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Positive and negative risk-taking in adolescents and adults – what we already know?

Abstract: As many risks may have detrimental outcomes to people's health or well-being, risk-taking is often viewed as negative. This negative bias has been present in scientific research, particularly on adolescent risk-taking. However, recent attention has been given to the fact that many risks taken by adolescents and adults are beneficial for their development and well-being and are accepted and supported by society. This article reviews the current literature on positive and negative risk-taking, beginning with how they are conceptualized in psychology and why a positive perspective on risk-taking is important, especially in research on adolescence and risk-taking across the lifespan. The article summarizes the current (although still scarce) research results on the relationships between positive and negative risk-taking and personality, social functioning, and decision-making. It also shows what is known so far about age differences in positive and negative risk-taking. Finally, challenges for future research on positive and negative risk-taking are discussed.

Keywords: *Positive risk-taking, negative risk-taking, adolescents, adults*

POSITIVE AND NEGATIVE RISK-TAKING

In the behavioral economic literature, the term *risk-taking* refers to choosing an option with a wide range of possible outcomes (Figner & Weber, 2011). None of these outcomes need to be negative, although in real life we usually define as risky those behaviors that may have negative consequences. As many risks may have detrimental outcomes to people's health or well-being (e.g. accidents caused by excessive speed or texting while driving), risk-taking is often viewed as negative. This negative bias has been present in scientific research, particularly on adolescent risk-taking (Willoughby et al., 2021). Young people were typically asked about taking illegal or dangerous risks (e.g. substance use; Benthin et al., 1993; Gullone et al., 2000). Also, theories explaining adolescent risk-taking were initially dominated by a deficit-based perspective (e.g. risk-taking caused by a lack of self-control; Casey et al., 2011; Shulman et al., 2016). As the field developed, greater emphasis was placed on

adolescents' ability to make thoughtful, strategic decisions (e.g. taking risks when it is profitable; Crone & Duijven-voorde, 2021; Telzer et al., 2022). More attention was also paid to the fact that many risks are beneficial to adolescents' development and well-being and are accepted and supported by society (e.g. trying a new sport, or auditioning for a play; Duell & Steinberg, 2019; 2021).

Although the concept of positive risk-taking has been developed and studied relatively recently (Duell & Steinberg, 2020; Fisher & Smith, 2004; Hansen & Breivik, 2001; Patterson et al., 2023), the recognition that risk-taking is developmentally beneficial or adaptive is not new in psychology (e.g. Arnett, 2000; Spear, 2000). Some authors (Bjork & Pardini, 2015; Romer et al., 2017) noted that the tendency to take harmful, impulsive risks occurs in a small subgroup of adolescents (and often persists into adulthood), while most people go through adolescence without experiencing serious consequences of risk-taking, such as substance addiction, premature pregnancy, or a car accident. Based on his longitudinal research, Romer (et al.,



2009) distinguished between impulsive (maladaptive) and exploratory (adaptive) risk-taking in adolescence, demonstrating that the latter is positively related to both sensation-seeking and cognitive control, which promotes learning from experience. Reyna also noted (Reyna & Farley, 2006; Reyna et al., 2015) that adolescents are not impulsive but hyper-rational (in the conventional economic sense) in assessing the benefits and costs of risks they can take. This may make them more willing (than adults) to take risks when negative consequences are unlikely (e.g. contracting HIV from unprotected sex) but also compensate for their lack of life experience (i.e. being willing to take risks in new, ambiguous situations, adolescents quickly accumulate experience).

The authors of the conceptual framework of positive risk-taking (Duell & Steinberg, 2019; 2021) note that what distinguishes positive from negative risks is not the lack of possible negative consequences (as positive risks can also end in failure, rejection, or physical harm, e.g. when an adolescent defend their peer from a bully) but social desirability and developmental benefit. Positive risks are theorized as beneficial to someone's development or well-being and socially acceptable, such as asking someone new on a date, running for a leadership position, or standing up for one's beliefs. In turn, negative risks are considered maladaptive to someone's development or well-being and typically antisocial, such as driving after drinking alcohol, stealing, or getting into fights. In practice, positive risks are usually supported by communities and social policies, while negative risks are discouraged (e.g. trying new sports vs. taking drugs; Duell & Steinberg, 2019).

