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Developmental psychology

Development and validation of the Adolescent and Young Adult Risk-Taking Inventory: An ecological risk-taking measure



Développement et validation de l'inventaire de prise de risque des adolescents et des jeunes adultes (Adolescent and Young Adult Risk-Taking Inventory) : une mesure écologique de la prise de risque

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ABSTRACT

Objectives. – Risky behaviors are predominant during adolescence and young adulthood but there is no tool adapted to a non-North American context for assessing risk-taking at these two stages of development. The present study aims to develop and validate the Adolescent and Young Adult Risk Inventory (AYARTI), which can be used jointly in adolescent and young adult populations.

Material and methods. – Three French samples were recruited ($n = 174$ young adults; $n = 177$ young adults; $n = 310$ adolescents). A pool of 29 items was generated, 13 items were selected by a committee of experts and administered to participants with a personality scale and an impulsivity scale.

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Results. – A selection of items based on factorial analysis resulted in a 12-item version. The results show that AYARTI is made up of two factors, transgressive and social behaviors, and overtaking behaviors. However, three factors can be distinguished in young adults: transgressive behavior, social behavior and overtaking behavior. The relationship with other variables has also been demonstrated for impulsivity and personality dimensions.

Conclusions. – The AYARTI appears to be a promising instrument for comparative and longitudinal use of engagement in risky behaviors throughout adolescence and young adulthood.

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R É S U M É

Mots clés :

Comportements à risque
Adolescence
Jeune adulte
Développement d'échelle
Validation psychométrique

Objectifs. – Les comportements à risque sont prédominants à l'adolescence et chez les jeunes adultes, mais il n'existe pas d'outil adapté à un contexte non nord-américain pour évaluer la prise de risque à ces deux stades de développement. La présente étude vise à développer et à valider l'Inventaire des risques chez l'adolescent et le jeune adulte (AYARTI), qui peut être utilisé conjointement dans les populations d'adolescents et de jeunes adultes.

Matériel et méthode. – Trois échantillons français ont été recrutés ($n=174$ jeunes adultes ; $n=177$ jeunes adultes ; $n=310$ adolescents). Un pool de 29 items a été générés, 13 items ont été sélectionnés par un comité d'experts et administrés aux participants avec des échelles de personnalité et d'impulsivité.

Résultats. – Une sélection d'items basée sur une analyse factorielle a abouti à une version de 12 items. Les résultats montrent que l'AYARTI est composé de deux facteurs, les comportements transgressifs et sociaux, et les comportements de dépassement. Cependant, trois facteurs peuvent être distingués chez les jeunes adultes : les comportements transgressifs, les comportements sociaux et les comportements de dépassement. La relation avec d'autres variables a également été démontrée pour l'impulsivité et les dimensions de la personnalité.

Conclusions. – L'AYARTI semble être un instrument prometteur pour une utilisation comparative et longitudinale de l'engagement dans des comportements à risque au cours de l'adolescence et de la vie de jeune adulte.

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1. Introduction

Risk-taking behaviors can be defined as behaviors with an uncertain outcome involving a probable loss as well as an opportunity to obtain rewards (Duell & Steinberg, 2021). This generic term includes behaviors that differ in various aspects. Some behaviors present immediate risk (e.g., break a leg while playing a risky sport) and/or long-term risks (e.g., develop lung cancer from smoking tobacco for years); present a risk to oneself (e.g., bumping into someone weird while going on a date with a stranger) and/or to others (e.g., causing a road accident by driving excessively fast). Some behaviors are perceived as negative within society (e.g., drug use), while others are valued (e.g., starting a business). Finally, risks and benefits may have different consequences, including financial, social, physical, emotional, or even ethical consequences (Osmont, Aïte, & Habib, 2022).

Some authors propose to assess engagement in risk-taking through a general risk-taking factor, while others consider risk-taking to be a multifactorial process. Proponents of a global assessment of risk-taking engagement argue that the presence of a general risk-taking factor explains some of the common variance observed across risk-taking domains, independent of differences in risk preferences between these domains (Zhang, Highhouse, & Nye, 2019). In other words, individuals who are more committed to risk-taking may exhibit varying levels of commitment depending on the situation, but they generally tend to be more willing to take risks. This argument is supported by several studies that indicate that domain specificity in risk-taking is attributed to domain-specific perceptions of risk and reward, while general risk propensity remains constant across different situations (Blais & Weber, 2006). Furthermore, Frey et al. (2017) also found evidence of a general risk-taking factor with a high level of temporal stability through the examination of 39 risk preference measures.

However, several arguments in favor of a multifactorial assessment of risk-taking have been put forward in the literature (Blais & Weber, 2006; Duell & Steinberg, 2020; Gullone, Moore, Moss, & Boyd, 2000). Take, for example, a scenario in a classroom or meeting room, where three adolescents or young adults stand out because of their different characteristics. The former regularly indulges in recreational drug use with friends. He is generally drawn to risky new activities, seeking the excitement of breaking the rules. The second adolescent, on the other hand, prefers sporting activities that challenge him to push back his own limits. Finally, the third, more solitary, immerses himself in individual activities such as reading or playing video games. In this example, the first two individuals take risks, while the third avoids them. The first two individuals then both share a general propensity to engage in risk-taking, but the behaviors in which they engage are very different. Furthermore, it is essential to take into account the diversity of risk-taking behaviors, as the consequences associated with them can again be very different (Osmont, Camarda, Habib, & Cassotti, 2021). As all consequences of risk-taking not being equivalent, the use of multifactorial assessment scales is recommended (Blais & Weber, 2006; Duell & Steinberg, 2020; Gullone et al., 2000). Although risk-taking is prevalent in adolescence and early young adulthood (Dahl, 2004; Duell et al., 2018; Ernst, 2014; Steinberg et al., 2018), consequences of risk-taking differ. For example, alcohol consumption is prevalent in adolescence and young adulthood (Chung et al., 2018; Curtis et al., 2018), but consequences associated with it differ in many countries like France, since it is illegal before the age of 18.

