Using the risk-return model to explain Gambling Disorder symptoms in youth:

An empirical investigation with Italian adolescents

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- All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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Abstract

Historically, individual differences research has sought to explain problem-gambling severity in adolescence by means of unitary "risk-taking" traits, such as sensation seeking and impulsivity, implying that these personality traits account for risk-taking tendencies across different types of behaviors and situations. However, increasing empirical evidence suggests that risk taking seems to be better conceptualized as a domain-specific construct. In the current study, we adopted a psychological risk-return framework, which posits that perceptions of perceived risks and benefits predict gambling risk attitudes, which in turn, account for variance in Gambling Disorder (GD) symptoms in adolescents. The study involved 296 Italian adolescents (86% boys, M_{age} = 17.76, SD = 1.17). Participants completed the risk-taking, risk perception, and expected benefits scales from the Adolescent *Domain Specific Risk Taking* (DOSPERT) scale (Barkley-Levenson et al., 2013), as well as the *Gambling Behavior Scale for Adolescents* (GBS-A; Primi et al., 2015) were administered. Consistent with predictions, risk-taking scores for the Gambling domain predicted adolescent gambling outcomes, relative to the other DOSPERT risk-domains (Ethical, Health/Safety, Recreational, Social). Additionally, we found that greater Gambling risk perceptions were associated with lower risk-taking scores, whereas greater perceived expected benefits were associated with higher risk-taking scores. Moreover, we found significant indirect effects between perceived risks and benefits and problem-gambling severity, mediated via Gambling risk-taking scores, though expected benefits demonstrated a stronger indirect effect. These results have important implications for practice as they emphasize that specific interventions aimed at preventing problem gambling in adolescents should address their perceptions about gambling benefits.

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Due to the rapid expansion of legalized gambling opportunities and the development of new forms of gambling, especially in regard to Internet-based activities and new media contexts, such as e-Sports and loot-boxes (Macey & Hamari, 2018), there has been a rapid increase of the prevalence of adolescent gambling (see, for a review, Calado et al., 2017). Indeed, international studies report that up to 80-99% of adolescents engage in some forms of gambling (e.g., Donati et al., 2013; Splevins et al., 2010), and that between 0.2 and 12.3% meet criteria for pathological gambling behavior depending on the population studied and the instruments used (Calado et al., 2017). Moreover, adolescents who gamble concurrently showed a higher prevalence of at-risk behaviors, such as tobacco and psychoactive substance use (Molinaro et al., 2018). Furthermore, research has attested that early gambling onset is associated with more severe gambling-related problems in adulthood (Dowling et al., 2017). For these reasons, it is important to identify the factors associated with adolescent pathological gambling. Among the individual differences related to problem-gambling severity in adolescence, considerable attention has been given to personality traits such as impulsivity (e.g., Auger et al., 2010; Cosenza & Nigro, 2015) and sensation seeking (Nower et al., 2004; Reardon et al., 2019). Impulsivity and sensation seeking can be considered as broader personality traits which are generally thought to represent the personality basis of risk taking across different types of behaviors and situations (e.g., Enticott & Ogloff, 2006; Zuckerman & Kuhlman, 2000) inside a conceptualization of risk propensity as a domain-general aspect (Nicholson et al., 2005).

Although this stream of research has provided valuable insights into the predictors of problematic gambling, we propose that a domain-specific perspective of risk behavior may provide greater fidelity in examining risk attitudes, rather than focus on broader bandwidth traits related to a general propensity

to risk taking. Contrary to unitary approaches, increasing empirical evidence suggests that risk taking seems to be better conceptualized as a domain-specific construct. Specifically, supporters of a domain-specific approach suggest that risk behaviors may be qualitatively different from one another (e.g., Hanoch et al., 2006; Soane & Chmiel, 2005; Weber et al., 2002). A range of empirical studies have demonstrated the utility of a domain-specific approach in relation to risk taking. For example, Hanoch and colleagues (2006) showed how people who participate in extreme sports are more willing to take other recreational risks, but are not more likely to do so in other domains, such as financial or health/safety risks. Similarly, smokers reported greater risk-taking for health/safety risks compared to non-smokers, but this relationship does not occur in other domains. Also, Markiewicz and Weber (2013) supported the association between favorable attitude to gambling and engagement in excessive trading stock. Additionally, different risk domains appear to be associated with different constellations of personality traits. Weller and Tikir (2011) found that conscientiousness and honesty/humility, two traits related to disinhibition (Lauriola & Weller, 2018), were associated with health/safety and ethical risks but not with recreational and social risk taking. In contrast, other traits, like Openness, predicted recreational and social risk-taking, but not health/safety or ethical risk taking.

