Longitudinal Associations between Peer Victimization and Positive and Negative Risk Taking in

Adolescence and Young Adulthood

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ABSTRACT

Adolescence is a developmental period characterized by an increase in risk taking.

However, this is not always adverse, as risks can be classified as both positive and negative.

Adolescence is also a period of time in which social relationships, particularly among peers,

become increasingly salient, and as such, peer-related factors are often connected to risk-taking

in adolescence. While peer relationships can provide adolescents with social support, they can

also be harmful when they manifest in peer victimization. Thus, this study sought to understand

the associations between positive and negative risk taking and relational and physical

victimization in adolescence and young adulthood. Data were collected from 167 adolescents

across five time points, approximately one year apart. Adolescents completed questionnaires that

assessed their risk-taking perceptions and likelihood as well as peer victimization experiences.

Results demonstrated that there were no significant cross-construct associations between positive

and negative risk-taking perception and relational and physical peer victimization across

adolescence. However, additional analyses examining positive and negative socially-related risk

taking revealed a significant association between positive socially-related risk perception and

relational victimization such that higher initial levels of positive socially-related risk perception

predicted a slower decline in relational victimization across adolescence. Results also showed

that overall, higher levels of risk-taking perception in adolescence predicted decreased levels of

risk-taking likelihood in young adulthood, and that higher initial levels of physical and relational

victimization in adolescence predicted higher levels of positive and negative risk-taking

likelihood in young adulthood, respectively. Findings highlight the connection between peer victimization and positive and negative risk perception in adolescence, the potential risk-taking outcomes in young adulthood resulting from peer victimization experiences and risk-taking perception in adolescence, and most importantly, the differential roles of positive and negative risk taking in adolescence and young adulthood.

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GENERAL AUDIENCE ABSTRACT

Adolescence is a time in development where risk taking increases. However, this is not always adverse, as risks can be classified as both positive and negative. Adolescence is also a time in which peer relationships become especially important, and as such, peer-related factors are often connected to risk-taking in adolescence. While peer relationships can provide adolescents with social support, they can also be harmful when they result in peer victimization. Thus, this study sought to understand the associations between positive and negative risk taking and relational and physical victimization in adolescence and young adulthood. Data were collected from 167 adolescents across five time points, approximately one year apart. Adolescents completed questionnaires that assessed their risk-taking perceptions and likelihood as well as peer victimization experiences. Results demonstrated that there were no significant associations between positive and negative risk-taking perception and relational and physical peer victimization across adolescence. However, additional analyses examining positive and negative socially-related risk taking revealed a significant association between positive socially-related risk perception and relational victimization such that higher initial levels of positive socially-related risk perception predicted a slower decline in relational victimization across adolescence. Results also showed that overall, higher levels of risk-taking perception in adolescence predicted decreased levels of risk-taking likelihood in young adulthood, and that higher initial levels of physical and relational victimization in adolescence predicted higher levels of positive and negative risk-taking likelihood in young adulthood, respectively.

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Introduction

In comparison to children and adults, adolescents are most likely to take risks (Duell & Steinberg, 2019). However, contrary to popular assumption, this isn't necessarily adverse, as risks can be classified along a spectrum of desirability, with some risks falling on the more positive end and some landing in the negative. An increasing body of literature examines potential reasons why adolescents are more prone to risk-taking behavior; with peer-related factors emerging as one of the most common. Although many peer relationships provide friendship and social support, others can be hurtful and even violent. Peer victimization, also referred to in literature as peer harassment or bullying, can be defined as physical, verbal, or psychological abuse that tends to take place at or around school (Graham, 2006). This raises the question of how, if at all, peer victimization influences both positive and negative risk taking in adolescence.

Risk Taking in Adolescence

Of all stages of development, adolescents (typically referred to as individuals falling between the ages of 12-18) are the most likely to take risks (Duell & Steinberg, 2019). A salient stereotype exists regarding this association, one that depicts adolescents as irrational, unaware individuals who feel that they are invincible to the potential dangers of engaging in risky behavior. However, this commonly held belief is refuted by research, as it has been found that the logical reasoning abilities of adolescents are no worse than that of adults (Reyna & Farley, 2006). Then, if adolescents are just as skilled at perceiving a situation's potential risk, the question is raised as to why adolescents take so many risks. The answer may be rooted in brain development in adolescence.

From a neurological standpoint, adolescents are at a sensitive developmental period for risk taking (Steinberg et al., 2008). This can be best explained by a dual-systems theory, characterized by an interaction between two brain networks, one lying in the limbic system, and the other in the lateral and prefrontal cortices (Casey et al., 2008; Steinberg et al., 2008). According to this view, the limbic system is associated with an increase in reward seeking, and this develops quickly at the onset of puberty. In contrast, the lateral and prefrontal cortices, associated with cognitive control and self-regulation, develop much more slowly, and do not complete full development until young adulthood. Simply speaking, adolescents are more sensitive to exciting experiences and rewarding stimuli before they have the self-regulation skills to control their impulsivity. This can be quite adaptive–from an evolutionary standpoint. Risk taking is an essential aspect of growth in adolescence, as risk allows for the achievement of certain developmental milestones such as establishment of personal identity, autonomy, and close social bonds (Ellis et al., 2012). However, many risks come with negative, potentially life-altering consequences, which is why it is critical to make the distinction between positive and negative risks.

Elements of Positive and Negative Risk Taking

Risk is a broadly defined construct comprised of three components: 1) potential for both cost and reward, 2) variability in the likelihood of potential outcomes, and 3) a degree of uncertainty about the outcomes (Holton, 2004). Thus, risks can fall on both ends of a desirability spectrum, with some risks being more positive in nature and others being more negative. Positive risks can be characterized by three features: being beneficial to an adolescent's well-being, carrying potential costs that are mild in severity, and being socially acceptable (Duell & Steinberg, 2019). Some positive risks an adolescent could engage in may be protesting for social

justice, joining in a new sport or club, or making the first move in a potential friendship or relationship. In contrast, negative risks can be thought of as the opposite of these features, tending to be harmful to an adolescent's well-being, carry quite severe potential costs, and generally illegal or socially unacceptable–defined broadly as activities with a reasonable chance of a negative life outcome (Fischer & Smith, 2004). For example, adolescents may take part in negative risky behavior, such as using illegal substances, unsafe driving, or engaging in unprotected sex.

Research on risk taking has found that positive and negative risk taking tend to be positively correlated. For example, studies show that adolescents who take part in socially acceptable behaviors such as sports or clubs, also tend to engage in socially unacceptable behaviors such as substance use and delinquency (Wood et al., 2013). Positive and negative risk taking are also both positively related to sensation-seeking, which can be defined as the tendency to seek out novel and thrilling experiences (Duell & Steinberg, 2020; Fischer & Smith, 2004). However, negative risk taking is positively correlated with poor impulse control, whereas positive risk taking is not (Duell & Steinberg, 2020). In fact, some studies suggest that positive risk-taking may actually be positively associated with greater self-regulation (Wood et al., 2013), whereas negative risk taking was shown to be correlated with poor self-regulation (Castellanos-Ryan et al, 2013). Further, recent work comparing positive vs. negative risk taking in relation to positive psychological functioning demonstrated that positive risk taking is positively associated with school engagement, whereas negative risk taking was negatively associated with school engagement (Duell & Steinberg, 2020).

Risky decision making is related to the perceived risk of a situation (Spurrier & Blaszczynski, 2014), and for many years, the reason why adolescents take so many risks was

explained by their inability to perceive situations as potentially harmful (e.g. Lapsley et al., 1986). However, as mentioned earlier, adolescents have no difference in their logical reasoning abilities than adults (Reyna & Farley, 2006), and it has even been found that adolescents will sometimes overestimate risk rather than underestimate it (Millstein & Halpern-Felsher, 2002). While studies have identified several factors that influence adolescents' risk perception including risk reappraisal (Grevenstein et al., 2015) and social influence (Knoll et al., 2015), one large gap in the risk perception literature lies within how adolescents perceive positive or negative risks. One goal of this study is to examine which risks adolescents perceive as positive or negative, and if these classifications correspond with the findings by Duell and Steinberg (2020).