1.1. Risk-taking in adolescents and young adults

Adolescence and young adulthood are two periods of development between childhood and adulthood. Adolescence is characterized by physical changes (i.e., growth spurts, changes in body mass, sexual maturation), psychological changes (i.e., emotional intensity and lability, romantic aspirations, feelings of invulnerability) and social changes (i.e., distancing from adults and children, primacy of peer relationships; Blakemore, Burnett, & Dahl, 2010; Dahl, 2004; Ernst, Pine, & Hardin, 2006; Forbes et al., 2010). The age ranges of individuals classified as adolescents vary widely from one study to another (Galvan et al., 2012; Sawyer et al., 2018). Given the difficulty in precisely defining the period of adolescence, Galvan et al. (2012) propose categorizing individuals into specific age groups based on their school year. This approach allows grouping individuals according to the stages of elementary school, middle school, and high school, corresponding to children, pre-adolescents, and older adolescents respectively. These classification challenges highlight the importance of using tailored measurement tools when studying this population. Indeed, measurement instruments must account for the variability within the different stages of adolescence. Young adulthood or emerging adulthood, is a period between adolescence and adulthood that ranges between 18 and 29 years and is characterized by instability (e.g., moving house), identity exploration (e.g., in love and at work), feeling in-between (i.e., neither adolescent nor adult), self-focus (e.g., learning to stand on one's own two feet) and a range of possibilities (e.g., choices and opportunities about the future; Arnett, 2000; 2004). It is important to note that in France, half of all young adults aged 21 are students (INSEE, 2023). Moreover in France, the length of studies and the age of first full-time employment are increasing, with the result that more and more young adults aged 25 and over are still students (Lannegrand-Willems, Sabatier, & Brisset, 2011). It is important to emphasize that, adolescence and young adulthood are two periods

of development characterized by identity upheavals, during which the new possibilities offered by the environment play an important role in individual behaviour.

Adolescence and young adulthood are widely described in the literature as a time of increased risk-taking compared with childhood and adulthood (Dahl, 2004; Duell et al., 2016; Ernst, 2014; Steinberg et al., 2018). Indeed, adolescents' increased involvement in risk-taking has been shown to increase morbidity and mortality rates during this period (Dahl, 2004; Blakemore, 2018). Note that some risk-taking behaviors emerge during adolescence, such as alcohol and drug use or risky sexuality (Boyer, 2006; Szucs et al., 2020; Yellman, Bryan, Sauber-Schatz, & Brener, 2020; Zelnik & Kantner, 1980). The emergence of these risk-taking behaviors during adolescence can be explained by the process of empowerment in relation to parents, the importance of peer relationships, and new environmental opportunities that did not exist during childhood (Blakemore et al., 2010). Risk-taking behaviors initiated in adolescence can then continue into young adulthood (Chassin, Pitts, & Prost, 2002; Maggs, Almeida, & Galambos, 1995). In addition, new risk-taking behaviors may emerge in early adulthood because of the new opportunities offered by the environment, such as reckless driving (Massie et al., 1995). The persistence of risk behaviors initiated in adolescence and the adoption of new behaviors in early adulthood can be explained by the identity exploration underway during this period and by the range of new opportunities offered by the environment at this time (Arnett, 2000; 2004).

1.2. Risk-taking assessment scales

Questionnaires exist to assess general risk-taking behavior (e.g., General Risk Propensity Scale – GriPS, Zhang et al., 2019; Marton, Monzani, Vergani, Pizzoli, & Pravettoni, 2023). However, in regard to assessing specific risk-taking domains, existing questionnaires are either adapted for adolescents (e.g., Adolescent Risk-Taking Questionnaire – ARQ, Gullone et al., 2000; Duell & Steinberg questionnaire, 2020) or for adults (e.g., Domain Specific Risk-Taking – DOSPERT, Blais & Weber, 2006), none for young adults specifically. The ARQ is composed of 4 factors: thrill-seeking behaviors, defined as generally socially accepted behaviors with low negative consequences; rebellious behaviors and antisocial risky behavior, defined as factors with more likely negative social or legal consequences, rather than life-threatening consequences; and reckless risky behaviors, corresponding to stereotypical risk-taking behaviors. The Gullone et al. (2000) questionnaire is composed of a general negative risk-taking factor defined as socially unacceptable behaviors with significant potential costs and a general factor of positive risk taking defined as socially acceptable behaviors that are unlikely to result in a negative life outcome. Finally, the DOSPERT is composed of 5 factors covering the major decision areas (MacCrimmon & Wehrung, 1990), which are ethical, financial, health/safety, recreational and social domains. The number of factors differs from one risk-taking scale to another, while some of the behaviors assessed are similar. For example, the notion of alcohol consumption can be found in the different scales, but in distinct factors: *rebellious behaviors* in the ARQ, *health and safety* in the DOSPERT and *negative risk-taking* in the Duell & Steinberg questionnaire.

Moreover, the current risk-taking behavior scales have several limitations. First, as they had been developed just for adolescents or adults, they do not allow for group comparisons due to too specific items (e.g., the item *leaving school* or the item *investing 5% of your annual income in a very speculative stock*). Some of the items used are also too specific to a particular field (e.g., the item *Tao Kwon Do fighting*) and do not represent the most significant behaviors in the target population (e.g., the item *taking a skydiving class*). Items may be obsolete with respect to current behaviors (e.g., the item *sniffing gas or glue*). Finally, because of the legislative and cultural context, some items are not adapted to the non-North American context, including all items relating to driving that do not concern adolescents (e.g., the Geneva Convention on Road Safety sets the minimum driving age at 18 with the exception of 4 member countries that have set the legal age at 17; United Nations, 1949) and the carrying or use of firearms (e.g., prohibited or highly regulated in several countries such as most European countries, Australia, Japan or Canada).

1.3. Risk-taking, personality and impulsivity

Not all adolescents and young adults engage in risky behavior in the same way. Indeed, engagement in risk-taking behaviors is closely linked to interindividual differences. Personality, as described in the Big Five model is frequently identified as a key determinant of engagement in risk-taking behaviors (for reviews, see [Buelow and Cayton, 2020](#); [McEwan et al., 2019](#); [Plaisant, Courtois, Réveillère, Mendelsohn, & John, 2010](#)). In fact, general risk-taking behaviors are closely related to personality traits, particularly a high level of extraversion and a low level of agreeableness and openness ([Joseph & Zhang, 2021](#)). Specifically, health/safety, reckless behaviors and rebellious behaviors are associated with high levels of extraversion, low levels of neuroticism and, depending on the items, openness and agreeability. Antisocial and social behaviors are associated with high levels of extraversion and openness, a low level of conscientiousness, and, depending on the items, agreeability. Recreation and thrill-seeking behaviors are associated with high levels of extraversion, agreeability and openness and low levels of neuroticism ([Gullone & Moore, 2000](#); [Joseph & Zhang, 2021](#); [Nicholson, Soane, Fenton-O’Creedy, & Willman, 2005](#)). Finally, research evidence has supported a link between risk-taking and impulsivity, particularly for all transgressive consumption behaviors ([Bıçaksız and Özkan, 2016](#); [Lejuez et al., 2002](#); [Martínez-Loredo et al., 2015](#); [Pietruska and Armony, 2013](#); [Pechorro, Ayala-Nunes, Ray, Nunes, & Gonçalves, 2016](#); [Stamates & Lau-Barraco, 2017](#); see [Stanford et al., 2009](#) and [Stautz & Cooper, 2013](#) for meta-analysis), although one study has questioned these links ([Demidenko, Huntley, Martz, & Keating, 2019](#)).