The domain-specific risk approach can be conceptualized as a psychological risk-return model. This model is inspired by financial risk-return models that propose that the tendency to accept a risk (i.e., engage in behavior) involves a trade-off between (a) perceived riskiness and (b) expected return (formalized as outcome variance and the expected value of engaging in an activity in financial models, respectively; Sarin & Weber, 1993). Like these models, psychological risk-return models (Weber, 2010; Weber et al., 2002; Weber & Johnson, 2009) posit that individuals will be more likely to engage in a behavior if its perceived expected benefits are high. Conversely, the greater risk, or perceived danger, an individual perceives in an activity, the less likely he/she will be to do so (Weber et al.,

2002). Additionally, in these models, the perceived risks and the expected benefits are negatively correlated (Finucane et al., 2000; Hanoch et al., 2006; Weber et al., 2002; Weller & Tikir, 2011). This point is an important insight as it highlights the divergence between how individuals perceive risks and benefits, compared to how risk and return actually correlate (i.e., positively correlated, or show zero correlation; see Slovic et al., 2004). Moreover, from this perspective, one's propensity to take risks (quantified as the likelihood of engaging in a behavior) can be considered an intermediary between cognitive-affective evaluations of risks and benefits, and actual reported problem behavior (Finucane et al., 2000; Slovic et al., 2004).

This model can be scaffolded upon prior research in youth gambling. For instance, past studies have highlighted that gambling problems in youth can be predicted by positive and negative beliefs about engaging in gambling. Positive perceptions motivating gambling have been shown to be the perception of gambling as a profitable economic activity (e.g., Delfabbro et al., 2006; Delfabbro et al., 2009; Donati et al., 2013), positive attitude toward gambling in terms of harmfulness (e.g., Derevensky et al., 2010; Moore & Ohtsuka, 1999), the perception to become better and to follow friends' activities through gambling (e.g., Canale et al., 2015; Huic et al., 2017), and the view that gambling is a way to avoid emotional negative states and to reach positive emotions (e.g., Canale et al., 2015; Donati et al., 2015). Negative outcome expectancies derivable from gambling have been shown to characterize adolescents less involved in gambling, as relational costs, loss of money, and expectations of negative social consequences and parental disapproval (Wickwire et al., 2010; Wong & Tsang, 2012).

Although these studies provide valuable insights into youth gambling behavior, they did not directly take into account perceived risks, which, together with outcome expectancies, are key motivators for behaviors. Although outcome expectancies refer to personal understanding of the links between certain actions and subsequent outcomes, risk perception is imbued with affect; if personal

feelings toward an activity are favorable, people will tend to judge the risks low, while, if the feelings toward an activity are unfavorable, they will tend to judge the activity as highly risky (Finucane et al., 2000). Being very based on affect, it is particularly important to understand risk and benefits perception toward an activity like gambling that is hazardous in nature as it involves a risky choice that is unpredictable and potentially harmful. Indeed, research suggests that, in case of risky choices, perceptions of risk have a fundamental role in determining intention and behavior (e.g., Breakwell, 2007; Oei & Jardim, 2007). Understanding how perceived expected benefits and perceived risks associated with problem gambling is particularly relevant in the case of adolescents. For instance, studies in the domains of alcohol, cannabis use, and risky sexual behavior have shown that the expected benefits are an important explanatory construct for problematic behaviors in youth (Hurley et al., 2017; Schmits et al., 2016; Smit et al., 2018).