A number of cross-sectional studies have examined whether risk-taking behavior peaks in late adolescence or early young adulthood, but results have been found to be inconsistent. According to the dual systems model, risk taking is expected to hit its peak in middle adolescence to late adolescence, the developmental period in which reward sensitivity is at its highest (Steinberg, 2008). However, as opportunities to engage in risky behavior increase with age, it is likely that young adults may experience greater risk-taking behavior than adolescents. For example, a cross-sectional study examining risk-taking behavior in multiple different countries found that while risk taking overall followed an inverted U shape, increasing through adolescence and declining in young adulthood, risk taking propensity hit its peak in middle to late adolescence, while real-world health risk behaviors hit their peak in young adulthood (Duell et al., 2018). However, this study in particular examined negative risk-taking behaviors, and many other studies examining developmental trajectories of risk-taking behavior focus on solely negative risks, including substance use (Chen & Jacobsen, 2012) and delinquency (Miller et al., 2010). As such, there is a salient gap in literature regarding the developmental trajectories of

positive risk taking, and clarity is needed to further understand the developmental changes involved in negative risk-taking behavior.

Peer Victimization, Social Context, and Risk Taking

Adolescence is a developmental period in which peer influence becomes especially influential (Blakemore, 2008). During adolescence, many youths become more emotionally detached from parents, and peers typically become adolescents' main source of social support in place of parents (Bukowski et al., 2019). Thus, peers tend to gain influence over many aspects of daily life. As adolescents spend an increasing amount of time among peers, they tend to become more aware of their social status and thus increase their motivation to seek more elevated status (Levy et al., 2004). Thus, as the peer domain and the status that coincides becomes increasingly salient in adolescence, experiencing peer victimization during this developmental period is especially harmful. Peer victimization can be broken down further into two critical distinctions: physical victimization and relational victimization (Ostrov & Kamper, 2015). Physical victimization is characterized by receiving any form of physical aggression or the threat of physical aggression, such as hitting, kicking, punching, or stealing from others. In comparison, relational victimization is characterized by the removal or threat of removal of social relationships, such as social exclusion or spreading rumors (Ostrov & Kamper, 2015; Crick et al., 2002). Peer victimization is growing steadily as a public health issue, as it has been associated with many mental health issues in adolescence (Graham, 2016), making understanding the outcomes of each distinction of victimization extremely critical.

Recent research examining the development of relational and overt victimization over time is sparse. However, one longitudinal study has shown that overall, peer victimization tends to decline starting in middle childhood and continue to decline throughout adolescence, as

cognitive abilities develop further and social structures among peers become more equal (Troop-Gordon, 2017). However, these trends change when examining peer victimization within the context of its subtypes. More recent longitudinal work has found that relational victimization increases generally across adolescence, but decelerates over time (Herd, 2021), and that being friends with adolescents who are experiencing relational victimization increases adolescents' own relational victimization over time (Sentse et al., 2013). This can be explained by the social changes that occur during adolescence–as social status becomes more of a salient motivator (Levy et al., 2004), peer relationships may include cliques which can be characterized by features of relational victimization such as exclusion and character victimization (Prinstein et al., 2001). However, when it comes to the developmental trajectory of physical victimization, results become increasingly unclear. In Herd's study, while a clear pattern was able to be observed in the development of relational victimization, year-to-year or constant change in physical victimization during adolescence was not significant (2021). Whereas some longitudinal research has demonstrated that physical victimization tends to decline in adolescence (Williford et al., 2011), other longitudinal work has shown an increase in physical victimization at least at the onset of puberty (Haynie & Piquero, 2006). Taken together, while research has reported that peer victimization declines overall from childhood to adolescence, there is evidence to suggest differing trajectories depending on the type of the victimization: That is, relational victimization may increase across adolescence where as physical victimization may stay relatively consistent or even decrease. Thus, there is a reason to consider these two different types of peer victimization as serving differential social contexts for risk taking development throughout adolescence.

One lens through which researchers can view the link between peer victimization and risk taking is through that of the social defeat model. This model, originally constructed from animal studies, posits that when a "submissive" animal is consistently beaten and threatened by a "dominant" animal, the "submissive" animal experiences a wide variety of social stress outcomes, including depression, increased sleep, and decreased immunological function (Björkquist, 2001). This model is commonly related to humans to better understand the effects of peer victimization. In this case, the "submissive" animal represents the victim, and the "dominant" animal represents the bully. Similar outcomes result from studies on peer victimization, as those who have been victimized report to have poor self-esteem, experience depression, withdraw socially, experience heightened anxiety, and view themselves as unintelligent and ugly (Hawket & Boulton, 2000). This model can be related to both physical and relational victimization, as physical victimization is characterized by *physical* threats towards the submissive (e.g. punching, kicking), whereas relational victimization involves *social* threats towards the submissive (e.g. exclusion, rumors). The effects of social defeat on victims of physical and relational victimization also align with those of the victim schema model, which posits that prolonged peer victimization changes young peoples' social-cognitive processing by developing a negative cognitive bias to social interactions (Rosen & Harris, 2009). Thus, the victims will tend to interpret future interactions more negatively and become more sensitive to information perceived as threatening (Rosen & Harris, 2007). It follows that victimization experience can lead the victims to behave more awkwardly and withdrawn in future interactions, opening the door to additional victimization, and thus continuing the cycle.

For individuals experiencing social defeat from peer victimization, engaging in risky behavior may be a way for them to cope with the mental and emotional struggles that result.

Loneliness is an experience of emotions, characterized by feelings of sadness caused by lack of companionship, and prior studies have found that higher levels of loneliness were associated with higher levels of health risk behaviors such as substance use among adolescents (Mason et al., 2020; Stickley et al., 2014;). Research using functional neuroimaging provides further understanding of the link between emotional distress triggered from hurtful social relationships such as peer victimization and use of substances as a way to self-medicate by illuminating a shared activation in the brain between social and physical pain. Specifically, the anterior insula and the dorsal anterior cingulate cortex, brain regions that respond to physical pain, were activated while completing a computer task that mimicked social rejection (Eisenberger, 2012). Further, victimized individuals may be even more inclined to use substances as a coping mechanism, as there is a well-established connection in the literature between physical abuse in childhood and adolescence and later substance use behavior (Afifi et al., 2012; Rogosch et al., 2010; see Simpson & Miller, 2002 for review). Thus, for victims of peer abuse who may experience symptoms of social defeat, they may be more prone to engaging in negative risks, particularly substance use, rather than positive risks.

Additionally, adolescents experiencing social defeat following peer victimization may attempt to present themselves more favorably to peers through making risky decisions. Prior work has demonstrated that adolescents tend to take riskier decisions when in the presence of peers (e.g., Chein et al., 2011; De Bour & Harakeh, 2017) which can be explained due to the increase in sensitivity to social reward that occurs during adolescence. Thus, adolescents who have been victimized by their peers may be more susceptible to making risky decisions as a way to increase their social standing after experiencing social threat and exclusion. For example, it has been found that negative risk encouragement (e.g., "if you quit, you're a softy") was related

to higher risk-taking behavior around peers (Wagemaker et al., 2020). This finding is in line with prior work indicating that social exclusion and negative peer interactions are related to reputation management and greater risk taking (Nesdale & Lambert, 2008). Given work that suggests adolescents engage in substance use as a way to increase their social standing (e.g., Moody et al., 2011), these victimized individuals may tend to engage in similar negative risks as a way to increase their reputation and break the cycle of continued victimization.