1.4. The current study

The main objective of the present study is to develop and psychometrically validate a new risk-taking behavior questionnaire that can be used with adolescents and young adults in an ecological context, the Adolescent and Young Adult Risk-Taking Inventory (AYARTI). By ecological context, we refer to the relevance and applicability of the items in real-life contexts of adolescents and young adults. In fact, the AYARTI aims to assess daily engagement in salient risk behaviors by basing item selection on risk-taking behaviors identified in the literature as frequently observed and significant in target populations. Firstly, the aim of the AYARTI was to assess engagement in risk behaviors involving the transgression of established rules or laws. The diversity of consequences associated with these behaviors highlights the importance of avoiding over-generalized elements in assessments in order to develop more targeted preventions adapted to the specific characteristics of each transgressive behavior ([Duell & Steinberg, 2020](#)). We have therefore adopted an approach that makes it possible to assess the predominant behaviors in adolescence and early adulthood. To achieve this, 3 items were adapted from existing questionnaires (for example, item 25 of the [Duell & Steinberg \(2020\)](#) questionnaire *decided to skip class even though you could get in trouble and fall behind on your schoolwork?* was adapted by *skipping a class, a meeting or a professional appointment*), three items were translated (for example the ARQ *drug use* item) and one item was created (*defrauding/taking public transport without paying*). Secondly, the AYARTI aimed to assess engagement in risk-taking behaviors with mainly social consequences. As the consequences associated with social risk behaviors are relatively similar, we adopted a more general approach to these behaviors. To enable adolescents and young adults to identify with this dimension of risk-taking, we avoided including items that were too specific and unrepresentative. In this way, two items were adapted from existing questionnaires (for example, item 27 of the [Duell & Steinberg \(2020\)](#) questionnaire *sent sexy messages or pictures to someone?* was adapted to *send sexy pictures of yourself to someone*). One item has been created for the purposes of the study (*going to an appointment with a stranger*). Thirdly, the AYARTI aimed to assess engagement in risk-taking behaviors focused on searching for self-improvement and sensations. Here again, a general approach to these behaviors was adopted to enable adolescents and young adults to identify with this dimension of risk-taking, avoiding items that were too specific and unrepresentative. In this way, three items were created and inspired from existing questionnaires (for example, *practicing a risky sport*). Thus, the AYARTI proposes both new items and adaptations of existing items in the current scales (translated with a blind parallel method and/or adapted items) on the basis of their representativeness of the adolescent and young adult populations, their general aspect, their adaptability to a non-North American context and their transposability to other cultures, particularly European ones.

Table 1
Sociodemographic information for samples 1, 2 and 3.

	Young adults			Adolescents
	Sample 1	Sample 2	Samples 1–2	Sample 3
<i>n</i>	174	177	351	310
Age <i>M</i> (<i>SD</i>)	21.76 (1.93)	21.77 (1.89)	21.76 (1.91)	13.52 (1.63)
Age range	18–28	18–25	18–28	10–17
Women %	45.98	51.41	48.69	42.90

Following the standards for educational and psychological testing (AERA et al., 2014), we can assume that, regarding evidence based on internal structure, the AYARTI will be composed of three factors. A first factor of *transgressive behaviors* of law established rules or laws, grouping together items from the DOSPERT health/safety factor, ARQ rebellious behaviors and *negative risk-taking* behaviors from the Duell & Steinberg questionnaire; a second factor of *social behaviors* which have mainly social consequences, grouping together items from the DOSPERT social factor and ARQ antisocial behaviors; and a third factor of *overtaking behaviors* which have consequences that are generally socially accepted in society, grouping together items from the DOSPERT recreational factor and ARQ thrill-seeking behaviors. We expected to find positive bivariate correlations between these three factors, as in the existing questionnaires.

To address psychometric validity based on the relationship with other variables, the AYARTI is thus expected to be similarly correlated as the ARQ, the DOSPERT and the Gullone et al. (2000) with personality and impulsivity variables. Similar to health/safety, reckless and rebellious behaviors in the existing questionnaire, the *transgressive behaviors* factor is expected to be positively correlated with extraversion and openness and negatively correlated with neuroticism. It is also expected to correlate with agreeableness (Gullone & Moore, 2000; Joseph & Zhang, 2021; Nicholson et al., 2005). Similar to antisocial and social behaviors in the existing questionnaire, the *social behaviors* factor is expected to be positively correlated with extraversion and openness and negatively correlated with conscientiousness. It is also expected to correlate with agreeableness (Gullone & Moore, 2000; Joseph & Zhang, 2021; Nicholson et al., 2005). Similar to recreation and thrill-seeking behaviors, the *overtaking behaviors* factor is expected to be positively correlated with extraversion, agreeableness and openness and negatively correlated with neuroticism (Gullone & Moore, 2000; Joseph & Zhang, 2021; Nicholson et al., 2005). Finally, given the correlations between impulsivity and risk-taking in general (Lejuez et al., 2002), the AYARTI factors are expected to be correlated with impulsivity.

2. Method

2.1. Samples and procedures

Two French young adult samples were recruited, namely, sample 1 ($n = 174$; $M = 21.76$; $SD = 1.93$, $Min = 18$, $Max = 28$, 45.98% women) and sample 2 ($n = 177$; $M = 21.77$; $SD = 1.89$, $Min = 18$, $Max = 25$, 51.41% women), and one French adolescent sample, namely, sample 3 ($n = 310$; $M = 13.52$; $SD = 1.63$, $Min = 10$, $Max = 17$, 42.90% women; see Table 1). Participants in samples 1 and 2 were recruited thanks to funding obtained through a call for projects. For these samples, data were gathered electronically using a Crowd Panel (Qualtrics) with compensation for samples 1 and 2. These samples were pooled for analysis and constituted the young adult sample. For sample 3, the adolescent sample, participants were recruited through secondary schools using paper-and-pencil questionnaires. Parents were informed and provided consent. All participants consented to complete self-report questionnaires on a voluntary basis and confidentially.