The current study applied this psychological risk-return model to predict Gambling Disorder (GD) symptoms among adolescents. The *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5, American Psychiatric Association, 2013) specifies that GD is a condition characterized by symptoms such as preoccupation with gambling, risked relationships because of gambling habits, and inability to control or stop gambling, and that it can occur even in adolescence and young adulthood. In order to quantify domain-specific risk attitudes for risk-taking, perceived risks, and expected benefits, we used an adolescent-version of the *Domain Specific Risk Taking* (DOSPERT) scale (Barkley-Levenson et al., 2013; Figner et al., 2015; Figner & Weber, 2011). This instrument assesses five distinct risk domains: Social, Recreational, Gambling, Health/Safety, and Ethical. The strength of this measure is that it can assess both differences across individuals for a given domain and intra-individual differences across different risk domains, in terms of both risk-taking propensities as well as motivators of such behaviors, namely perceived risks and benefits (Wu & Cheung, 2014).

In accordance, we made several hypotheses. First, we predicted that adolescents' reported risk-taking for the Gambling domain would show the strongest positive correlations with gambling frequency and problem gambling behavior (consistent with DSM-5 symptoms of Gambling Disorder), compared to the other DOSPERT domains. As a second step, we hypothesized a mediation model to explain the mechanism through which gambling-related perceived risks and expected benefits are associated with problem gambling in adolescents. Related, we hypothesized that gambling frequency and severity would be (a) positively associated with Gambling perceived expected benefits, and (b) inversely associated with Gambling perceived risks. Third, consistent with the risk-return model, we predicted that Gambling expected benefits and perceived risks would show a direct association (positive and negative associations, respectively). Finally, we predicted that Gambling domain risk-taking scores would mediate the associations between gambling frequency/severity, and both expected benefits and perceived risks.

As a second step, we hypothesized a mediation model to explain the mechanism through which perceived risks and expected benefits related to the gambling domain are associated with problem gambling in adolescents. In detail, consistent with prior research (Hu & Xie, 2012; Johnson et al., 2004; Weller et al., 2015; Weber et al., 2002), we predicted that gambling-related perceived risks and expected benefits would predict – respectively in a negative and a positive way – the likelihood of engaging in those activities. We also expected that perceived risk and the perceived benefits would negatively correlate, and that risk taking toward gambling would positively predict problem gambling behavior. Moreover, based on past studies (e.g., Finucane et al., 2000; Hanoch et al., 2006; Slovic et al., 2004; Weber et al., 2002), we posited that perceived risk and expected benefits in the DOSPERT Gambling domain would have an indirect effect on gambling severity through Risk Taking in the domain. In detail, we predicted that perceived risks and expected benefits related to gambling activities

would exercise their effects on gambling problem severity through the intermediation of risk taking attitude towards gambling. In other words, adolescents who have a lower perception of risks and a higher expectation of benefits towards gambling were thought to be more likely to have a risk-taking propension with respect to gambling behavior than those adolescents who have a higher perception of risks and a lower expectation of benefits towards gambling. Such risk approach, in turn, was predicted to lead to more gambling-related problems. We verified the adequacy of the model through a path analysis.

Methods

Participants

Participants were 296 Italian adolescents (68% males, M_{age} = 17.76, SD = 1.17, range: 15-19) attending several high schools; 239 (65%) attended a technical school, 74 (20%) a vocational school, and 53 (15%) a lyceum in urban areas in Italy (Tuscany). The institutional review boards for each school approved the protocol. The students received an information sheet, which assured them that the data obtained would be handled confidentially and anonymously, and they were asked to give written informed assent. Parents of minors were required to provide consent in addition to the child agreeing to participate. All parents gave their permission.

Measures and Procedure

The adolescent version of the *Domain Specific Risk Taking* (DOSPERT) scale (Barkley-Levenson et al., 2013; Figner & Weber, 2011; Lee et al., 2019; Sommerville et al., 2019; Weber et al., 2002) was employed to assess individual differences in risk attitudes across different domains. The adolescent version was obtained by adapting the original DOSPERT items to better reflect activities relevant to adolescents for each domain. The domains included: Social, Recreational, Gambling, Health/Safety, and Ethical. For instance, for the Social domain, the item "*Choosing a career that you*

truly enjoy over a more secure one" in the adult version of the DOSPERT was revised into "*Dropping out of school to pursue your dream*"; for the Recreational domain, "*Piloting a small plane*" was changed in "*Skateboarding down a steep hill*"; in the Gambling domain, the item "*Betting a day's income on the outcome of a sporting event*" was rephrased into "*Betting all your pocket money on the outcome of a sporting event*"; in the Ethical domain, the item "*Having an affair with a married man/woman*" was adapted in "*Dating someone else's girlfriend/boyfriend*". Finally, for the Health/safety domain, the item "*Having sex*" has been added. Primi and colleagues (2017) obtained the Italian adolescent version of the DOSPERT scale using a forward-translation method and showed good psychometric properties for each of the three DOSPERT scales (i.e., *risk taking*, *risk perception*, and *expected benefits*), including recovering a five-factor structure similar to the original DOSPERT, and comparable reliability indices. Moreover, the DOSPERT risk taking scales resulted to have adequate validity.