Alternative to the social defeat model, the link between peer victimization and risk taking can also be viewed through the lens of justice sensitivity. Justice sensitivity is defined as a personality trait that encapsulates individual differences in emotional and behavioral responses to real or perceived injustice (Schmitt et al., 2010). Those high in justice sensitivity tend to ruminate upon and be hypervigilant towards situations of injustice. Justice sensitivity can be broken down into three perspectives: *victim justice sensitivity* describes the tendency to feel unfairly treated; *observer justice sensitivity* describes the tendency to perceive others being unfairly treated; *perpetrator justice sensitivity* describes the tendency to feeling unfairly treating others. Persistent mistreatment by peers can lead to individuals being more sensitive to unfairness and injustice, which could in turn heighten their level of justice sensitivity. Indeed, it has been found that adolescent girls who have experienced peer victimization developed increased levels of victim justice sensitivity over time (Bondü et al., 2016). Justice sensitivity is associated with strong feelings toward what is morally right and just—a finding that has even been supported neurologically. Specifically, functional neuroimaging studies have shown that those high in justice sensitivity show enhanced neural processing while evaluating "bad" versus "good" actions (Yoder & Decety, 2014).

However, experiencing the injustices of peer victimization combined with a heightened sense of what is just and right may result in differing risk-taking outcomes. According to a longitudinal study of adolescents and young adults, higher victim justice sensitivity was positively associated with both peer victimization and substance use behavior (Bilgin et al., 2021). This association can be explained by the General Strain Theory, which emphasizes that stressful social situations such as rejection or victimization may pressure adolescents to engage in deviant behaviors due to a violation of the basic norms of justice. When the social strain is perceived as unjust, not just unfortunate, associations with deviant behavior becomes stronger due to the increase in negative emotions (Agnew, 1992; Agnew, 2001; Bilgin et al., 2021), providing another reason why adolescents experiencing peer victimization may engage in negative risks. On the other hand, observer justice sensitivity is commonly associated with skills such as empathy, role-taking, and social responsibility (Schmitt et al., 2005). Thus, after experiencing prolonged unfairness themselves, adolescents who have experienced peer victimization may be higher in this form of justice sensitivity, making them more inclined to take positive risks, particularly ones that involve morals and ethics. For example, an ethical positive risk could be returning a wallet you found that contains a wad of cash inside. Further, due to the altruistic skills that accompany observer justice sensitivity, victims of peer victimization may engage in an adaptive response focused on rebuilding social connections that were lost to the victimization. Indeed, it has been found that higher reported prosocial behaviors in children served as a protective factor, significantly reducing victimization over time (Griese et al., 2016). Thus, adolescents who experience peer victimization may also be prone to taking positive risks related to social relationships. For example, these adolescents may take the positive risk of joining a new club or team or inviting a new student to join them at lunch, as ways to regain the

sense of social connection that was hindered due to the victimization. Further, due to the social nature of these positive risks and the goal of rebuilding a social network, those who experienced relational victimization may be more inclined to engage in these risks than those who experienced physical victimization.

The Present Study

Current literature suggests the important role the peer context plays on risk-taking behavior in adolescence, specifically for those who have experienced victimization by their peers. However, many studies focus primarily on negative risk taking, and a significant gap in the literature remains involving peer victimization and the propensity to take positive or negative risks, and few studies have examined this connection longitudinally. As such, this study is the first empirical study to examine longitudinal associations of peer victimization with the developmental changes in both positive and negative risk taking across adolescence. In sum, this study has two primary aims and one ancillary aim:

> **Primary Aim 1.** Understand patterns of developmental trajectories of peer victimization (physical and relational) and positive and negative risk-taking

> **Primary Aim 2.** Understand the association between peer victimization (physical and relational) and positive and negative risk taking

>> a. Given the theoretical accounts based on the social defeat model and the justice sensitivity model, we hypothesize significant positive associations between peer victimization with both positive and negative risk taking during adolescence and examine whether links are stronger with positive or negative risks.

>> b. We hypothesize significant positive associations between both physical and relational victimization and positive and negative risk taking in young adulthood

and aim to examine which subtypes are more prominent in predicting

developmental changes in positive or negative risk taking.

Ancillary Aim: Understand similarities and differences between positive and negative

risk categorization and positive and negative risk outcome perceptions among

adolescents.

Methods

Participants

The sample used was comprised of 167 adolescents (53% males) from a southeastern

state in the United States of America. These adolescents participated in five yearly assessments

across six years (with a two-year gap between Time 4 and Time 5). Adolescents were 14-15

years old at Time 1 ($M = 15.05$, $SD = 0.54$ for Time 1, $M = 16.07$, $SD = 0.56$ for Time 2, 17.01,

$SD = 0.55$ for Time 3, $M = 18.39$, $SD = 0.67$ for Time 4, and $M = 19.62$, $SD = 0.72$ for Time 5).

Roughly 78% of participants reported their race as Caucasian, 14% African-American, 6% as

more than one race, and 2% as other. The sample had a median family income ranging from

$35,000-$50,000 and levels of family economic status varied (50% "poor/near poor" and 50%

"non-poor" according to income-to-needs ratio). 150 adolescents participated at Time 1. At Time

2 data from 147 participants, at Time 3 data from 150 participants, at Time 4 data from 126

participants, and at Time 5 data from 124 participants were collected. Some participants did not

participate in all possible assessments for various reasons such as: ineligibility for tasks (i.e.,

brain abnormality, not meeting MRI safety criteria), declined participation, and lost contact.

Procedures

Data included in this study were gathered as part of a greater longitudinal project.

Participants (adolescents and their primary caregivers) were recruited through use of email,

flyers, and snowball sampling (word-of-mouth). Data was collected in university spaces where

participants completed a combination of behavioral and neuroimaging tasks, self-report surveys,

and verbal interviews by trained research assistants. The data collection sessions lasted an

average of five hours. All participants gave written informed consent or assent, and all

procedures were approved by the institutional review board of the university. Participants were

compensated monetarily for their time.

Measures

Peer Victimization. Peer victimization was measured at Times 4 and 5 using the Maltreatment

and Abuse Chronology of Exposure scale (MACE; Teicher & Parigger, 2015) (see Appendix A),

which assesses the severity of exposure to multiple types of maltreatment throughout each year

of childhood (1-18). Participants were asked to report the ages at which they experienced the

events described within the items, retrospectively. For the proposed study, two of the ten

maltreatment subscales were used: peer emotional abuse (5 items) and peer physical bullying (5

items). Sample items include "[Peers] intentionally excluded you from activities or groups" (peer

emotional abuse) and "[Peers] threatened you in order to take your money or possessions" (peer

physical bullying). Subscale scores were scaled using an algorithm provided by Teicher and

Parigger (2015). The current analyses used retrospective reports of peer victimization from ages

6-18. Scores ranged from 0-10, with higher scores indicating higher maltreatment. Peer physical

bullying (r = .68) and peer emotional abuse (r = 0.85) demonstrated good test-retest reliability

over one year, and previous research has similarly demonstrated good to excellent test-retest

reliability for study variables (r = .83 for peer physical bullying; r = 0.75 for peer emotional

abuse) (Teicher and Parigger, 2015). For the purposes of this study, peer emotional abuse is

operationalized as relational victimization, while peer physical bullying is operationalized as physical victimization.