2.2. Development of the AYARTI

A pool of 29 items was generated based on existing questionnaires. More specifically, some items were translated (e.g., the item *taking drugs* from the ARQ), and some items were adapted (e.g., the

Table 2
Results of the exploratory factor analysis on the items of the AYARTI (samples 1–2).

AYARTI items	13-item			12-item		
	1	2	3	1	2	3
1. S'écher un cours, une réunion ou un rendez-vous professionnel <i>Skip a class, meeting, or business appointment</i>	.41	.02	-.08	.42	.01	-.07
2. Rentrer seul.e la nuit dans un quartier dangereux <i>Going home alone at night in a dangerous neighborhood</i>	.39	.14	.12	.40	.07	.12
3. Aborder une personne qui vous plaît <i>Approach a person you like</i>	-.06	.56	.15	-.02	.50	.18
4. Vous rendre à un rendez-vous avec un.e inconnu.e <i>Go on a date with a stranger</i>	-.04	.81	-.02	-.04	.84	-.01
5. Sortir sans l'autorisation de vos parents/Sortir alors que vous travaillez le lendemain <i>Going out without your parents' permission/Going out while you are working the next day</i>	.54	-.06	.02	.54	-.05	.02
6. Envoyer des photos sexy de vous à quelqu'un <i>Send sexy pictures of yourself to someone</i>	.00	.59	-.13	.03	.54	-.10
7. Pratiquer un sport à risque <i>Practice a risky sport</i>	.00	.04	.54	.02	.03	.53
8. Dépasser vos limites dans un sport <i>Exceed your limits in a sport</i>	-.01	-.15	.76	-.01	-.13	.74
9. Consommer de la drogue <i>Taking drugs</i>	.81	-.12	.06	.79	-.10	.06
10. Vous engager dans une activité qui vous procure de l'adrénaline <i>Engage in an activity that gives you adrenaline</i>	-.03	.06	.69	-.03	.07	.71
11. Frauder/Prendre les transports en commun sans payer <i>Fraud/Taking public transport without paying</i>	.69	-.03	-.04	.67	-.01	-.04
12. Consommer de l'alcool <i>Consume alcohol</i>	.33	.16	.00	.34	.16	.01
13. Aller à une fête ou un évènement où vous ne connaissez personne <i>Gone to a party or a social event where you did not know anyone</i>	.13	.28	.13	-	-	-

n = 351. Promax rotation was used. Factor loadings below to .30 are in bold. 1 = transgression. 2 = social. 3 = overtaking.

item *snuck out of your house without telling your parents where you were going* from the Duell & Steinberg questionnaire was adapted to *going out without your parents' permission/going out while you are working the next day*). Finally, some items were created to respond to behaviors that are increasingly prevalent among adolescents and young adults (e.g., the item *go on a date with a stranger*). Thirteen items were selected by a committee of experts, composed of 3 members from the research field and 2 external members, based on simultaneous consideration of the following criteria: representativeness in both adolescent and young adult populations, adaptability to a non-North American context, and transposability to other cultures (see Table 2). Six items were selected to assess transgressive behaviors, four to assess social behaviors, and three to assess overtaking behaviors. The expert committee deliberately included a higher number of items measuring transgressive behaviors, considered as formative measures. This decision is based on the complex and diverse nature of transgressive behaviors, which require a more detailed evaluation, recognizing that each indicator contributes independently to the construction of the latent variable of risk-taking. In contrast, fewer items assessing social and overtaking behaviors (reflective measures) were chosen, as these categories of behaviors are generally more conceptually homogenous and coherent¹ (for more information on reflective and formative

¹ "Formative" and "reflective" measures are two distinct approaches to modelling in psychometrics. In a reflective measure, the items in a questionnaire are considered to be manifestations or reflections of an underlying latent construct. The items are therefore interchangeable and must be highly correlated with each other. Conversely, in a formative measure, the items are seen as forming or constructing the latent construct. They are not necessarily correlated with each other, and each item makes a unique and specific contribution to the definition of the construct.

measurements). This approach maintains the clarity and conciseness of the AYARTI while considering the complexity of transgressive behaviors. A detailed description of the procedure is available at https://osf.io/pfjcn/?view_only=becef85ac47d49a39f12ad4c7d2e9a7e.

2.3. Measures

2.3.1. Risk-taking

Participants were administered the 13-item version of the AYARTI (see Table 2). For each risk-taking behavior, participants reported their frequency of engagement on a 5-point Likert-type scale, ranging from 1 (never) to 5 (very frequently).

2.3.2. Personality (samples 2 and 3)

The Big Five Inventory (BFI) is a self-assessment scale with 44 items in its initial version that measures the five personality dimensions: openness, conscientiousness, extraversion, agreeableness, and neuroticism (John, Donahue, & Kentle, 1991). Participants in samples 2 and 3 completed the 45-item French version (Plaisant et al., 2010) and indicated on a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree), the degree to which they agreed or disagreed with each proposed statement. An average score was calculated for each of the five dimensions. A high score corresponded to a high level in the personality dimension studied.

2.3.3. Impulsivity (sample 2)

The Barratt Impulsivity Scale (Barratt, 1959) is a self-assessment scale with 34 items in its French version (Baylé et al., 2000), which measures three dimensions of impulsivity: motor impulsivity (11 items), which measures the behavioral dimension of impulsivity; cognitive impulsivity (11 items), which measures the potential difficulties experienced when performing intellectual tasks and the way of evaluating one's cognitive functioning; and planning difficulty (12 items), which measures the way of functioning in relation to the notion of the future. An overall score combining the 3 impulsivity subdimensions was calculated. For each situation, participants reported the frequency of occurrence of these behaviors on a 4-point Likert-type scale, ranging from 1 (rarely) to 4 (almost always). An average score was calculated for each of the three dimensions. A high score corresponded to a high level in the impulsivity dimension studied.

2.3.4. Analytic strategy

To test the psychometric validity of the AYARTI, an approach following the current recommendations was carried out (AERA et al., 2014). First, to test evidence based on internal structure, an exploratory factor analysis (EFA) using a polychromic matrix to consider the ordinal nature of the data was conducted. Promax rotation was applied consistent with the assumption that the factors were correlated. All items with a saturation greater than .30 in absolute value were retained. This first analysis was performed on the sample of young adults (samples 1–2) to ensure that the risk-taking behaviors assessed were not present only among adolescents. Then, based on the item selection and the factor structure of the EFA, a confirmatory factor analysis (CFA) was conducted in both samples 1–2 and 3 using a diagonally weighted least squares estimation. The different possible models were tested on both samples and compared using the true-likelihood ratio test. We relied on conventional criteria to evaluate model fit (i.e., RMSEA \leq .800, CFI \geq .900, TLI \geq 0.900, SRMR \leq .080; Vandenberg and Lance, 2000).