For each behavior, participants assessed the likelihood that they would engage in the behavior (*Risk Taking*), the activity's perceived risks (*Risk Perception*), and the perceived expected benefits for engaging in the behavior (*Expected Benefits*). To assess risk taking, participants were asked to indicate the likelihood of engaging in the activity on a 5-point Likert scale from 1 (*Extremely unlikely*) to 5 (*Extremely likely*). Risk perception was assessed by asking participants to indicate how risky they perceive each activity, from 1 (*Not at all risky*) to 5 (*Extremely risky*). Finally, participants had to indicate the degree to which they would expect benefits from each activity by indicating, for each behavior, the perceived benefits, from 1 (*No benefits at all*) to 5 (*Great benefits*) (See the instructions in the Appendix). In line with past studies that have used the DOSPERT scale (e.g., Weller et al., 2015), the order of administration was the following: *Risk Taking* scale, then the *Risk Perception* scale, and finally the *Expected Benefits* scale. In this study, Cronbach's alpha values resulted to be from

sufficient to good for the *Risk Taking* domains (Social: .65, Recreational: .80, Gambling: .75, Health/Safety: .76, and Ethical: .73), the *Risk Perception* domains (Social: .60, Recreational: .74, Gambling: .80, Health/Safety: .81, and Ethical: .77), and the *Expected Benefits* domains (Social: .74, Recreational: .78,Gambling: .76, Health/Safety: .71, and Ethical: .76).

To measure gambling behavior and GD symptoms, the *Gambling Behavior Scale for Adolescents* (GBS-A; Primi et al., 2015) was used. It is composed of two sections. The first section consists of unscored items investigating gambling behavior. Specifically, these items assess the frequency (never, sometimes in the year, sometimes in the month, sometimes in the week, daily) of participation during the last year in ten gambling activities as playing card games, private bets with friends, and bets on sporting events. The second section is composed of nine items, each one developed in order to assess one of the nine DSM-5 diagnostic criteria of GD among adolescents. An example of item is "Have you spent in gambling money intended for other purposes?" All items have a three-response format, i.e., 0 = never, 1 = sometimes,2 = often. This scale has been shown to be unidimensional and highly informative for mid- to high-levels of severity of GD (Donati et al., 2017). In this study, internal consistency was adequate (Cronbach's alpha = .77). Following an Item Response Theory (IRT)-based weighing system of items' responses, participants can be classified as non-problem gamblers, at-risk gamblers, and problem gamblers.

Each participant individually completed the scales in a self-administered format during class time. Participation was voluntary and anonymous, and answers were collected in a paper-and-pencil format. All participants completed the DOSPERT items and the GBS-A in about 30 mins.

Results

Prior to conducting the analyses, we examined the dataset for potential missing values. As our aim was to explain gambling behavior, only adolescent gamblers i.e., the 238 respondents who

affirmed having gambled at least once during the last year, were retained in the analyses. Among those cases, starting from the assumption that missing values for the GBS-A variable – the outcome variable – could not be replaced by a missing data treatment, a listwise deletion was conducted excluding cases for which the GBS-A score was missing, i.e. those participants who did not respond to one or more items. Only 7 cases were excluded. For the remaining cases (n=231), a listwise deletion was not necessary as all the cases had less than 10% of missing at the DOSPERT items. For those cases, missing values were replaced with the subject's mean value.

The most common gambling activities in the sample were scratch-cards (61%), sport bets (55%), and bingo (48/%). Based on reported GD symptoms (section 2 of the GBS-A), 89% of the respondents were non-problem gamblers, 7% at-risk gamblers, and 4% problem gamblers.