Positive and Negative Risk-Taking. Positive and negative risk taking was measured at Times 1-5 using the Domain Specific Risk Taking scale (DOSPERT; Blais & Weber, 2006). An adolescent version of the measure was given at Times 1-3 and was replaced by the adult version at Times 4 and 5 (see Appendices B and C). Between the adolescent and adult versions of the measure, 21 items were selected for use in this study based on equivalence between the two versions (e.g. "dating somebody else's boyfriend or girlfriend" in the adolescent version equated to "having an affair with a married man/woman" in the adult version). Of these 21 items, 10 were classified as positive risks and 11 were classified as negative risks. These items were differentiated using face validity by comparing them to other measures of positive and negative risk (Duell & Steinberg, 2020; Gullone et al., 2000). Recreational items (e.g., "taking a skydiving class") were classified as positive risks due to justification provided by Gullone et al. (2000) considering that such thrill-seeking behaviors can be classified as positive because they are generally socially acceptable and the possible negative outcomes are usually not as severe. One caveat exists between the two versions, as the adolescent version asks participants to indicate "how risky they feel" about each item (ranging from "1 = not at all risky" to "7 = extremely risky") while the adult version asks participants to assess their likelihood of engaging in each item (ranging from 1 = extremely unlikely" to "7 = extremely likely"). Thus, the adolescent version measures risk-taking *perceptions*, while the young adult version measures risk-taking *likelihood*.

Positive and Negative Risk Outcome Perceptions. Positive and negative risk outcome perception was measured at Times 1-3 using Parts 2 and 3 of the Domain Specific Risk Taking

Scale (DOSPERT; Blais & Weber, 2006) (see Appendices D and E). The first 10 items from each part were selected for use in this study. In Part 2, participants were asked how bad the described situation could turn out (ranging from 1 = "not at all bad" to 7 = "extremely bad") , and in Part 3, participants were asked how good the described situation could turn out (ranging from 1 = "not at all good" to 7 = "extremely good"). The 10 items were the same in both parts. Of these 10 items, 7 were classified as negative risks and 3 were classified as positive risks using the same criteria that was used to classify the DOSPERT positive and negative risk taking items above.

Data Analytic Plan

Descriptive statistics were examined for both peer victimization and positive and negative risk taking to determine normality of distributions and outliers. Outliers (N = 19) were identified as values lying $\geq$ 3.29 SD away from the mean. These values were Winsorized to preserve statistical power and reduce any elimination bias (Ghosh & Vogt, 2012). Skewness and kurtosis were also examined with acceptable levels less than 3 and 10, respectively (Kline, 2011). Multivariate GLM analyses were conducted to test for significant effects of demographic backgrounds (including sex, race, and income-to-needs ratio) on the study variables.

The hypothesized models were tested via Structural Equation Modeling (SEM) using M*plus* statistical software version 8 (Muthén & Muthén, 2021). Model fit was assessed by χ^2 value, degrees of freedom, corresponding *p*-value, Root Mean Square Error of Approximation (RMSEA), and Confirmatory Fit Index (CFI). For RMSEAs, values less than .05 and .08 were taken to reflect good and acceptable fits, respectively. For CFIs, values greater than .90 and .95 were taken to reflect acceptable and good fits, respectively (Little, 2013). Full information maximum likelihood (FIML) estimation procedure (Arbuckle, 1996) was used for missing data

since FIML estimates are greater than those obtained using other ad hoc methods such as listwise deletion (Schafer & Graham, 2002).

Figure 1 depicts the hypothesized model. Slopes and intercepts of peer victimization and risk-taking perceptions were simultaneously tested using bivariate growth curve modeling. Models were tested separately for 1) subtype of peer victimization (physical or relational) and 2) type of risk-taking perception (positive or negative), resulting in a total of four models.

First, a series of unconditional univariate growth curve models (GCM) for peer victimization and risk taking were tested across all three time points (ages 14-16). Models were tested separately for 1) subtype of peer victimization (physical or relational) and 2) type of risk-taking perception (positive or negative), resulting in a total of four models. The intercept was the first latent factor, with all factor loadings fixed to one. The slope was the second latent factor, indicating growth of the change and function over time. The latent basis growth model was compared to the linear growth and no growth models in order to establish the shape of the trajectories using nested model comparisons. In the no growth model, non-significant change in the slope was assumed. In the linear growth model, a linear pattern of change was assumed and factor loadings for the latent slope factor will be fixed to 0, 1, and 2. Lastly, the latent basis growth model allowed the data to estimate the shape of growth; by which the first and last time points were fixed (to 0 and 1, respectively) and the second time point was freely estimated. The nested models were compared using a χ^2 difference test and the model that was the most parsimonious was chosen to be the best-fitting model, provided it had acceptable fit.

Next, bivariate GCMs were tested involving both peer victimization and risk-taking perception constructs. Correlations were estimated between the intercept and the slope within the peer victimization and risk-taking perception variables and between the peer victimization and

risk-taking perception variables. To understand the longitudinal prediction from peer

victimization and risk-taking perception during adolescence on risk-taking behavior in young

adulthood, regression paths were estimated between the intercept and slope of adolescent risk-

taking perceptions and young adult risk-taking likelihood and between the intercept and slope of

peer victimization during adolescence and young adult risk-taking likelihood.

Power

To estimate power, we used an a priori sample size calculator (Soper, 2022) to test the

desired sample size for hypothetical effect sizes of .10, .30, and .50 (small, medium, and large, as

described by Cohen, 1988) with a desired power of .8. The sample sizes needed for effect sizes

.10, .30, and .50 were 1,454, 137, and 34, respectively. Upon examining the effect sizes in a

similar study (Sullivan et al., 2006), the correlations between peer victimization and risk-taking

variables ranged from .16-.35. Thus, as prior studies demonstrated having medium effect size,

and our calculations suggested a sample size of 137 for a medium effect size, our analyses had

sufficient power (>.8) using our sample size of 167.

<div align="center">

Results

</div>

Descriptive statistics and correlations for the study variables are shown in Table 1.

Univariate Growth Curve Models

Peer Victimization. Three possible models were fit in order to establish the shape of the

trajectories of both relational and physical victimization (see Table 3). For relational

victimization, the linear growth model ($\chi^2 = 5.208$, $df = 3$, $p = .157$, RMSEA= 0.073, CFI =

0.993) fit the data best compared to the no growth and latent basis growth models. Significant

variance of the intercept ($\sigma^2 = 10.810$, SE = 1.427, $p < .001$) and slope ($\sigma^2 = 1.087$, SE = 0.215, p

< .001) indicated that there were significant individual differences in initial levels and change in

relational victimization. The means of the intercept ($M = 2.981$, $SE = 0.293$, $p < .001$) and slope ($M = -0.333$, $SE = 0.111$, $p = .003$) were significantly different from 0, showing that relational victimization decreased over time.

For physical victimization, the latent basis growth model ($\chi^2 = 2.862$, $df = 2$, $p = .239$, RMSEA= 0.056, CFI = 0.995) fit the data best compared to the no growth and linear growth models. Significant variance of the intercept ($\sigma^2 = 1.335$, SE = 0.172, $p < .001$) and slope ($\sigma^2 = 1.090$, SE = 0.154, $p < .001$) indicated that there were significant individual differences in initial levels and change in physical victimization. The means of the intercept ($M = 0.474$, $SE = 0.102$, $p < .001$) and slope ($M = -0.251$, $SE = 0.095$, $p = .008$) were significantly different from 0, showing that physical victimization decreased over time.

Risk-taking perception. As with peer victimization, three possible models were fit in order to establish the shape of the trajectories of both positive and negative risk-taking perception (see Table 3). For positive risk-taking perception, the linear growth model ($\chi^2 = 0.706$, $df = 3$, $p = .872$, RMSEA= 0.000, CFI = 1.000) fit the data best compared to the no growth and latent basis growth models. Significant variance of the intercept ($\sigma^2 = 0.621$, SE = 0.104, $p < .001$) and slope ($\sigma^2 = 0.086$, SE = 0.032, $p = 0.008$) indicated that there were significant individual differences in initial levels and change in positive risk-taking perception. The means of the intercept ($M = 3.988$, $SE = 0.076$, $p < .001$) and slope ($M = -0.128$, $SE = 0.040$, $p < .001$) were significantly different from 0, showing that risk-taking perception for positive risks decreased over time.