Second, to test reliability and correlation, McDonald's omegas as well as correlations between the different factors were checked in all samples. As this is a risk-taking inventory, not an exhaustive questionnaire, McDonald's Omegas should be between .60 and .80. Third, to test evidence based on the relation to other variables, correlations between the AYARTI, personality (samples 2 and 3) and impulsivity (sample 2) dimensions were performed.

Table 3
Results of the confirmatory factor analyses on the AYARTI (samples 1–3).

	χ^2	df	RMSEA [90 CI%]	CFI	TLI	SRMR
Young adults – Samples 1–2 (n = 351)						
3-Factor model	100.06	51	.052 [.037, .374]	.961	0.950	.057
2-Factor model	182.64	53	.084 [.071, .097]	.897	0.872	.081
2-Factor model + Cov.errors	131.69	50	.068 [.054, .083]	.935	0.914	.067
3-Factor model + Cov.errors	77.33	48	.042 [.023, .059]	.977	0.968	.048
Second-order + Cov.errors	107.12	49	.058 [.043, .073]	.954	0.938	.062
Adolescents – Sample 3 (n = 310)						
3-Factor model	144.60	51	.077 [.063, .093]	.832	0.783	.103
3-Factor model + Cov.errors	84.00	46	.052 [.034, .069]	.932	0.902	.076
2-Factor model + Cov.errors	89.33	48	.053 [.035, .070]	.926	0.898	.078
Second-order + Cov.errors	86.74	46	.054 [.036, .071]	.927	0.895	.077

RMSEA: root mean square error of approximation; CFI: comparative fit index; TLI: Tucker-Lewis Index; SRMR: standardized root mean squared error. Cov.errors for sample 1–2: errors of items 9 and 12, 1 and 11, 9 and 11 are allowed to covary. Cov.errors for sample 3: errors of items 9 and 12, 2 and 8, 3 and 8, 2 and 10, 1 and 3 are allowed to covary.

3. Results

3.1. Evidence based on internal structure

3.1.1. Item selection and structure of the AYARTI (using samples 1–2)

Regarding the EFA and the KMO (.80), all items had a saturation higher than .30 except Item 13 (*gone to a party or a social event where you did not know anyone*; see Table 2). This item was removed, and a second EFA was performed on the remaining twelve items. The items followed the same three factors (see Table 2). Factor one, *transgressive behaviors*, assesses the propensity to engage in transgressive behaviors (e.g., Item 9 *taking drugs*). Factor two, *social behaviors*, assesses the propensity to engage in social approach behaviors (e.g., Item 4 *go on a date with a stranger*). Factor three, *overtaking behaviors*, assesses the propensity to engage in behaviors to achieve defined goals (e.g., Item 4 *practice a risky sport*).

3.1.2. Structure confirmation (using all samples)

First, the 3-factor structure was confirmed by a CFA on samples 1–2, $\chi^2(51) = 100.06, p < .001$; CFI = .961, TLI = 0.950, RMSEA = .052 [.037, .074], SRMR = .057. Second, the 3-factor structure was also confirmed on Sample 3 after allowing the errors of items 9 and 12, 1 and 11, 9 and 11 to covary following Kline's (2016) recommendations: $\chi^2(48) = 77.33, p < .001$; CFI = .977, TLI = 0.968, RMSEA = .042 [.023, .059], SRMR = .048. These covariances reflected both item dependence within factors and between factors 1 and 2. Fit indices and error covariances are reported in Table 3.

In sample 3, *transgression behaviors* and *social behaviors* had a very large covariance ($\phi = .93$), which suggests that a two-factor or a second-order factor solution might be the best fit. The two-factor solution obtained an acceptable fit ($\chi^2[48] = 89.34, p < .001$; CFI = .926, TLI = 0.898, RMSEA = .053 [.035, .070], SRMR = .078) after allowing for the same covariance errors as the three-factor solution, similar to the second-order factor solution ($\chi^2[46] = 86.74, p < .001$; CFI = .927, TLI = 0.895, RMSEA = .054 [.036, .071], SRMR = .077). Using the likelihood-ratio test, the two-factor model fit the data better than the three-factor model and the second-order factor model ($\chi^2[48] = 80.16, p = .06, \Delta\chi^2 = 5.51, \Delta df = 2$; see Table 4). The two factors were *social-transgressive behaviors*, which assess the propensity to engage in transgressive behaviors and to engage in social approach behaviors, and *overtaking behaviors*, which assess the propensity to engage in behaviors to achieve defined goals.

In light of the sample 3 results, the two-factor and second-order solutions were tested on samples 1–2. Both solutions had an acceptable fit after allowing the errors of items 9 and 12, 2 and 8, 3 and 8, 2 and 10, 1 and 3 to covary following Kline's (2016) recommendations ($\chi^2[50] = 131.69, p < .001$; CFI = .935, TLI = 0.914, RMSEA = .068 [.054, .083], SRMR = .067 for the two-factor model, and $\chi^2[49] = 107.12, p < .001$; CFI = .954, TLI = 0.938, RMSEA = .058 [.043, .073], SRMR = .062 for the second order-factor model). These covariances typically reflect item dependence within dimensions. The

Table 4
Comparison of the different models of the AYARTI structure (samples 1–3)^a.

	χ^2	df	$\Delta\chi^2$	Δdf	p
Young adults – Samples 1–2 (n = 351)					
3-Factor model + Cov.errors	57.38	48	–		
Second-order + Cov.errors	73.04	49	8.45	1	**
2-Factor model + Cov.errors	108.06	50	21.73	1	***
Adolescents – Sample 3 (n = 310)					
3-Factor model + Cov.errors	73.54	46	–		
Second-order + Cov.errors	79.02	47	3.80	1	.05
2-Factor model + Cov.errors	80.16	48	1.24	1	.26

^a * $p < .05$; ** $p < .01$; *** $p < .001$.

likelihood-ratio test showed that the 3-factor structure model fit the data best compared to the other solution ($\chi^2 [50] = 131.69$, $p < .001$, $\Delta\chi^2 = 29.78$, $\Delta df = 2$; see Table 4).