Saying that positive risks are those that a person and society consider desirable raises at least two issues that are worth resolving. First, some risks are more ambiguous in terms of social acceptability (e.g. participation in street protests, or mountain climbing). For this reason, Duell & Steinberg (2021) propose to arrange risks on a spectrum: from negative, through ambiguous, to positive, also noting that how particular risks are perceived certainly vary across cultures. Second, it is worth knowing whose perspective is decisive in considering a given risk positive or negative (Patterson et al., 2023). The perception of risks may differ, for example, between adolescents and adults. Some of the risks adolescents take become more acceptable as they reach adulthood (e.g. binge drinking). Others (e.g. initiating friendships) are not considered risky by adults because they underestimate their possible negative consequences such as rejection or embarrassment. Meanwhile, social failures at a young age can be as severe as physical harm (Patterson et al., 2023). Therefore, researchers need to make sure that the risks they study are actually what people perceive them to be.

Currently, there are two self-report scales for measuring positive risk-taking. Both are designed for adolescents, contain a fairly similar set of positive risks, and demonstrate good psychometric properties. Importantly, most of their items are social activities that have typically been omitted in measuring adolescent risk-taking (e.g. Gullone et al., 2000). The Positive Risk-Taking Scale

(Duell & Steinberg, 2020) is inspired by an older tool for measuring risks without negative life outcomes (Fisher & Smith, 2004). Its items were selected based on whether they met the criteria for positive risk-taking and modified to emphasize that they may end up with some negative consequences (e.g. "Tried a new sport or played a sport you are not good at where you might have embarrassed yourself" instead of "Tried a new sport") (Duell & Steinberg, 2020). The items of the Texas Positive Risk-Taking Scale (Patterson et al., 2023) were, in turn, selected after analyzing students' free statements about the risks they took. This qualitative approach assured researchers that young people do identify behaviors such as trying out for a team or initiating a friendship as risky.

In research on positive risk-taking, negative risk-taking is also measured. For this purpose, various sets of items are used, usually selected from existing scales that include health and antisocial risks (e.g. Benthin et al., 1993; Gullone et al., 2000). The challenge is certainly the low availability of many negative risks (e.g. underaged adolescents usually do not drive), which is why researchers must pay attention to matching appropriate examples to samples of specific ages (Duell et al., 2018; Fryt et al., 2022).

Most of the existing (though still limited) research on positive and negative risk-taking has been conducted on samples of adolescents and young adults (of various age ranges), and one study has focused specifically on adults. Several studies have performed factor analysis confirming that positive and negative risk-taking are separate constructs (Duell & Steinberg, 2020; Fryt et al., 2021; Fryt et al., 2023). Most studies (Duell & Steinberg, 2020; Fisher & Smith, 2004; Fryt & Szczygieł, 2021; Fryt et al., 2022; Patterson et al., 2023) found that positive and negative risk-taking are positively correlated ($r = 0.2-0.4$), meaning that people who take positive risks (e.g. running for leadership at school or work) also take negative risks (e.g. taking drugs) to some extent. The fact that positive and negative risk-taking are correlated but distinct constructs is supported by research findings (presented below) showing that they have both common and differential correlates and vary differently with age. A summary of these study results is also provided in Table 1.

RELATIONSHIPS WITH PERSONALITY AND SOCIAL FUNCTIONING

First, both positive and negative risk-taking have been associated with greater sensation-seeking (Duell & Steinberg, 2020; Fisher & Smith, 2004; Hansen & Breivik, 2001; Patterson et al., 2023) and sensitivity to reward¹ (Fryt & Szczygieł, 2021; Wood et al., 2013), suggesting that a need for new, exciting, and rewarding experiences

¹ The term *sensitivity to reward* here refers to Gray's theory in which sensitivity to reward and punishment are manifestations of the Behavioral Activation and the Behavioral Inhibition Systems responsible for the approach and avoidance motivation (Cooper & Gomez, 2008).