For negative risk-taking perception, the linear growth model ($\chi^2 = 0.884$, $df = 3$, $p = .829$, RMSEA= 0.000, CFI = 1.000) also fit the data best compared to the no growth and latent basis growth models. Significant variance of the intercept ($\sigma^2 = 0.607$, SE = 0.101, $p < .001$) and slope

(σ^2 = 0.080, SE = 0.032, p = .013) indicated that there were significant individual differences in initial levels and change in negative risk-taking perception. The means of the intercept (M = 5.424, SE = 0.075, p < .001) and slope (M = -0.097, SE = 0.039, p = .013) were significantly different from 0, showing that risk-taking perception for negative risks decreased over time.

Bivariate Growth Curve Models of Peer Victimization and Risk-Taking Perception during Adolescence with Young Adult Risk-Taking Likelihood as an Outcome

Dynamic relations between growth functions of peer victimization and risk taking were examined using bivariate growth curve analyses and by estimating correlations between the intercept and slope factors within each construct, as well as correlations between the intercept and slope factors of peer victimization and the interact and slope factors of risk-taking perception during adolescence. Initial levels and growth of both relational and physical victimization were tested using four models with initial levels and growth of both positive and negative risk taking separately. The demographic covariate of sex was included two of the final growth models (relational and physical victimization with negative risk-taking perception models) because there were significant associations with initial levels or growth in the risk taking or peer victimization variables.

Positive Risk-Taking Perception and Relational Victimization. The bivariate model examining joined development of positive risk taking and relational victimization demonstrated good fit (χ^2 = 14.809, df = 13, p = .319, RMSEA = 0.029, CFI = 0.996). There were significant associations of both the intercept (b = -0.680, SE = 0.129, p < .001) and slope (b = -1.972, SE = 0.610, p = .001) of positive risk-taking perception with positive risk-taking likelihood at Times 4-5, indicating that higher initial levels of positive risk-taking perception in early adolescence (age 14) and change in positive risk-taking perception during middle adolescence (ages 14-16)

predicted decreased positive risk-taking likelihood in young adulthood (ages 18-19). There was also a significant correlation between the intercept and slope of relational victimization ($b = -1.613$, $SE = 0.413$, $p < .001$), indicating that higher levels of relational victimization in early adolescence (age 14) was associated with a greater decline in relational victimization during middle adolescence (ages 14-16). A significant correlation was also found between the intercept and slope of positive risk-taking perception ($b = -0.093$, $SE = 0.046$, $p = .044$), indicating that higher levels of risk-taking perception for positive risks in early adolescence (age 14) was associated with a greater decline in risk-taking perception for positive risks during middle adolescence (ages 14-16). However, none of the cross-construct regression or correlation paths between the victimization and risk-taking perception growth factors were statistically significant, indicating that the initial levels and growth of relational victimization were not significantly associated with the initial levels and growth of positive risk-taking perception (see Table 5 for standardized estimates).

Positive Risk-Taking Perception and Physical Victimization. The bivariate model examining joined development of positive risk taking and physical victimization demonstrated good fit ($\chi^2 = 8.284$, $df = 12$, $p = .763$, RMSEA = 0.000, CFI = 1.000). There was a significant association between the slope of physical victimization and positive risk-taking likelihood at Times 4-5 ($b = 0.393$, $SE = 0.173$, $p = .023$), indicating that slower decline of physical victimization during middle adolescence (ages 14-16) predicted increased positive risk-taking likelihood in young adulthood (ages 18-19). There were also significant associations of both the intercept ($b = -0.697$, $SE = 0.129$, $p < .001$) and slope ($b = -2.056$, $SE = 0.619$, $p = .001$) of positive risk-taking perception and positive risk-taking likelihood at Times 4-5, indicating that higher initial levels of positive risk-taking perception in early adolescence (age 14) and change in

risk-taking perception during middle adolescence (ages 14-16) predicted decreased positive risk-taking likelihood in young adulthood (ages 18-19). There was also a significant correlation between the intercept and slope of physical victimization (b = -1.048, SE = 0.150, p < .001), indicating that higher levels of physical victimization in early adolescence (age 14) was associated with a greater decline in physical victimization during middle adolescence (ages 14-16). A significant correlation was also found between the intercept and slope of positive risk-taking perception (b = -0.093, SE = 0.046, p = .044), indicating that higher levels of risk-taking perception for positive risks in early adolescence (age 14) was associated with a greater decline in risk-taking perception for positive risks during middle adolescence (ages 14-16). However, none of the cross-construct regression or correlation paths between the victimization and risk-taking perception growth factors were statistically significant, indicating that the initial levels and growth of physical victimization was not significantly associated with the initial levels and growth of positive risk-taking perception (see Table 5 for standardized estimates).

Negative Risk-Taking Perception and Relational Victimization. The bivariate model examining joined development of negative risk taking and relational victimization demonstrated good fit (χ^2 = 11.077, df = 15, p = .747, RMSEA = 0.000, CFI = 1.000). There was a significant association between the intercept of relational victimization and negative risk-taking likelihood at Times 4-5 (b = 0.063, SE = 0.023, p = .007), indicating that higher initial levels of relational victimization in early adolescence (age 14) was associated with greater negative risk taking in young adulthood (ages 18-19). There was also a significant association between the intercept of negative risk-taking perception and negative risk-taking likelihood at Times 4-5 (b = -0.377, SE = 0.096, p < .001), indicating that higher initial levels of negative risk-taking perception in early adolescence (age 14) predicted decreased negative risk-taking likelihood in young adulthood

(ages 18-19). A significant correlation between the intercept and slope of relational victimization ($b = -1.655$, $SE = 0.428$, $p < .001$), indicated that greater levels of relational victimization in early adolescence (age 14) was associated with a greater decline of relational victimization during middle adolescence (ages 14-16). Lastly, there was a significant association between sex and the intercept of negative risk-taking perception ($b = 0.529$, $SE = 0.143$, $p < .001$), indicating that females showed higher levels of negative risk-taking perception at Time 1, and between sex and negative risk taking at Times 4-5 ($b = -0.316$, $SE = 0.128$, $p = .014$), such that females were less likely to take negative risks in young adulthood. However, none of the cross-construct regression or correlation paths between the victimization and risk-taking perception growth factors were statistically significant, indicating that the initial levels and growth of relational victimization was not significantly associated with the initial levels and growth of negative risk-taking perception (see Table 5 for standardized estimates).

Negative Risk-Taking Perception and Physical Victimization. The bivariate model examining joined development of negative risk taking and physical victimization demonstrated good fit ($\chi^2 = 9.698$, $df = 14$, $p = .784$, RMSEA = 0.000, CFI = 1.000). There was a significant association between the intercept of negative risk-taking perception and negative risk-taking likelihood at Times 4-5 ($b = -0.380$, $SE = 0.098$, $p < .001$), indicating that higher initial levels of negative risk-taking perception in early adolescence (age 14) predicted lower levels of negative risk-taking likelihood in young adulthood (ages 18-19). There was also a significant correlation between the intercept and slope of physical victimization ($b = -1.047$, $SE = 0.150$, $p < .001$), indicating that higher initial levels of physical victimization in early adolescence (age 14) was associated with a greater decline of physical victimization during middle adolescence (ages 14-16). Lastly, there was a significant association between sex and the intercept of negative risk-

taking perception ($b = 0.528$, $SE = 0.144$, $p < .001$), indicating that females showed higher levels of negative risk-taking perception at Time 1. However, none of the cross-construct regression or correlation paths between the victimization and risk-taking perception growth factors were statistically significant, indicating that the initial levels and growth of physical victimization was not significantly associated with the initial levels and growth of negative risk-taking perception (see Table 5 for standardized estimates).