3.2. Reliability and correlation (using all samples)

The reliability of the AYARTI was satisfactory for the three factors of samples 1–2 ($\omega = .80$ for *transgressive behaviors*, $\omega = .69$ for *social behaviors*, and $\omega = .69$ for *overtaking behaviors*) as well as for the two factors of Sample 3 ($\omega = .74$ for *transgressive-social behaviors*, and $\omega = .62$ for *overtaking behaviors*). For samples 1–2, the three factors were positively intercorrelated ($r \geq .36$), except for *transgressive behaviors* and *overtaking behaviors* ($r = .14$, $p = .07$). At the level of latent factor correlation, the three factors were significantly associated ($.28 \geq \phi \geq .64$). The two factors in sample 3 were positively and significantly intercorrelated at $r = .26$ as at the latent factor level ($\phi = .30$). Detailed results are reported in Table 5.

3.3. Evidence based on relation to other variables (using samples 2 and 3)

All bivariate and correlations are reported in Table 5. Concerning the link with personality traits, for sample 2, *transgressive behaviors* were negatively related to conscientiousness ($r = -.17$; $p < .05$) and related to openness (trend link $r = .17$; $p < .10$). *Social behaviors* were positively related to openness ($r = .14$; $p < .05$), conscientiousness ($r = .17$; $p < .05$), extraversion ($r = .24$; $p < .001$) and agreeableness ($r = .15$; $p < .05$). *Overtaking behaviors* were positively related to extraversion ($r = .21$; $p < .001$), agreeableness ($r = .15$; $p < .05$), neuroticism ($r = .17$; $p < .05$) and openness ($r = .23$; $p < .001$). For sample 3, *transgressive-social behaviors* were positively related to extraversion ($r = .19$; $p < .05$) and negatively related to conscientiousness ($r = -.25$; $p < .001$) and agreeableness ($r = -.21$; $p < .001$). *Overtaking behaviors* was positively related to extraversion ($r = .27$; $p < .001$), conscientiousness ($r = .16$; $p < .001$), openness ($r = .20$; $p < .01$) and neuroticism ($r = .17$; $p < .10$).

Concerning the link with impulsivity, for sample 2, all risk-taking factors were positively linked to impulsivity. *Transgressive behaviors* were positively related to impulsivity ($r = .18$; $p < .001$) and more specifically positively related to motor impulsivity ($r = .22$; $p < .05$). *Social behaviors* were positively related to impulsivity ($r = .27$; $p < .001$) and more specifically positively related to motor impulsivity ($r = .22$; $p < .05$) and tendentially related to cognitive impulsivity ($r = .20$; $p < .10$) and planning difficulty ($r = .19$; $p < .10$). Finally, *overtaking behaviors* were positively related to impulsivity ($r = .26$; $p < .001$) and more specifically positively related to cognitive impulsivity ($r = .32$; $p < .001$).

4. Discussion

This study aimed to develop and validate a risk-taking behavior assessment tool that could be used in both adolescent and young adult populations. As expected by grouping existing factors in the literature, a three-factor structure composed of *transgressive behaviors*, *social behaviors*, and *overtaking behaviors* was confirmed in the young adult sample (Blais & Weber, 2006; Duell & Steinberg, 2020; Gullone et al., 2000). On the other hand, a two-factor structure composed of a grouping of *transgressive*

Table 5
Descriptive statistics, reliability, and correlations for study variables (sample 1–3).

Measures	Min	Max	M	SD	ω	Young adults			Adolescents	
						Transgressive	Social	Overtaking	Transgressive/ social	Overtaking
AYARTI										
Young adults (samples 1–2)										
Factor 1 – 6 items	1.00	4.33	1.82	0.61	.80	–	–	–	–	–
Factor 2 – 3 items	1.00	5.00	1.62	0.66	.69	.44****	–	–	–	–
Factor 3 – 3 items	1.00	5.00	2.16	0.80	.69	.14*	.36****	–	–	–
Adolescents (sample 3)										
Factor 1 – 9 items	1.00	3.90	1.77	0.54	.74	–	–	–	–	–
Factor 2 – 3 items	1.00	5.00	2.13	0.81	.62	–	–	–	.26****	–
Personality (samples 2 and 3)										
Openness	1.33	5.00	3.45	0.63	.85/.79	.17**	.14**	.23****	.08	.20***
Conscientiousness	1.11	5.00	3.41	0.66	.86/.81	–.17**	.17**	.14	–.25****	.16****
Extraversion	1.13	5.00	3.27	0.79	.90/.82	.12	.24****	.21****	.19***	.27****
Agreeableness	1.60	5.00	3.73	0.51	.63/.70	.07	.15**	.15**	–.21****	–.05
Neuroticism	1.00	5.00	2.75	0.78	.89/.76	.07	.03	.17**	.13	–.08
Impulsivity (sample 2)										
Impulsivity (general)	1.03	3.09	2.36	0.29	.80	.18****	.27****	.26****	–	–
Cognitive impulsivity	1.00	3.55	2.50	0.41	.76	.12	.20*	.32****	–	–
Motor impulsivity	1.00	3.73	2.33	0.43	.75	.22****	.22**	.13	–	–
Planning difficulty	1.08	3.08	2.26	0.34	.68	.06	.19*	.26**	–	–

Omega for sample 2/Omega for sample 3.

AYARTI factors: for young adults' sample, factor 1: transgressive behaviors, factor 2: social behaviors, factor 3: overtaking behaviors. For adolescents' sample, factor 1: social-transgressive behaviors, factor 2: overtaking behaviors.

* $p < .10$.

** $p < .05$.

*** $p < .01$.

**** $p < .001$.

social behaviors, and overtaking behaviors, was confirmed in the adolescent sample. This two-factor structure also works for young adults. The AYARTI appears as a promising tool to assess engagement in various risk behaviors from adolescence to adulthood in an ecological context. It allows for comparative and longitudinal studies, as well as targeted analyses on the developmental stages of adolescence or young adulthood.

4.1. The structure of the AYARTI

This study aimed to develop and validate a risk-taking behavior assessment tool that could be used in both young adult and adolescent populations. A set of 29 items was generated from items translated and adapted from existing questionnaires and by adding new items. The AYARTI consists of items translated and adapted from the ARQ, DOSPERT and the Duell and Steinberg questionnaire, to which new items have been added. It was therefore expected that the structure of the AYARTI would

be consistent with the structure of these scales. A 3-factor structure grouping *transgressive* behaviors (health/safety factor of the DOSPERT, rebellious behaviors of the ARQ, negative behaviors of the Duell and Steinberg questionnaire), *social* behaviors (social factor of the DOSPERT, antisocial behaviors of the ARQ) and *overtaking* behaviors (recreational factor of the DOSPERT, thrill-seeking behaviors of the ARQ) is perfectly consistent with the items that make up the AYARTI (see Blais and Weber, 2006; Duell & Steinberg, 2020; Gullone et al., 2000). The CFA carried out on the adolescent sample, combined with the likelihood ratio test, demonstrated that a two-factor structure (composed of the social-transgressive behavior and overtaking behavior factors) was more suitable for adolescents. The error covariances between the AYARTI items for the young adult and adolescent sample are consistent, since these are behaviors that can be performed in the same context (e.g., for items 9 and 12, drinking and drug use at a party). McDonalds' omega scores between .62 and .80 were an expected result, since this is a non-exhaustive inventory of risk behaviors.