To assess the relationship between gambling and domain-specific risk propensity, first we computed bivariate correlations between the DOSPERT *Risk Taking* scores for each domain, and both gambling frequency and problem-gambling severity scores. Results showed that gambling frequency was significantly and positively correlated with *Risk Taking* scores in the Ethical, Health-Safety, and Gambling domains, and that significant and positive correlations existed between gambling problem severity and *Risk-Taking* scores in the Ethical and Gambling domains (Table 1).

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Consistent with our hypotheses, the correlation between gambling frequency and Gambling *Risk Taking* domain was significantly higher than its correlation with either the Ethical ($z = -3.17$, $p = .001$) and Health-Safety domains ($z = -2.12$, $p = .011$)[1]. Similarly, the correlation between gambling problem severity and Gambling *Risk Taking* was significantly higher than the correlation with the Ethical

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[1] This test was conducted following the formula provided by Steiger (1980). The correlation between Risk-Taking in the Gambling domain and Risk-Taking in the Health-Safety domain was .40 ($p < .001$), while the correlation between Risk-Taking in the Gambling domain and Risk-Taking in the Ethical domain was .36 ($p < .001$).

domain, which was the only other risk-taking domain that demonstrated a significant correlation (z = -3.03, p = .002).

Next, in order to better understand our mediation hypothesis, we investigated the associations between problem-gambling severity and risk perception and expected benefits in the Gambling domain. We found that gambling problem severity was positively correlated with expected benefits (r = .21, p = .001) and negatively correlated with risk perception (r = -.23, p = .008). Consistent with the risk-return model, Gambling Risk Taking was negatively associated with Gambling risk perceptions (r = -.37, p < .001), whereas it was positively associated with Gambling Expected Benefits was positive (r = .48, p < .001). Moreover, Gambling risk perceptions were negatively correlated with Gambling expected benefits (r = -.30, p < .001).

To test the effects of the risk-return model on GD symptoms, we conducted a path analysis with SPSS AMOS software using the maximum likelihood estimation method. This model (see Figure 1) was specified as a fully mediated model, with GD symptoms as the dependent variable, Gambling risk perceptions and expected benefits as the predictor variables, mediated via Gambling risk taking. Additionally, we modeled the correlation between perceived risks and expected benefits, consistent with our predictions. To obtain p-values and reliable confidence intervals, we conducted 2000 bootstrap resamples (Edwards & Lambert, 2007; Shrout & Bolger, 2002). Several goodness-of-fit indices were used to test the adequacy of the model: The CFI (Bentler, 1990), the TLI (Tucker & Lewis, 1973), and the RMSEA (Steiger & Lind, 1980). CFI and TLI values equal to.90 or greater (Tucker & Lewis, 1973; Bentler, 1990) and RMSEA values of.08 or below (Steiger & Lind, 1980) were considered as indices of adequate fit.

The hypothesized model showed a good fit to the data (CFI = .99, TLI = .98, RMSEA = .03). As shown in Figure 1, the model supported our hypotheses. Specifically, results revealed that risk

perception had significant direct negative effect on risk-taking, whereas expected benefits has a significant direct positive effect. Moreover, risk perception and expected benefits were negatively interrelated. In turn, risk taking was positively related to GD symptoms. Additionally, both risk perception and expected benefits had significant indirect effects on GD symptoms, and overall the variables in the model resulted to explain 18% of GD symptoms.

- INSERT FIGURE 1 -

Finally, we tested if there was a direct path from the predictor variables to the dependent variable in addition to the indirect path from the independent variables to the dependent variable through the mediator. Results showed that the direct links between risk perception, expected benefits, and gambling problem severity were both non-significant, respectively, β = -.11 (p =.080) and β =.10 (p = .137).

Discussion

The current study investigated the degree to which a psychological risk-return model framework for domain-specific risk taking could explain problem-gambling severity among adolescents. Our findings first indicate that the Gambling domain of the adolescent version of the DOSPERT predicts adolescent gambling outcomes, relative to the other DOSPERT risk-domains. Second, our results suggest that the risk-return model was able to explain GD symptoms in youth. Specifically, Gambling-related perceived risks and expected benefits indirectly accounted for variance in problem-gambling severity. This relationship was mediated by individuals' risk-taking tendencies in the gambling domain. Specifically, our results indicate that perceived expected benefits had a high indirect effect on gambling problems, relative to the risk perception→risk taking → problem gambling severity path. In summary, this is the first study to demonstrate empirically the suitability of this approach to explain GD symptoms in adolescents.