Post-Hoc Analyses Using Positive and Negative Socially-Related Risks

Although we did not detect any significant cross-construct associations between initial levels and growth of peer victimization and positive and negative risk-taking perception, given that peer victimization experiences are expected to be more keenly associated with socially-related risk taking rather than general risk taking, we expanded the scope of the models to explore the relationship between peer victimization and specifically positive and negative socially-related risks (see Appendices 2 and 3 for a list of risks in each category). First, univariate GCMs was tested to evaluate the pattern of developmental trajectory of risk-taking perception for positive and negative socially-related risks. Next, four bivariate GCMs were fit to test initial levels and growth of perception of positive and negative socially-related risks with initial levels and growth of relational and physical victimization separately. Young adult positive or negative socially-related risk-taking likelihood was also included as an outcome variable in each model. The demographic covariate of race was included in the negative socially-related risk taking and physical victimization model, because of its significant associations with initial levels or growth in the risk taking or peer victimization variables. Descriptive statistics and correlations between the positive and negative socially-related risk taking and peer victimization variables are presented in Table 2.

Univariate Growth Curve Models of Positive and Negative Socially-Related Risk Perception

Three possible models were fit in order to establish the shape of the trajectories of both positive and negative socially-related risk-taking perception (see Table 4). For positive socially-related risk-taking perception, the linear growth model ($\chi^2 = 2.289$, $df = 3$, $p = .515$, RMSEA= 0.000, CFI = 1.000) fit the data best compared to the no growth and latent basis growth models. Significant variance of the intercept ($\sigma^2 = 0.784$, SE = 0.164, $p < .001$) indicated that there were significant individual differences in initial levels of positive socially-related risk-taking perception. The means of the intercept ($M = 3.298$, $SE = 0.093$, $p < .001$) and slope ($M = -0.179$, $SE = 0.050$, $p < .001$) were significantly different from 0, showing that risk-taking perception for positive socially-related risks decreased over time. However, the variance of the slope was not significant ($\sigma^2 = 0.049$, SE = 0.057, $p = .386$), indicating that there were not significant individual differences in change in positive socially-related risk-taking perception.

For negative socially-related risk-taking perception, the latent basis growth model ($\chi^2 = 0.965$, $df = 2$, $p = .617$, RMSEA= 0.000, CFI = 1.000) fit the data best compared to the no growth and linear growth models. Significant variance of the intercept ($\sigma^2 = 0.625$, SE = 0.155, $p < .001$) and slope ($\sigma^2 = 0.419$, SE = 0.197, $p = .033$) indicated that there were significant individual differences in initial levels and change in negative socially-related risk-taking perception. The mean of the intercept ($M = 5.815$, $SE = 0.090$, $p < .001$) was significantly different from 0. However, the mean of the slope was not significant ($M = -0.158$, SE = 0.098, $p = .107$), indicating that there were not significant changes in negative socially-related risk-taking perception over time.

Bivariate Growth Curve Models of Peer Victimization and Positive and Negative Socially-Related Risk-Taking Perception during Adolescence with Young Adult Risk-Taking Likelihood as an Outcome

Positive Socially-Related Risk-Taking Perception and Relational Victimization. The bivariate model examining joined development of positive socially-related risk taking and relational victimization demonstrated good fit (χ^2 = 11.493, *df* = 13, *p* = .570, RMSEA = 0.000, CFI = 1.000). There was a significant association between the intercept of positive socially-related risk perception and the slope of relational victimization (*b* = 0.340, *SE* = 0.137, *p* = .013), indicating that higher initial levels of risk perception of positive socially-related risks (age 14) was associated with slower decrease of relational victimization throughout middle adolescence (ages 14-16). However, no other cross construct associations were significant, including the links between the intercept of relational victimization and the intercept of positive socially-related risk perception (*b* = -0.515, *SE* = 0.364, *p* = .157), between the intercept of relational victimization and the slope of positive socially-related risk perception (*b* = 0.202, *SE* = 0.197, *p* = .305), and between the slope of relational victimization and the slope of positive socially-related risk perception (*b* = -0.108, *SE* = 0.073, *p* = .139). There was a significant association between the intercept of positive socially-related risk-taking perception and positive risk-taking likelihood at Times 4-5 (*b* = -0.720, *SE* = 0.145, *p* < .001), indicating that higher initial levels of positive socially-related risk-taking perception in early adolescence (age 14) predicted lower levels of positive socially-related risk-taking likelihood in young adulthood (ages 18-19). There was also a significant correlation between the intercept and slope of relational victimization (*b* = -1.624, *SE* = 0.433, *p* < .001), indicating that higher levels of relational victimization in early adolescence

(age 14) was associated with a greater decline in relational victimization during middle adolescence (ages 14-16) (see Table 6 for standardized estimates).

Positive Socially-Related Risk-Taking Perception and Physical Victimization. The bivariate model examining joined development of positive socially-related risk taking and physical victimization demonstrated good fit ($\chi^2 = 7.290$, $df = 12$, $p = .834$, RMSEA = 0.000, CFI = 1.000). However, no cross construct associations were significant, including the links between the intercept of physical victimization and the intercept of positive socially-related risk perception ($b = -0.093$, $SE = 0.126$, $p = .461$), the intercept of physical victimization and the slope of positive socially-related risk perception ($b = 0.001$, $SE = 0.067$, $p = .984$), the intercept of positive socially-related risk perception and the slope of physical victimization ($b = 0.132$, $SE = 0.115$, $p = .253$) and the slope of physical victimization and the slope of positive socially-related risk perception ($b = 0.006$, $SE = 0.061$, $p = .919$). There was a significant association between the intercept of positive risk-taking perception with positive risk-taking likelihood at Times 4-5 ($b = -0.725$, $SE = 0.170$, $p < .001$), indicating that higher initial levels of positive socially-related risk-taking perception in early adolescence (age 14) predicted lower levels of positive socially-related risk-taking likelihood in young adulthood (ages 18-19). There was also a significant correlation between the intercept and slope of physical victimization ($b = -1.049$, $SE = 0.150$, $p < .001$), indicating that higher levels of physical victimization in early adolescence (age 14) was associated with a greater decline in physical victimization during middle adolescence (ages 14-16) (see Table 6 for standardized estimates).

Negative Socially-Related Risk-Taking Perception and Relational Victimization. The bivariate model examining joined development of negative socially-related risk taking and relational victimization demonstrated good fit ($\chi^2 = 12.162$, $df = 12$, $p = .433$, RMSEA = 0.009,

CFI = 1.000). However, no cross construct associations were significant, including the links between the intercept of relational victimization and the intercept of negative socially-related risk perception ($b = 0.187$, $SE = 0.329$, $p = .570$), the intercept of relational victimization and the slope of negative socially-related risk perception ($b = -0.188$, $SE = 0.345$, $p = .585$), the intercept of negative socially-related risk perception and the slope of relational victimization ($b = 0.106$, $SE = 0.122$, $p = .387$) and the slope of relational victimization and the slope of negative socially-related risk perception ($b = 0.071$, $SE = 0.128$, $p = .580$). There was a significant association between the intercept of relational victimization and negative socially-related risk-taking likelihood at Times 4-5 ($b = 0.059$, $SE = 0.022$, $p = .006$), indicating that higher initial levels of relational victimization in early adolescence (age 14) predicted greater negative socially-related risk-taking likelihood in young adulthood (ages 18-19). There also was a significant association between the intercept of negative socially-related risk-taking perception with negative socially-related risk-taking likelihood at Times 4-5 ($b = -0.300$, $SE = 0.105$, $p = .004$), indicating that higher initial levels of negative socially-related risk-taking perception in early adolescence (age 14) predicted lower levels of negative socially-related risk-taking likelihood in young adulthood (ages 18-19). There was also a significant correlation between the intercept and slope of relational victimization ($b = -1.610$, $SE = 0.430$, $p < .001$), indicating that higher levels of relational victimization in early adolescence (age 14) was associated with a greater decline in relational victimization during middle adolescence (ages 14-16) (see Table 6 for standardized estimates).