However, the two- or three-factor structure is an unexpected result. These results could be explained by the social nature of transgressive and exploratory behaviors in adolescence (Tomova, Andrews, & Blakemore, 2021). In adolescence, the need for social belonging and the quest for popularity are particularly important (Cillessen et al., 2023; La Fontana & Cillessen, 2010; Rudolph, 2021). Adolescents are also notably sensitive to the risk of being rejected by their peers if they do not adopt the behaviors accepted and valued within their group (Blakemore & Mills, 2014; Sebastian, Viding, Williams, & Blakemore, 2010; Silk et al., 2012). It has also been widely demonstrated that adolescents are more motivated to avoid situations that could lead to exclusion by their peers (Blakemore & Mills, 2014; Sebastian et al., 2010; Silk et al., 2012). Adolescents then engage in *transgressive* risk-taking behaviors to be popular and/or maintain their social status (Capella et al., 2023; Crone & Dahl, 2012) but also to avoid rejection by their peers (Blakemore & Mills, 2014; Sebastian et al., 2010; Silk et al., 2012). Alcohol consumption or any other *transgressive behavior* could then be perceived by adolescents as a behavior enabling them to be popular and valued (Agan et al., 2015). Conversely, not consuming alcohol could be interpreted as risky by adolescents in terms of exclusion, rejection and potential harassment (Sebastian et al., 2010). *Transgressive behaviors* could thus be interpreted by adolescents in terms of the social benefits of engaging in these behaviors (becoming popular, maintaining one's social standing) and the social risks of not engaging in these behaviors (being unpopular, rejected, excluded), which would explain the clustering of transgressive and social factors in adolescence. This distinction in factor structure between adolescents and young adults seems theoretically relevant and suggests that *transgressive behaviors*, such as *social behaviors*, could be a response to an objective of social belonging or affiliation with a group only in adolescence (Sebastian et al., 2010).

Furthermore, these results could be interpreted through the prism of social representation of risk-taking continuum ranging from negative risk-taking (i.e., socially unacceptable behaviors that transgress established social rules or laws; Duell & Steinberg, 2020, 2021; Fryt et al., 2021) to positive risk-taking (i.e., socially acceptable behaviors; Duell & Steinberg, 2020, 2021; Fryt et al., 2021). Indeed, overtaking behaviors can be qualified as positive risk behaviors, since they are generally socially accepted and even encouraged within society. *Transgressive* AYARTI behaviors can be qualified as negative risk-taking behaviors as defined in the literature, since by definition they transgress established rules or laws (Duell & Steinberg, 2020, 2021; Fryt et al., 2021). However, social behaviors can be perceived differently among adolescents and young adults. While rewards associated with this type of behaviors are similar, the risk differ between adolescents and young adults. Social behaviors, while not necessarily law-breaking, are socially frowned upon, especially in adolescence, since they run counter to the teachings received since childhood. In the case of adolescents, social behaviors can more accurately be described as negative risk behaviors, since they transgress social rules that are widely propagated at this time (e.g., not talking to strangers because it can be very dangerous). In young adults, the risks associated with social behavior are lower, since they are less vulnerable in this type of situation.

Another explanation for the clustering of transgressive and social factors in adolescence could be the subjective interpretation of the context in which the risky behaviors being assessed take place. The influence of the presence of peers on adolescents' engagement in risky behavior is well established. Adolescents are more likely to engage in transgressive behaviors when in the presence of peers than when alone (Dishion & Tipsord, 2011; Gardner & Steinberg, 2005; Lerner et al., 2005). Further-

more, peer risk behaviors influence adolescents' engagement in similar behaviors (Jackson et al., 2014; Maxwell, 2002; Teunissen et al., 2014). Adolescents might therefore interpret transgressive AYARTI behaviors as necessarily part of a social context that might not be the case for young adults (e.g., drinking alcohol with friends rather than alone). The AYARTI therefore appears to be a valid instrument for conducting comparative and longitudinal studies of adolescents and young adults risk-taking behaviors in an ecological and non-North American context.

4.2. The AYARTI in relation to personality and impulsivity variables

The relationship between the AYARTI and other variables also confirmed its psychometric qualities. For young adults, *transgressive behaviors* were positively associated with openness and negatively associated with conscientiousness. This consistent result was expected given that young adults with a high level of openness will tend to be interested in new experiences, which, combined with their low level of conscientiousness, which underpins a certain level of carefreeness, may lead them to engage in this type of behavior (Joseph & Zhang, 2021; Nicholson et al., 2005). As presumed, *social behaviors* were positively associated with openness, extraversion, conscientiousness and agreeableness. Young adults with high levels of openness, extraversion, conscientiousness and agreeableness will tend to prefer social activities and avoid conflict, which, combined with an openness to new experiences, may lead them to engage in purely social behaviors (Joseph & Zhang, 2021; Nicholson et al., 2005). Contrary to the links previously found in the literature between social behaviors and conscientiousness (Joseph & Zhang, 2021; Nicholson et al., 2005), *social behaviors* were positively associated with conscientiousness. This result can be explained by the nature of the items studied. If we take the example of social items used in the literature for adults (e.g., the item *disagreeing with an authority figure on an important issue* in the DOSPERT), it is consistent to think that people with a low level of conscientiousness, and therefore with a relaxed and sometimes carefree attitude, engage in this type of conduct. On the other hand, if we look at the social items of the AYARTI (for example, the item *approach a person you like*), it is logical to assume that people with a high level of conscientiousness, who take the means to achieve their goals, engage in this type of behavior. *Overtaking behaviors* were positively associated with extraversion, agreeableness and neuroticism, which was expected. Young adults with high levels of extraversion, agreeableness and neuroticism will tend to prefer contact with others, be active, and be prone to experiencing upsetting or upsetting emotions, which may lead them to engage in this type of conduct to regulate their emotions (Joseph & Zhang, 2021; Nicholson et al., 2005). For adolescents, *transgressive-social behaviors* were positively related to extraversion and negatively related to conscientiousness and agreeableness. This result was expected since adolescents who prefer to be active and in contact with others tend to be carefree and rather firm in their opinions, which may lead them to engage in *transgressive* and *social behaviors* (Essau, 2004; Gullone & Moore, 2000; Joseph & Zhang, 2021). *Overtaking behaviors* were positively related to extraversion, which was expected (Essau, 2004; Gullone & Moore, 2000; Joseph & Zhang, 2021). Furthermore, *overtaking behaviors* were also positively related to openness and conscientiousness. Adolescents who prefer contact with others, are open to new experiences and have varied interests associated with a quest for excellence and a desire to achieve their goals may lead them to engage in *overtaking behaviors*. The psychometric qualities of the AYARTI are supported by the existing links between all risk-taking factors and personality traits, consistent with the literature.