Table 1. Psychological Correlates of Positive and Negative Risk-Taking

Shared correlates of positive and negative risk-taking			
Sensation seeking ¹	Duell & Steinberg (2020); Fisher & Smith (2004); Hansen & Breivik, 2001; Patterson et al. (2022)		
Sensitivity to reward ^{1, 2}	Fryt & Szczygieł (2021); Fryt et al. (2023); Wood et al. (2013)		
Low sensitivity to punishment, tolerance to ambiguity, future time perspective ²	Fryt et al. (2023)		
General risk-taking propensity ²	Fryt et al. (2022)		
Differential correlates of positive and negative risk-taking			
Positive risk-taking		Negative risk-taking	
Risk-taking in social domain ^{1, 2}	Fryt & Szczygieł (2021); Fryt et al. (2022)	Risk-taking in health & ethical domains ^{1, 2}	Fryt & Szczygieł (2021); Fryt et al. (2022)
Extraversion, openness to experience ¹	Patterson et al. (2022)	Impulsivity ¹	Duell & Steinberg (2020), Fisher & Smith (2004); Wood et al. (2013)
Tolerance to ambiguity ¹	Fryt & Szczygieł (2021)	Low sensitivity to punishment ¹	Fryt & Szczygieł (2021)
High school engagement ¹	Duell & Steinberg (2020)	Low school engagement ¹ Few challenges from school and parents	Duell & Steinberg (2020) Hansen & Breivik (2004)
Peers' positive risk-taking ¹	Fryt et al. (2021)	Peers' negative risk-taking, low perceived family support, high risk perception ¹ Risk-taking in the Balloon Analogue Risk Task (BART) ¹ Male gender ^{1, 2}	Fryt et al. (2021) Duell & Steinberg (2020) Duell & Steinberg (2020); Fryt & Szczygieł (2021); Fryt et al. (2022)

¹ Research conducted on adolescents and/or young adults; ² research conducted on adults aged 19-71

motivates both types of risk-taking. Also, our study in adults found that both positive and negative risk-taking are associated with greater risk-taking propensity² (Fryt et al., 2022), consistent with evidence that different types of risk-taking are underpinned by a general risk factor (Frey et al., 2017).

In addition to similarities, research has shown that positive and negative risk-taking also have differential correlates. First, studies have consistently shown that gender differentiates negative but not positive risk-taking (Duell & Steinberg, 2020; Fryt & Szczygieł, 2021; Fryt et al., 2022). In risk research, gender differences are usually explained in terms of risk perception (e.g. women perceive risks as more risky than men in all domains except social; Figner & Weber, 2011). The lack of gender differences in positive risk-taking may therefore mean that men and women perceive its possible consequences similarly (however, this needs to be confirmed). Second, impulsivity,

a personality trait often linked to risk-taking, was found to be associated with negative but not positive risk-taking (Duell & Steinberg, 2020; Fisher & Smith, 2004; Wood et al., 2013). This supports current theories that only some risks are taken on the spur of the moment or to obtain an immediate reward (Duell & Steinberg, 2019; Telzer et al., 2022). Third, positive risk-taking showed exclusive associations with extraversion and openness to experience (Patterson et al., 2023). Also, our adult studies using the DOSPRT scale (Blais & Weber, 2011) have shown that positive risk-taking is associated with the propensity to take risks in the social domain, while negative risk-taking with the propensity to take risks in the ethical and health/safety domains (Fryt et al., 2022) or in all domains except social (Fryt & Szczygieł, 2021). This suggests that social interactions are a domain of positive risk-taking. Perhaps sociable or more socially competent individuals are less averse to possible failures associated with positive risks (a hypothesis worth testing in future research).

In addition to the above, there are two other characteristics for which it is unclear whether they are related to positive or negative risk-taking or both. One of our studies on adolescents and young adults (Fryt &

² The term refers to overall risk-taking propensity, which in the mentioned study was measured by the question: "How would you rate your risk propensity? on a scale from 1 – I am not willing to take risks to 10 – I am very willing to take risks".