Negative Socially-Related Risk-Taking Perception and Physical Victimization. The bivariate model examining joined development of negative socially-related risk taking and physical victimization demonstrated good fit ($\chi^2 = 13.771$, $df = 13$, $p = .390$, RMSEA = 0.019,

CFI = 0.997). However, no cross construct associations were significant, including the links between the intercept of physical victimization and the intercept of negative socially-related risk perception ($b = 0.029$, $SE = 0.111$, $p = .797$), the intercept of physical victimization and the slope of negative socially-related risk perception ($b = 0.081$, $SE = 0.107$, $p = .450$), the intercept of negative socially-related risk perception and the slope of physical victimization ($b = 0.038$, $SE = 0.101$, $p = .706$) and the slope of physical victimization and the slope of negative socially-related risk perception ($b = -0.143$, $SE = 0.098$, $p = .142$). There was a significant association between the intercept of negative socially-related risk-taking perception with negative socially-related risk-taking likelihood at Times 4-5 ($b = -0.278$, $SE = 0.106$, $p = .009$), indicating that higher initial levels of negative socially-related risk-taking perception in early adolescence (age 14) predicted lower levels of negative socially-related risk-taking likelihood in young adulthood (ages 18-19). There was also a significant correlation between the intercept and slope of physical victimization ($b = -1.042$, $SE = 0.149$, $p < .001$), indicating that higher levels of physical victimization in early adolescence (age 14) was associated with a greater decline in physical victimization during middle adolescence (ages 14-16). Lastly, there were significant associations between race and the intercept ($b = -0.595$, $SE = 0.212$, $p = .005$) and slope ($b = 0.508$, $SE = 0.202$, $p = .012$) of negative socially-related risk perception, indicating that non-white adolescents had lower initial levels of negative socially-related risk perception in early adolescence (age 14) and slower decline of negative socially-related risk perception throughout middle adolescence (ages 14-16) (see Table 6 for standardized estimates).

Ancillary Analyses

To explore our question of whether adolescents perceive positive or negative risks as having more positive or negative outcomes, respectively, we conducted a series of paired sample

t-tests. First, we tested if there were significant differences between the means of Dospert 2

responses (how bad a situation would turn out) and Dospert 3 responses (how good a situation

would turn out) for both positive and negative risks. For positive risks, results of the paired

sample *t*-test demonstrate that the mean marginally significantly differed between Dospert 2

responses ($M = 3.607$, $SD = 1.110$) and Dospert 3 responses ($M = 3.904$, $SD = 1.156$) ($t = -1.926$,

$df = 152$, $p = .056$), suggesting that adolescents perceived positive risks as having a significantly

more positive outcome than a negative outcome. Similarly, for negative risks, results of the

paired sample *t*-test demonstrate that the mean significantly differed between Dospert 2

responses ($M = 5.342$, $SD = 0.762$) and Dospert 3 responses ($M = 2.394$, $SD = 0.961$) ($t =$

26.087, $df = 152$, $p < .001$), indicating that adolescents perceived negative risks as having a

significantly more negative outcome than a positive outcome. Next, we tested if there were

significant differences between the means of positive and negative risks within Dospert 2 and

Dospert 3. For Dospert 2, results of the paired sample *t*-test demonstrate that the mean

significantly differed between positive risks ($M = 3.607$, $SD = 1.110$) and negative risks ($M =$

5.342, $SD = 0.762$) ($t = -23.068$, $df = 152$, $p < .001$), indicating that adolescents perceived

negative risks as having a significantly more negative outcome than positive risks. For Dospert 3,

results of the paired sample *t*-test demonstrate that the mean significantly differed between

positive risks ($M = 3.904$, $SD = 1.156$) and negative risks ($M = 2.394$, $SD = 0.961$) ($t = 18.250$, *df*

$= 152$, $p < .001$), indicating that adolescents perceived positive risks as having a significantly

more positive outcome than negative risks.

Discussion

Throughout development, adolescence emerges as a period characterized by increased

risk-taking behavior (Duell & Steinberg, 2019). Adolescence is also marked by an increase in

influence of peer relationships and awareness of social status, making experiencing peer victimization during this developmental period all the more harmful (Blakemore, 2008; Levy et al., 2004). To fill a gap in literature regarding the developmental link between social experience and risk taking, this study sought to clarify the longitudinal associations between relational and physical peer victimization and peer positive and negative risk taking throughout adolescence and young adulthood.

The first aim of our study was to understand the longitudinal trajectories of peer victimization and positive and negative risk taking throughout adolescence. The results of our univariate growth curve models demonstrate that both relational and physical victimization decline significantly from early through middle adolescence. This result helps to clarify inconsistent findings in current literature regarding longitudinal trajectories of peer victimization subtypes. The significant decline of both subtypes throughout adolescence is supportive of prior work suggesting that as adolescents' cognitive abilities further develop and social structures among peers become increasingly equal, peer victimization declines from middle childhood throughout adolescence (Troop-Gordon, 2017).

The results of our univariate growth curve models also suggest that both positive and negative risk perceptions significantly decrease throughout adolescence, suggesting that adolescents view both positive and negative risks as significantly less risky as they age. This finding is supportive of prior work that demonstrates perceived benefits of risk behavior increase with age, whereas perceived costs of risk behavior decrease with age (Goldberg, 2002). This decrease in risk perception is likely be attributed to peer-related factors. As adolescents grow older, they spend more time with peer groups, exposing them to more situations and experiences where risky behavior is present, and may see such risky behavior as a beneficial way to increase

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their social status (Knoll et al., 2015; Levy et al., 2004). Additionally, research suggests that merely being in the presence of peers sensitizes the reward system in the brain to the reward value of risky behavior (Albert et al., 2013; Chien et al., 2011). For example, regarding the negative risk of substance use, it has been found that adolescents who affiliated with peers who used substances were more likely to be exposed to opportunities to see substances in a normative light, resulting in decreased neural sensitivity to risk over time (Kim-Spoon et al., 2019).

While peer-related factors may explain the decline in risk perception of both positive and negative risks, development of identity throughout adolescence may provide further support particularly for the decline of positive risk perception. Many positive risks can be defined as constructive and/or prosocial, that is, risks that have the potential to benefit the adolescent and/or others around them. As adolescents develop their identity throughout this developmental period, learning who they are, what they value, and what their goals in life are (Ragelienė, 2016), they may grow in their confidence to take such risks that align with the person they are or want to be (e.g., speaking out against a popular opinion or spending a semester away from their family), thus viewing these risks as less risky.

The second aim of our study was to understand the association between peer victimization (relational and physical) and risk taking (positive and negative) throughout adolescence. This aim was divided into two hypotheses, the first being that there would be significant links between the developmental trajectories of peer victimization and the developmental trajectories of positive and negative risk perception over time. We did not find evidence to support our first hypothesis, as there were no significant cross-construct associations between relational and physical victimization and positive and negative risk perception. This finding contradicts the theoretical expectation regarding the links between peer victimization and

risk taking. This lack of significance may have been due to the fact that our positive and negative risk-taking composites were comprised of risks across multiple different domains. As risk taking preference has been found to be domain and context-specific (e.g., Frey et al., 2017), we thus conducted exploratory post-hoc analyses to narrow our scope of risk taking.

Since peer victimization is an aspect of adolescents' social experience, we decided to examine subsets of positive and negative risks that were also related to adolescents' social experience. The results of the post-hoc analyses highlighted a relationship between initial levels and growth of risk perception for positive socially-related risks and relational victimization, such that adolescents who perceived positive socially-related risks as more risky in early adolescence (age 14) experienced a slower decline of relational victimization throughout middle adolescence (ages 14-16), compared to those adolescents who perceived positive socially-related risks as less risky . Positive risks are unique because they are associated with an adolescent's values, purpose, and goals (Duell & Steinberg, 2019). However, positive socially-related risks are even more unique as they require the adolescent to embody such aspects in a way that could impact their social status. For example, the positive socially-related risk of "speaking out against a popular opinion at school" requires the adolescent to be confident in their thought, even in the face of losing friends if they do not agree.

