cognitive reappraisal, emotional self-efficacy) on risk taking among adults (e.g., [11,22,23]). Thus, in line with previous research, I also expected a positive relationship between trait emotional intelligence and risk taking among adolescents. More specifically, in the current study, it is predicted that adolescents with greater trait EI would show increased risk taking under deliberative conditions compared to adolescents with a lower such personality trait. Nevertheless, little is known on why these successful emotional strategies revealed a positive effect on risk taking. Thus, in the present research, a positive relationship between trait EI and risk taking is also expected because specific trait EI facets (e.g., self-motivation; a goal-oriented tendency and unlikely disposition to give up in the face of adversity) could play a mediating role in this relationship, explaining this positive association.

2. Materials and Methods

2.1. Participants

Ninety-four adolescents who attend high school in a suburban area in Italy participated in the study (21% women; M_{age} = 17.23, SD = 0.7).

2.2. Measures

2.2.1. Adolescent Trait Emotional Intelligence Questionnaire-Short Form TEIQue-ASF

Adolescents' trait EI was assessed using the TEIQue-ASF [21,24]. The TEIQue-ASF was devised to measure global trait EI [21,24]. Some instances of item are: "On the whole, I'm a highly motivated person", "I try to control my thoughts and not worry too much about things", "I pay a lot of attention to my feelings", "I would describe myself as a good negotiator". Participants responded on a seven-point Likert scale, ranging from 'completely disagree' to 'completely agree'. Internal consistency for the current sample was 0.87. This 30-item form includes items from each of the 15 facets of the TEI-Questionnaire (extended version) [21,24]. In the TEIQue-ASF, authors selected items on the basis of their correlations with the corresponding total facet scores, which ensured broad coverage of the sampling domain of the construct [21,24]. The TEI facets are the following: "Adaptability, Assertiveness, Emotion perception, Emotion expression, Emotion management, Emotion regulation, Impulse control, Relationships, Self-esteem, Self-motivation, Social awareness, Stress management, Trait empathy, Trait happiness, Trait optimism" [21,24].

2.2.2. Cold Columbia Card Task CCT

Risk taking was assessed using the "cold" version of the Columbia Card Task (cold-CCT), a 24-trial computer-based measure showing 32 cards face down and a score of 0 points for each game round [25,26]. Participants indicated how many cards they wanted to turn over in the current round by clicking on one of 33 buttons (ranging from 0 to 32 cards to be turned over), which were shown on the top of the screen. Choosing more cards indicates greater potential reward, but also greater risk. Accordingly, the indicator of risk taking is the average number of cards chosen per trial with higher scores indicating greater risk taking [26]. Participants did not receive a payout. This risk task was designed to assess risk taking under deliberative conditions (i.e., when decisions are made with the involvement of mainly "cold" cognitive processes). Several studies using skin conductance measurement, self-reports and convergent validity with other measures [26] established that the cold version involves mainly deliberative cognitive processes and triggers comparatively little emotional arousal. This contrasts with the "hot" affective version of the CCT which was specifically designed to trigger substantial involvement of affective decision-making processes (the hot CCT achieves this by incorporating both immediate feedback about participants' choices and incremental stepwise risky decisions instead of the "overall" type of decisions in the cold CCT). For example, in the cold CCT participants rely more strongly on "mathematical decision strategies", whereas in the hot CCT,

they rely more on their "gut feelings" and to experience greater emotional arousal when making their decisions [25,26].

2.3. Procedure

Participants were scheduled across two separate sessions. First, participants completed the trait EI measure. The questionnaires were administered in small-group sessions of about ten adolescents. Gender and age information was also collected on this occasion. Second–one month later–they played the cold CCT. This experimental design was chosen, first of all, to more conservatively test the predictive power of the trait EI on risk taking; and second, to reduce suspicion about the goals of the research. This procedure made it more difficult for participants to realize that the research was interested in how trait EI (measured in the testing session) was related to the extent to which they took risk in the second session (see [27,28] for similar procedure).

3. Results

Analysis Plan. As a first step, to investigate the relationships between trait EI, risk taking, age and gender, the zero-order correlations were computed among these variables. In addition, to estimate the 95% CI and related statistics, the participants' risk taking on trait EI scores was regressed. As a second step, in order to gain further insight into which of the different facets of the trait EI construct were predictive of the risk taking, I computed a series of zero-order correlations among these trait EI facets and risk taking. As a final step, to investigate whether one or more trait EI facets played a mediating role in the relationship between trait EI and risk taking, I then tested a mediation model including trait EI facets as mediators, the trait EI as an independent variable and risk taking as the outcome of the model (see Figure 1, for more details). To further investigate whether these effects were affected by covariates such as gender and age, I included them in the mediation model as covariates. To test this model, I used the PROCESS macro [29]. A bootstrapping procedure (with 5000 bootstrap samples) to estimate 95% confidence intervals (95% CI) was used. According to Preacher and Hayes [30], a 95% CI that does not include zero provides evidence of a significant indirect effect. Hayes and Scharkow [31] claim the bootstrapping procedure is the most trustworthy method of assessing the effects of mediation models.