In line with the literature on the links between risk-taking behaviors and impulsivity, positive relationships were found between all AYARTI factors and impulsivity (Lejuez et al., 2002; Stanford et al., 1996). More specifically, positive links were found between *transgressive* and *social behaviors* and motor impulsivity. Individuals with a tendency to perform an action or behavior on impulse will thus be more inclined to engage in *transgressive* (e.g., drinking alcohol) and *social* (e.g., sending a sexy photo of oneself) behaviors. Motor activity is essential for engagement in such behaviors (Sanchez-Roige et al., 2014; Stamates & Lau-Barraco, 2017). Conversely, a positive relationship was found between *overtaking behaviors* and cognitive and planning impulsivity. Individuals with difficulties in anticipation, planning and, more generally, cognitive functioning are more likely to engage in *overtaking behaviors* such as risky sports. This result could be explained by a lack of anticipation of the risks associated with this type of behavior (Svebak and Kerr, 1989). However, another study showed that excessive physical

practice (danger of doping and/or risky practice) was correlated more with the emotional components of impulsivity (sensation seeking) than with cognitive components (lack of premeditation and perseverance; Kotbagi, Morvan, Romo, & Kern, 2017). Further studies are thus essential to better grasp the link between cognitive and planning impulsivity and engagement in overtaking behaviors. It would be relevant, for example, to question and distinguish the goal-achieving behaviors in which individuals engage according to their level of cognitive and planning impulsivity. The results of the present study thus enrich our knowledge of the links between impulsivity and engagement in risky behaviors. The psychometric qualities of the AYARTI are supported by the existing links between the various risk-taking factors and impulsivity, in line with the literature.

4.3. Limitations and perspectives

However, the present study has its limitations. First, we did not ask participants about the nature of the risks and benefits they perceive for each of the AYARTI behaviors (social, health, safety, ethical, etc.). Assess the nature of the consequences associated with each of the AYARTI behaviors would shed light on the motivations of adolescents and young adults to engage or not engage in various risky behaviors (Steinberg, 2004). Secondly, it would also help to understand the clustering of transgression and social factors in adolescence by examining how the nature of the risks/benefits associated with risky behaviors differ according to age and developmental considerations (Agan et al., 2015; Sebastian et al., 2010). Thirdly, although this study included samples of adolescents and young adults, future research should explicitly test invariance across developmental stages, especially by integrating the study of the AYARTI with an older population. It would be interesting to test whether the three-factor model present in young adults remains stable with advancing age. Fourth, it would also be relevant to contextualize each of the behaviors to ensure that they are perceived in a similar way by adolescents and young adults (Dishion & Tipsord, 2011; Gardner & Steinberg, 2005; Lerner, Singer, & Simons-Morton, 2005). AYARTI's risk-taking behaviors could therefore be divided into two contexts: behaviors performed alone or with friends (e.g., consuming alcohol alone versus with friends). Fifth, the social acceptability of each of the AYARTI items has not been explicitly assessed, which represents an extremely interesting prospect for future research. Indeed, studying the link between the social acceptability of the behaviors assessed by the AYARTI and their potential impact on emotional regulation or risk adjustment could shed significant light on how these behaviors influence the individual and social development of adolescents and young adults, beyond the way these behaviors are viewed by society. Risk taking, particularly alcohol consumption and drug use, has been shown to be associated with psychopathological disorders such as anxiety and depression (e.g., Broman-Fulks et al., 2014). It would therefore be interesting to carry out an empirical study to establish the link between risk-taking assessed in the AYARTI and psychopathological disorders. As with any assessment tool, AYARTI is not an exhaustive inventory of risk behaviors. It must therefore be continually adapted to remain relevant, particularly in the face of the emergence of new risk behaviors, such as those linked to the use of social networks. In fact, the AYARTI does not specifically examine the involvement of adolescents and young adults in risky behaviors linked to social networks. Yet, social networks are an integral part of the lives of adolescents and young adults, who report spending a significant number of hours a day on them (Barry, Sidoti, Briggs, Reiter, & Lindsey, 2017). It would therefore be interesting to integrate the notion of risky virtual behavior (for example, the use of dating applications) into a future adaptation of AYARTI (see Vannucci, Simpson, Gagnon, & Ohannessian, 2020, for a meta-analysis).

5. Conclusion

The AYARTI is a valid instrument with the advantage of enabling comparative and longitudinal studies throughout adolescence and young adulthood. In particular, the AYARTI can be used to study the developmental trajectories of engagement in daily risk-taking, in order to set up appropriate intervention and prevention programs. AYARTI could also be used to study the impact of sociocultural and contextual factors on these behaviors. The AYARTI demonstrates sensitivity to developmental context, enabling distinct adaptation for adolescents and young adults. In fact, the AYARTI is composed of two factors in adolescents that can also be used in young adults. The first covers transgressive and

social behaviors. For studies carried out on a young adult population, three factors can be distinguished: the first concerns purely transgressive behaviors, the second purely social behaviors and the third overtaking behaviors. This ability to adjust scores according to age underlines the tool's suitability for different developmental contexts, while assessing the same behaviors. In this way, AYARTI will enable us to better understand the development of risky behaviors from early adolescence to young adulthood.

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Data availability statement

The data that support the findings of this study are openly available in Open Science Framework at https://osf.io/pfjcn/?view_only=bcecf85ac47d49a39f12ad4c7d2e9a7e.

Ethics and responsibility

The authors declare that the study complies with the principles of the Declaration of Helsinki and has obtained ethical approval by the ethics committee of Aix-Marseille University (approval number: 2022-05-12-012).

Disclosure of interest

The authors declare that they have no competing interest.

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