Szczygieł, 2021) exclusively associated positive risk-taking with greater tolerance to ambiguity, suggesting that many positive risks may be driven by the willingness to do complex and unpredictable things. Negative risk-taking was, in turn, associated with lesser sensitivity to punishment, which seems consistent with evidence that people who take negative risks perceive them as not very risky (Fryt et al., 2021; Reniers et al., 2016). However, in our other study in adults aged 19-71 (Fryt et al., 2023), both characteristics were associated with both positive and negative risk-taking. Moreover, the latent profile analysis performed in this study showed that individuals in the profile characterized by lesser sensitivity to punishment and greater tolerance to ambiguity, as well as greater future time perspective³ and sensitivity to reward, took more positive and negative risks. Conversely, individuals in the profile characterized by greater sensitivity to punishment and lesser tolerance to ambiguity, future time perspective, and sensitivity to reward, took less positive and negative risks. This finding suggests that tolerance for loss and ambiguity may be key factors that distinguish risk-prone and risk-averse adults. In addition, the result regarding future time perspective opens an exciting avenue for research on positive and negative risk-taking and well-being across life.

Finally, some studies have looked for associations between positive and negative risk-taking and young people's social functioning. First, positive risk-taking was associated with greater and negative risk-taking with lesser school engagement (Duell & Steinberg, 2020). Although the mechanism behind this relationship is not clear, it suggests that schools can increase academic engagement by offering opportunities for positive risk-taking. It also seems consistent with findings from an older study (Hansen & Breivik, 2001) that few challenges from school and parents are associated with negative but not positive risk-taking. Second, positive risk-taking has been associated with peers' positive risk-taking and negative risk-taking with peers' negative risk-taking (Fryt et al., 2021), suggesting that young people take risks that their close peers also take. Third, in the same study, we found that both positive and negative risk-taking are associated with low perceived family support (however, the association with positive risk-taking was revealed mainly in the youngest adolescents). Prior work has shown that a supportive family reduces negative risk-taking (Reininger et al., 2012). It appears it may also reduce positive risk-taking, especially at a young age. Perhaps, supportive parents want their children to avoid the possible negative consequences (e.g. rejection, failure) of some positive risks, however, this needs to be confirmed.

Together, the results presented above suggest that, despite important similarities (e.g. sensation seeking), positive risks are taken in different domains than negative

risks (e.g. social) and, perhaps, serve different goals (e.g. long-term, related to self-development or well-being). Certainly, what we know so far about correlates of positive and negative risk-taking opens many avenues for future research.

RELATIONSHIPS WITH DECISION-MAKING

In addition to risks taken in real life and measured by self-report scales, risk-taking is also studied in laboratory settings using decision-making tasks (Figner & Weber, 2011). Although there are no tasks that specifically measure positive and negative risk-taking, some studies have looked for relationships between positive and negative risk-taking in real life and risk-taking (or related variables) in decision-making tasks (Duell & Steinberg, 2020; Duell et al., 2022). The purpose of such research was to examine whether positive and negative risk-taking might be associated with similar or different decision-making patterns (e.g. whether propensity for positive risk-taking may be associated with more optimal task performance than negative risk-taking).

There is reason to believe that positive risk-taking may be associated with better (i.e. more rational) decision-making than negative risk-taking. Decision-making competence (DMC, the ability to follow normative principles when making decisions, which is similar but distinct from other cognitive abilities such as intelligence and executive functions; West et al., 2008; Stanovich et al., 2016) has been negatively associated with negative risk-taking, such as marijuana use, early sexual behavior, and delinquency. It was also positively associated with positive aspects of adolescents' and young adults' functioning, such as a supportive peer and family environment (Parker et al., 2005; 2018). Although DMC has not previously been studied as a correlate of positive risk-taking, it seems possible that people with high levels of it may engage in risks that are considered beneficial and socially acceptable.

So far, older and more recent studies have shown that negative risk-taking is associated with greater risk-taking on the Balloon Analogue Risk-Taking Task (BART; Lejuez et al., 2002; Duell & Steinberg, 2020). In this task, people earn points by inflating balloons that explode after an unknown (i.e. variable) number of pumps. Also, our recent, yet unpublished study using the Balloon Emotional Learning Task (BELT; Humphreys et al., 2013) showed that negative risk-taking is associated with greater risk-taking (i.e. more pumps and explosions) and lesser sensitivity to negative feedback. The BELT is a modification of BART that includes additional conditions in which balloons explode after a fixed number of pumps, allowing people to estimate the probability of explosions. Interestingly, the study found that negative risk-takers scored fewer points on the task when the probability of negative consequences (i.e. explosions) was high, but more points when it was low, meaning that negative risk-taking is associated with less or more optimal decision-making, depending on task conditions.