Statistical Analysis. As expected, trait EI was significantly positively associated with risk taking (see Table 1, for more details and descriptive statistics).

Table 1. Means, standard deviations and intercorrelations between trait EI, gender, age and risk taking.

	1	2	3	4
1 Risk Taking	1			
2 Trait EI	0.25 *	1		
3 Age	−0.15	−0.18	1	
4 Gender	0.06	−0.07	−0.25 *	1
M (*SD*)	12.34 (*4.96*)	4.39 (*0.8*)	17.23 (*0.7*)	

Note: Gender: men coded as 0; women coded as 1; * $p < 0.05$.

A single regression model showed a significant positive relationship between trait EI and risk taking ($\beta = 0.25$, $p < 0.05$; $B_{unstandardized} = 0.055$, 95% CI = 0.008 to 0.102; Cohen's $d = 0.51$). According to Cohen's [32] guidelines, this can be considered as a medium effect size.

A series of zero-order correlations among trait EI facets and risk taking showed that self-motivation ($r = 0.37$, $p < 0.001$), trait happiness ($r = 0.29$, $p < 0.01$) and trait optimism ($r = 0.23$, $p < 0.05$) were significantly positively related to risk taking. There were no further significant relationships between the other trait EI facets and risk taking. The zero-order correlations and the results of the regression analysis suggested that these trait EI facets (i.e., self-motivation, happiness and optimism) could play a mediating role in the relationship between trait EI and risk taking. To test

this possibility, a mediation model testing whether self-motivation, happiness and optimism played a mediating role in the relationship between trait EI and risk taking was carried out. As shown in Figure 1, the mediation model was estimated to derive the total, direct, and indirect effects of trait EI on risk taking through trait EI facets (i.e., self-motivation, trait happiness and optimism). Participants' age and gender were also entered as covariates. The analysis revealed a significant positive indirect effect of trait EI on risk taking through self-motivation (point estimate = 0.074, 95% CI = 0.029 to 0.130). In this analysis, trait happiness and optimism did not show significant results. Controlling for the covariates' effects did not change the relationships among trait EI, self-motivation, and risk taking. I also tested whether the covariates showed significant effects on risk taking and found all to be insignificant.
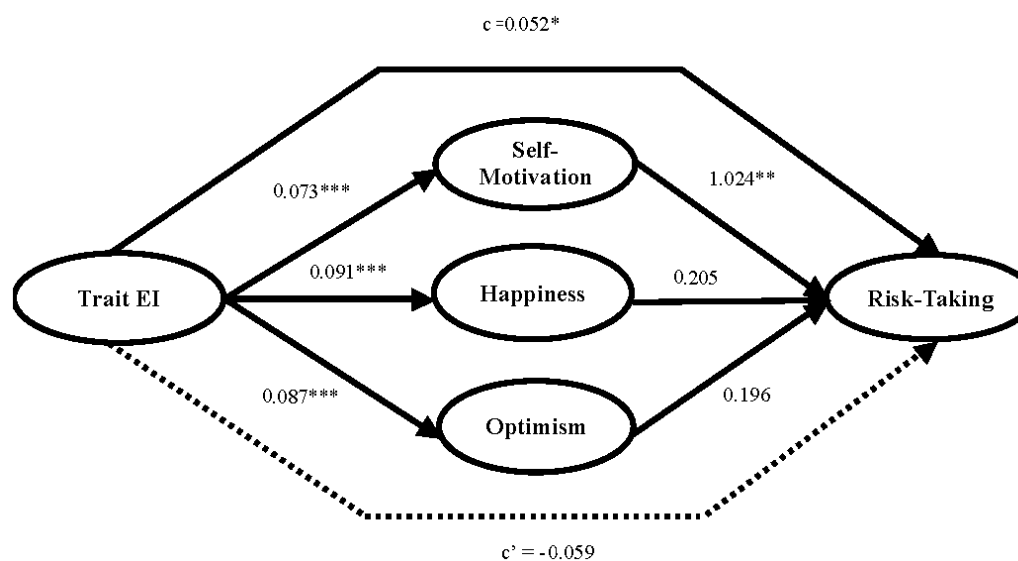
Figure 1. Mediation model showing the association between trait EI and risk taking through self-motivation, happiness and optimism. NOTE: Path values represent OLS unstandardized regression coefficients. The (c') value represents the direct effect, from bootstrapping analysis, of the trait EI on risk taking after the mediators are included. The (c) value represents the effect of the trait EI on risk taking prior to the inclusion of the mediating variables. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