Supporting domain-specific approaches to understanding risk behavior, our results demonstrate that the Gambling risk taking scale most strongly correlated with gambling behavior frequency and severity of symptoms, compared to other DOSPERT scales. Notably, these correlations were stronger than those observed between gambling behavior and both Ethical and Health-Safety risk-taking. Moreover, when examining the link between actual gambling severity and domain-specific risk taking, we observed a clear advantage for the Gambling scale relative to the other risk scales related to more maladaptive, antisocial risks Lauriola & Weller, 2018; Mishra et al., 2017; Weller et al., 2015). These results extend past research in adult samples that highlights the utility of a domain-specific approach to risk assessment (Hanoch et al. 2006, Markiewicz & Weber, 2013; Mishra et al., 2010).

Also consistent with past research, this study reinforced that risky gambling behavior will vary if there are differences in the magnitude of perceived risks and/or expected benefits (Weber et al., 2002). In line with our predictions, we found that risk perceptions and expected benefits are negatively correlated, and that gambling problem severity is largely associated with the perceived benefits of gambling and to a lesser extent by the perceived risks (Finucane et al., 2000; Hanoch et al., 2006; Weber et al., 2002; Weller & Tikir, 2011). This association is notable because risk and benefits often positively correlate (or at least show no correlation) in technical risk assessments (Finucane et al., 2000). Our results highlight that adolescents also utilize this pattern, at least within the gambling domain. Consistent with the literature are also the indirect links' directions between risk perception and expected benefits with gambling problem severity (e.g., Finucane et al., 2000; Hanoch et al., 2006; Slovic et al., 2004; Weber et al., 2002) Thus, gambling propensity in youth can be explained with a cost-benefit framework as it is largely predicted by the perceived benefits of gambling more than to the perceived risk (Hanoch et al., 2006).

These results suggest that perceived expected benefits, which have a greater direct predictive power on risk attitude toward gambling and a greater indirect effect on gambling problem severity with respect to risk perception, deserve greater attention in order to be better understood as a predictor of problem behavior. Expectancies are beliefs about the occurrence of certain outcomes as a result of a particular behavior (Olson et al., 1996). Research in the domains of alcohol, cannabis use, and sexual behaviors have shown that this construct is important both as an explanatory construct and a target for intervention in youth (Hurley et al., 2017; Schmits et al., 2016; Smit et al., 2018). In the research field of adolescent gambling, different positive expectancies have been reported among adolescents, and have differed based on one's cultural and linguistic background. For instance, Canadian adolescents report gaining money, enjoyment/arousal, and self-enhancement as expected benefits (Gillespie et al., 2007), whereas Wickwire et al. (2010) found material gain and positive self-evaluation as positive expectancies about gambling among African American youth. In contrast, in a sample of Chinese adolescents, social benefits and material gain have been found to be characterize young people (Wong & Tsang, 2012). Given the culturally-based nature of expectancies in general (Friedman et al., 2006; Peele & Brodsky, 2000; Wigfield et al., 2004), and specifically in the gambling domain (Gillispie et al., 2007; Wickwire et al., 2010; Wong & Tsang, 2012), it is important for future research to investigate which positive expectancies adolescents perceive towards gambling in different countries.

The influence of perceived expected benefits on gambling seems to be linked strictly to the issue of gambling advertisement (see Binde & Romild, 2019; Parke et al., 2015, for reviews). Indeed, gambling is typically advertised as a harmless entertainment, and a fun, leisure time activity (e.g., Derevensky et al., 2010; Pitt et al., 2016), while the harmful consequences of gambling are generally framed as an issue of choice (Korn et al., 2003). Thus, the underlying perceived message is that winning is easy, the chance of winning is high, and gambling is an easy way to become wealthy.