³ The term *future time perspective* here refers to whether people perceive their future time as open-ended or limited and how many opportunities and plans they see ahead, according to the theory of Carstensen et al. (1999).

Unlike negative risk-taking, positive risk-taking appears to have little to do with risk-taking in decision-making tasks. Research conducted so far (Duell & Steinberg, 2020; Duell et al., 2022) has not found any relationships between positive risk-taking and risk-taking in the BART, Stoplight⁴, or Cups⁵ tasks. Similarly, our above-mentioned study using BELT showed that associations between positive risk-taking and risk-taking or points earned in the task are less evident than associations between these variables and negative risk-taking. One possible explanation for these results may be the lack of social context in the tasks used, although this needs to be confirmed in future studies. Perhaps, the social aspect of positive risk-taking is such an important characteristic that to study it in the laboratory we need a task in which risk is part of the interaction with people.

Taken together, research to date suggests that taking risks in decision-making tasks has more to do with taking negative than positive risks in real life. It also does not support the idea that taking positive risks is associated with making optimal decisions. Instead, it suggests that negative risk-taking is not necessarily associated with suboptimal decision-making. These are intriguing results, but there are still too few to draw clear conclusions.

AGE PATTERNS IN POSITIVE AND NEGATIVE RISK-TAKING

In addition to the above, some research has focused on how positive and negative risk-taking vary with age. In a large international sample of people aged 10-30, Duell et al. (2018) observed that two types of negative risk-taking: antisocial and health risk-taking varied with age in the form of an inverted U-shape and peaked in different decades of life: the second and third. Partially consistent results were obtained in our study of people aged 12-71, which also examined positive risk-taking (Fryt et al., 2022). Positive risk-taking (measured with the scale of Duell and Steinberg, 2020) and health risk-taking (i.e. drinking alcohol, smoking cigarettes, and smoking marijuana) varied with age in the form of an inverted U-shape and were highest in middle adulthood (around the age of 40). In turn, antisocial risk-taking (i.e. getting into a fight, threatening someone, vandalism, and stealing) varied with age in the form of a U-shape and was highest in the teenage years. Worth noting that age explained less than 5% of the variability of positive risk-taking, so it varied little across ages 12-71.

Age differences in antisocial and health risk-taking are typically explained in the literature by differences in opportunity (e.g. adults, unlike adolescents, have less limited access to psychoactive substances, while social

responsibilities, such as being an employee or parent, make them avoid antisocial risks; Duell et al., 2018; Willoughby et al., 2021). The finding that positive risk-taking varies little with age is in line with the view that each period of life offers opportunities for taking positive risks (Duell & Steinberg, 2021). In a broader context, the obtained results are consistent with the research on risk-taking propensity across the lifespan (e.g. Josef et al., 2016; Mata et al., 2015). According to it, the inclination to take risks reaches its highest levels around middle adulthood, although notable variations across domains emerge (e.g. risk-taking in the social domain is more stable across age than risk-taking in non-social domains; Josef et al., 2016).

CHALLENGES FOR FUTURE RESEARCH

Future research on positive and negative risk-taking can be pursued in a variety of exciting directions. To make this research better, it may be worth addressing questions that have arisen as a result of what we already know.

How do people perceive positive and negative risks?

When planning studies among people of a specific age, social status, and cultural background, researchers should be sure that they are examining risks that are available and considered risky in a given sample. Hopefully, as the field develops, the measures of positive and negative risk-taking will expand to include examples relevant to different stages of life (e.g. for seniors). However, it is worth examining not only how often people take certain risks, but also how they perceive their possible costs and benefits (e.g. Bonem et al., 2015). It is important to remember that risks are behaviors with a wide range of possible consequences (Figner & Weber, 2011). Positive risks are likely to be perceived as having lower costs than negative risks (Fryt et al., 2021). How people perceive the benefits of positive and negative risks has not been studied so far, and determining this is crucial for the theory of positive risk-taking, which assumes that a person taking a positive risk needs to gain something, e.g. for their development or well-being (Duell & Steinberg, 2019). An important goal will also be to determine whether age differences in positive and negative risk-taking may result from differences in risk perception (e.g. older people may perceive some risks as more enjoyable and less likely to produce losses than young people; Bonem et al., 2015).