4. Discussion

This study shows that adolescents' trait EI is related to risk taking even when predominantly deliberative "cold" cognitive processes are involved in the decisions. These results are consistent with previous research showing that successful emotion regulation strategies and cognitive abilities (e.g., IQ) are positively associated with risk taking (e.g., [11,13,14,23]). In comparison to earlier studies, this study is the first to show a relationship between trait EI and risk taking under deliberative conditions among adolescents. Specifically, it supports and extends the previous results of Panno and colleagues' [16] in two ways: First, it shows that trait EI is related to risk taking under cognitive-deliberative as well as affective-charged conditions. Second, the current study points out this relationship in a population of adolescents, thus extending Panno et al.'s [16] results that investigated such a relationship in an adult population. Moreover, the current study expands the previous research on emotional self-efficacy and risk taking, showing that trait EI is related to risk taking through the self-motivation facet (i.e., an enhanced goal-oriented self-regulation) (e.g., [11–13,23]). Based on the results of this research, it is tempting to speculate that emotionally intelligent adolescents take more risk under cognitive-deliberative conditions for two reasons: (i) as they are driven from an enhanced goal-oriented self-regulation and (ii) as they are unlikely to give up in the face of adversity, for example when incurring a loss. From a different point of view, one could also argue that emotionally intelligent decision makers are more confident in coping with a potentially bad outcome, and therefore they are

more prone to take risks under such conditions [14,15]. Future research is needed to explore these potential mechanisms underlying the relationship between trait EI and risk taking under deliberative conditions. The current study is aimed at providing a first step on this avenue but further research is needed in order to advance our knowledge. For example, future research should adopt a risk-taking paradigm that explicitly measures both advantageous and disadvantageous decision making to understand whether trait EI is related to advantageous decision making (see [33,34], for this paradigm).

Even though this research offers notable strengths (e.g., the use of a behavioral measure of risk taking and the scheduling of participants across two separate sessions), some limitations of the present study need to be acknowledged. For instance, these results provide insights into the relationship between trait EI and risk but do not allow causal inference. Thus, future longitudinal studies are needed to investigate a causal effect. Petrides and colleagues [15] have shown that some personality traits such as extraversion and neuroticism are related to trait EI. As it was beyond the scope of the current study to investigate all of these, I cannot rule out that some of these personality factors may moderate the relationship between trait EI and risk taking. Nevertheless, based on our results, future research might investigate whether trait EI interacts with such personality traits when adolescents take risks. Finally, an incentive-compatible paradigm was not adopted in the current research; thus, future research should use such a paradigm to understand whether adolescents behave differently, when an incentive is expected.

I used a task that does not provide an immediate feedback on participants' choice to avoid the fact that integral emotions would influence their subsequent choice (e.g., the regret or the elation that participants feel when they know the outcome of their choice). Future studies might combine this task with a psychophysiological measure detecting the activation of anticipated emotion, such as pupil dilation, and investigate psychophysiological mechanisms underlying this relationship (e.g., [35]). Miu and Crisan [36] have shown that experimentally induced cognitive reappraisal reduces susceptibility to framing effects among adults by regulating the emotions associated with the decision frames. Future studies might investigate whether trait EI—and in particular the self-motivation facet—represents a stable personality factor reducing such susceptibility among adolescents.

The present findings could have applied implications. Effective psychological interventions should take into account both adolescents' individual differences (e.g., trait EI, self-motivation) and contextual factors (deliberative-cognitive circumstances) when planning such interventions. These interventions could focus on a mathematical prerequisite to increase the abilities implicated in the decision-making process in order to control the behavior for the benefit of longer-term goals. For example, in the school context, psychological interventions could combine the development of adolescents' understanding of probability by providing them with real-world experiences and abilities in managing emotions that arise when adolescents make deliberative decisions (e.g., [37]). Since some risky behavior takes place under a cognitive-deliberative domain, then such psychological interventions could use behavioral paradigms engendering risky choices under this domain, as well as in affective-charged situations.

These findings represent a novel insight because they highlight the individual's self-motivation as a relevant factor in the relationship between trait EI and risk taking. Moreover, the effect of emotion on risk taking is typically studied in affective-charged conditions; in addition, this research shows that cognitive-deliberative circumstances deserve more attention (e.g., [16,22]). Indeed, in accordance with some theoretical accounts (e.g., [8,10]), these results point out that even though cognitive-deliberative conditions trigger less emotional arousal, adolescents' emotional self-efficacy plays a relevant role in decision-making processes under such conditions. Research lines that rely on affective forecasts in decisional processes should take into account both trait EI and cognitive-deliberative conditions (e.g., [38,39]). For example, deliberative circumstances trigger anticipated emotions with different valences (positive vs. negative); this phenomenon could give rise to a decisional conflict affecting decision-making processes (see [38,39], for more details). Based on the results of the current research, one can argue that trait EI might influence risk taking through the interaction of the decisional

conflict. Future research should shed light on these mechanisms underlying decision-making processes. Since trait EI and decision making are topics with great relevance to psychology and decision science, as well as its applications, the current study may represent a further step in a fruitful avenue of research.

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