Young people are exposed to such kind of messages, through pop-up ads on the Internet, newspapers, radio, and TV, magazines. Research suggest that there is a proportion of adolescents who gamble because of these messages, and that boys, older youth, and problem gamblers are the most susceptible to the negative effects of advertisements (Derevensky et al., 2010) in terms of attitudes toward gambling. In this regard, another study found that greater intention to gamble was associated with higher frequency of watching televised sports, which are full of gambling promotions, and more positive attitudes to gambling operators, to gambling promotions during televised sport and to promotional techniques used (Hing et al., 2014).

Because the purpose of our study was not designed to assess the incremental validity of the DOSPERT relative to traits related to risk-taking, we must somewhat temper our conclusions regarding the unitary vs domain-specific approach. In fact, though our results highlight the utility of a domain-specific approach, we still see utility in the unitary trait approach as a complementary approach. First, the specificity of gambling as a risky behavior is not so clear (see Mishra et al., 2010), mostly because of its frequent association with various form of risk-taking behaviors both in adults (e.g., Ritchie et al., 2019; Winters & Whelan, 2019) and adolescents (e.g., Van Rooij et al., 2014; Willoughby et al., 2004). Gambling Disorder and Substance Use Disorder are often comorbid, and share some underlying characteristics, such as problems with impulse control, poor executive control, and maladaptive coping skills (Grant & Chamberlain, 2020). Additionally, Lauriola and Weller (2018) posited that domain-specific risk taking can be understood within a context of a hierarchical personality framework. In this model, individuals reporting high levels of disinhibition and impulsive sensation-seeking may be especially prone to engage in maladaptive risk-taking (compared to more growth-oriented, socially accepted risk behaviors). However, broad trait assessments lose fidelity in their predictive ability of specific behaviors, though their predictive bandwidth may be wider (Cronbach & Gleser, 1957). The

flexibility of this model allows for future research to examine the degree to which these traits, and other variables (e.g., peer influence, home environment, and decision skills) may relate to gambling severity by means of impacting risk perceptions and benefits (Weller et al., 2015; Weller & Tikir, 2011).

This study has some limitations. First, this study was , largely composed by male adolescents attending Italian public high schools. Although this aspect limits the generalizability of the present findings, international data indicate that gambling behavior and problem gambling are more widespread in boys rather than girls (Andrie et al., 2019). Thus, the present results can be useful to apply in explaining the reason why adolescent males are involved in gambling. However, as at the same time research suggests that an increasing proportion of female adolescent gamble and develop gambling-related problems (Huic et al., 2017), it would be important to test if our model can be applied also with girls. Another limitation to note is that this study is cross-sectional, and therefore, we cannot establish causal relationships among the variables. To overcome this limitation, future studies could address this issue by conducting longitudinal analyses in order to better study the processes described in this work.

This study may also bear some important practical implications. Often, prevention-oriented communication messages aimed at promoting responsible gambling habits aimed at increasing risk perceptions. For instance, gambling warning signs traditionally focus on informing individuals of the potentially risky outcomes of gambling, encouraging gambling within affordable limits, and advertising counseling services (Monaghan & Blaszczynski, 2010). This study suggests that, to maximize their efficacy with young populations, those messages maybe should be more about decreasing benefits. In this direction, several interventions in the school context have been directed to modify adolescents' positive perception of gambling economic profitability and erroneous beliefs linked to the easiness of winning in gambling (e.g., Canale et al., 2016; Donati et al., 2014; Donati et al., 2018; Lupu & Lupu,

2013; Williams, et al., 2010). To improve the educational efforts in gambling prevention, this study offers a theoretical and empirically evaluated framework of association with gambling problems to take into account, which is a preliminary requisite to realize and evaluate preventive interventions (Flay et al., 2005; Keen et al., 2017). A final consideration must be reported. As risk-taking toward gambling resulted to be the proximal antecedent of gambling problem severity in our model, given the difficulty in measuring intervention effects on behavioral outcomes in the gambling prevention literature (Keen et al., 2017), risk taking propensity should be included in the pre-, post-, and follow-up battery assessment of interventions in order to verify changes in this intentional indicator of gambling.

In summary, the current results show that utility of a domain-specific approach towards understanding risk behavior. Risk-taking in the in the specific gambling domain predicts adolescent gambling outcomes. Further, we found evidence of validity that the proposed psychological risk-return model explains GD symptoms in youth. These findings also demonstrate that perceived risks and expected benefits indirectly accounted for variance in problem-gambling severity, and this relationship is mediated by risk-taking tendencies in the gambling domain. Moreover, perceived expected benefits has a stronger indirect effect on gambling problems with respect to perceived risks. Results emphasize that specific interventions aimed at preventing problem gambling in adolescents require to address their perceptions about gambling outcomes, especially the perceived benefits.