How to compare positive and negative risk-taking?

A single scale of negative risk-taking should be created and used to make negative risk-taking comparable across studies. Scales for measuring positive and negative risk-taking should be compatible so that these types of risk can be compared. This means that it is worth having the same number of items and response format, but not the examples of risks that people take similarly often or perceive their possible costs and benefits similarly. Positive risks are likely to be taken more often than negative risks (Duell & Steinberg, 2020; Fryt et al., 2021). Also, it is possible that the benefits of positive risks outweigh their costs, and the costs of negative risks outweigh their benefits

⁴ In the Stoplight game (Steinberg et al., 2008), people are asked to drive a car across a road with changing traffic lights in the shortest time possible. Stopping at a yellow light is a safe option, not stopping is a risky option.

⁵ In the Cups task (Levin & Hart, 2003), people choose between cups hiding certain, small rewards (safe option) and cups hiding uncertain, larger rewards (risky option).

(although this needs to be confirmed). Finally, for some risks (especially those undertaken infrequently or for the first time), people may have difficulty estimating their possible costs and benefits.

Do we need to think about positive and negative risk-takers as separate groups? Positive and negative risk-taking are separate constructs, but they positively correlate with each other (e.g. Duell & Steinberg, 2020). Depending on research questions, researchers may focus on what distinguishes positive and negative risk-takers or risk-prone and risk-averse individuals. In the first case, it is worth noting that positive risk-taking may account for a part of the variability of negative risk-taking and vice versa (e.g. when examining predictors of positive risk-taking, it may be a good idea to include negative risk-taking among them). In the second case, it is worth controlling variables that may cause risk-prone individuals to take more positive or negative risks (e.g. gender). Certainly, more research is needed to determine whether and how variables such as social status, education, employment, and health may influence positive or negative risk-taking (e.g. Fryt et al., 2022).

Can we say that positive risk-taking is social, thoughtful, and adaptive, and negative risk-taking is antisocial, impulsive, and maladaptive? As the field of research on positive and negative risk-taking develops, we know more and more about their characteristics, but we also ask more precise questions. First, positive risk-taking has been associated with extraversion and propensity to take risks in the social domain. Does this mean that most positive risks are social risks? Or, is negative risk-taking associated with the tendency to violate social norms, and positive risk-taking with the tendency to comply with them? Second, negative risk-taking has been associated with impulsivity. Does this mean that most negative risks are taken due to a lack of self-control and most positive risks are taken thoughtfully? Or can we say that negative risks serve short-term goals and positive risks serve long-term goals? Third, negative but not positive risk-taking has been associated with decision-making in tasks such as BART. Taking harmful risks has also been linked to poor decision-making competence. Is positive risk-taking associated with making better (i.e. more rational) decisions, and negative risk-taking with making worse decisions? Can we say that the benefits of positive risks outweigh their costs (so it is wise to take them), and the costs of negative risks outweigh their benefits (so it is not wise to take them)? Answers to these questions will certainly help refine the theory of positive and negative risk-taking. Creating a task to measure positive risk-taking and finding other aspects of decision-making that may be related to positive and/or negative risk-taking can help researchers find these answers.

As a conclusion, it is worth emphasizing why research on positive and negative risk-taking is important for psychological theory and practice. This research supports a positive perspective on risk-taking, which is particularly needed in fields that have been previously dominated by a negative, deficit-based perspective (e.g.

adolescent risk-taking). Recognizing that many risks can be beneficial to young people's development and well-being opens up avenues for promoting them as alternatives to health and antisocial risks (Duell & Steinberg, 2019). It also challenges a negative stereotype of adolescents who make rash decisions and engage in many dangerous activities. Since this stereotype can act as a self-fulfilling prophecy and set adolescents' standards for their behavior, changing it may contribute to changing their behavior and improving their well-being (as they think better about themselves) (Telzer et al., 2022). Overcoming the negative perspective on risk-taking may have a similar effect in groups other than adolescents, e.g. seniors, for whom taking positive risks may be a way to increase autonomy and satisfaction with life (Duell & Steinberg, 2021). Future research on positive and negative risk-taking and well-being across the lifespan will likely show more benefits that people can derive from taking risks.

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