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APPENDIX

Instructions for the Domain-Specific Risk-Taking Adolescent's Scale – *Risk-Taking* scale

Each of the following statements describes a risky situation. Imagine yourself in these situations. Then, tell us how likely you would be to do the activity or behavior that is described. Please do this by circling one of the seven ratings below each question ranging from *Extremely unlikely* (1) to *Extremely likely* (7).

Instructions for the Domain-Specific Risk-Taking Adolescent's Scale – *Risk Perception* scale

We asked how likely you would be to do the activities or behaviors described in each of the situations. Now we are interested in how risky you feel each situation or behavior is. In other words, we want you to give a rating based on your gut feeling of how risky each situation or behavior is. Please do this by circling one of the seven ratings below each question ranging from Not at all risky (1) to Extremely risky (7).

Instructions for the Domain-Specific Risk-Taking Adolescent's Scale – Expected Benefits scale

Now we are interested in how much you would benefit from each situation or behavior. In other words, how much would each situation or behavior make your life better in some way? Please provide a rating by circling one of the seven ratings below each question ranging from No benefits at all (1) to Great benefits (7).

Table 1

Pearson correlations between the DOSPERT Risk Taking scores, and gambling frequency and

gambling problem severity scores

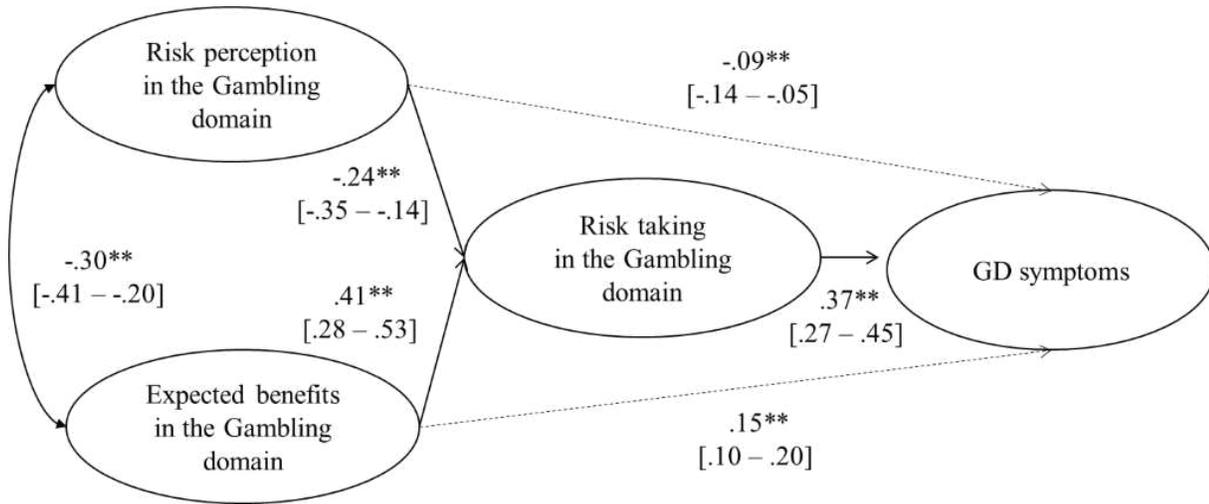| DOSPERT Risk-Taking		Gambling frequency	GD symptoms	M (SD)
Social		.13	-.03	29.16 (7.32)
Recreational		.12	.01	31.21 (10.24)
Ethical		.31***	.14*	26.33 (8.88)
Health/Safety		.39***	.08	30.82 (9.77)
Gambling		.53***	.37***	15.90 (5.77)
	M (SD)	5.07 (1.20)	4.21 (2.09)	

Note. ***$p < .001$, **$p < .01$, *$p<.05$, n = 231

Figure 1

Model of GD symptoms with standardized parameters (significant path coefficient ∗∗ at the .01 level).

Dotted lines represent indirect effects, while continuous lines indicate direct effects. n = 231