As such, positive socially-related risks likely require a significant amount of social confidence; thus, this finding may imply that adolescents who are less socially confident in early adolescence are a vulnerable group for continued relational victimization throughout middle adolescence. The victim schema model (Rosen & Harris, 2009) according to the social defeat theory provides explanation for this finding: as adolescents who lack social confidence may be at higher risk for prolonged victimization, as experiencing victimization creates a negative

cognitive bias around social experiences, especially if such experiences are already difficult for them. These experiences in turn could lead to adolescents becoming more socially awkward and withdrawn, making them more vulnerable to continued victimization (Cook et al., 2010; Kljakovic & Hunt, 2016; Rosen & Harris, 2007). From a statistical viewpoint, however, it should be noted that the variance of the slope for positive socially-related risk perception was not significant, indicating very little individual difference in the developmental change patterns. This small variance then may have in part contributed to the non-significant association with relational victimization growth factors.

However, this finding raises the question of why the link between positive socially-related risks and relational victimization is the only significant association. The answer may lie in the nature of both positive socially-related risks and relational victimization, as both are directly related to social relationships. Compared to negative socially-related risks, which are primarily concerned with moral and/or social norm-related risks (e.g., revealing your friend's secret to someone else) positive socially-related risks, according to the nature of this study's positive risk taking items, are directly related to peer relationships and have the potential to affect social status (e.g. speaking out against a popular opinion at school). Further, relational victimization, when compared to physical victimization, by definition is more directly related to peer relationships and social status, as it involves the removal or threat of removal of social relationships. Taken together, this finding is in line with existing knowledge surrounding adolescent social relationships, as extant literature suggests the salience of social relationships and maintaining social status in adolescence. Peer relationships are especially influential in adolescence, surpassing parental relationships in terms of social support, and hold great importance for adolescents' social functioning (Blakemore, 2008; Bukowski et al., 2019; Mikami

et al., 2010), while adolescents also place high value on social status that is related to their peer relationships (Levy et al., 2004; Pattiselanno et al., 2015), thus providing support for the significance of the positive socially-related risk taking and relational victimization model.

Our second hypothesis for the second aim—to understand the association between peer victimization and risk taking—was that peer victimization and risk-taking in adolescence would predict risk-taking in young adulthood. This hypothesis was partially supported. In our originally proposed models of the bivariate growth between risk taking (positive and negative) and peer victimization (relational and physical), we found that, in both of the positive risk taking models (positive risk taking and relational victimization; positive risk taking and physical victimization), both the intercept and slope of positive risk-taking perception was negatively associated with positive risk-taking likelihood in young adulthood. Thus, higher initial levels and less decrease in positive risk-taking perception throughout adolescence predicted lower positive risk-taking perception in young adulthood. In comparison, in both of the negative risk taking models (negative risk taking and relational victimization; negative risk taking and physical victimization), only the intercept of negative risk-taking perception had a negative association with negative risk-taking likelihood in young adulthood, indicating that higher initial levels of negative risk-taking perception predicted lower negative risk-taking likelihood in young adulthood. Further, in the four post-hoc models of the bivariate growth between socially-related risk taking (positive and negative) and peer victimization (relational and physical), only the intercepts of positive and negative socially-related risk perception were significantly associated with lower levels of risk-taking likelihood in young adulthood.

The overall findings that the intercepts of positive and negative risk perception were negatively associated with positive and negative risk-taking likelihood in young adulthood is

supportive of existing literature that states that higher risk perception is associated with lower likelihood of risk-taking behavior (Curry & Youngblade, 2006; Mills et al., 2008; Reniers et al., 2016). However, only the slope of the overall positive risk-taking perception was significantly predictive of the overall positive risk-taking likelihood in young adulthood. The slopes of overall negative risk taking, as well as positive and negative socially-related risk-taking perception were not significant predictors of risk-taking likelihood in young adulthood. This discrepancy can be explained in part by contextual differences between positive risks versus negative risks and socially-related risks. Positive risks tend to be decided based on characteristics such as moral or familial values or personal goals (Duell & Steinberg, 2019). In contrast, negative risks, such as substance use and risky sex (Allen at al., 2012; Widman et al., 2016), as well as socially-related risks, both positive and negative, are more susceptible to peer influence. Similarly, the longitudinal association between risk perception and risk-taking likelihood of *socially-related* risks is more complicated than the more straightforward association between perception and likelihood of overall positive risks. The social context may emerge as a competing predictor for these types of risks, as existing literature emphasizes the pivotal role peers can play in adolescents' risk-taking perception and behavior (e.g. Albert et al., 2013; Kim-Spoon et al., 2019).

We also found significant cross-construct associations between peer victimization during adolescence and risk-taking likelihood outcomes during young adulthood in our originally proposed models examining the bivariate growth of risk taking (positive and negative) and peer victimization (relational and physical). Specifically, we found that there was a significant positive association between the slope of physical victimization and positive risk-taking likelihood in young adulthood, such that slower decline of physical victimization across middle

adolescence predicted higher positive risk-taking likelihood in young adulthood. This finding is in line with the justice sensitivity model; as justice sensitivity is associated with experiencing peer victimization (e.g. Bondü et al., 2016), and adolescents who are higher in justice sensitivity tend to feel greater empathy and social responsibility (Schmitt et al., 2005), thus potentially leading them to take positive risks that are prosocial in nature. We also found that there was a significant positive association between the intercept of relational victimization and both negative and negative socially-related risk-taking likelihood in young adulthood, such that adolescents who experienced higher levels of relational victimization in early adolescence (age 14) were more likely to take negative risks as well as negative socially-related risks in young adulthood (ages 18-19). The social defeat model provides support for the negative risk taking finding, such that adolescents experiencing relational victimization may find that taking negative risks, particularly those involving substance use, serves as a coping mechanism for the mental and emotional struggles that come from experiencing victimization at such a salient time as early adolescence (Stickley et al., 2014) and these behaviors are likely to escalate over time into young adulthood, as earlier onset of substance use behaviors is associated with a greater likelihood of developing severe substance use problems or addiction (e.g., Grant et al., 1998; Ohannessian et al., 2015).

Further, regarding negative socially-related risks, adolescents who experience relational victimization may be subject to a variety of effects related to their social experience, including insecurity and rejection sensitivity (Long et al., 2020; Zimmer-Gimbeck et al., 2014). Such effects have been found to be related to negative socially-related risks. For example, one study found that adolescent girls high in rejection sensitivity were more likely to feel insecure in their romantic relationships and be willing do things that were known to be wrong as a means to

maintain their relationships (Purdie & Downey, 2000). Further, it has also been found that attachment insecurity, which is conceptualized by fears of rejection or abandonment by others and discomfort with the closeness of others, is associated with dishonesty (lying and cheating), which are negative social risks (Gillath et al., 2010; Ein-Dor et al., 2017). Rejection sensitivity caused by adolescent relational victimization has been found to last well into adulthood (Mellin, 2012), which further supports our finding connecting initial levels of relational victimization at age 14 to increased negative socially-related risk-taking likelihood in young adulthood.

The final ancillary aim of our study was to understand how adolescents differentiate between positively versus negatively perceived risks by expecting positive versus negative outcomes, respectively. First, we compared outcome perceptions of each type of risk (positive and negative) *between* Dospert 2 (measuring how bad the outcome could be) and Dospert 3 (measuring how good the outcome could be). The results indicated that for negative risks, adolescents perceived the outcome to be more likely bad than good. However, for positive risks, adolescents perceived the outcome to be only marginally more likely good than bad. Given prior work in risk preference (e.g. Kahneman & Tversky, 1984; Thaler et al., 1997), it is known that most people are loss averse, meaning they are more sensitive to losses than to gains, leading them to often be risk averse; avoiding risks where loss is likely. In the case of negative risks, these risks carry severe potential costs where losses are likely and can be life-altering. This knowledge may explain why adolescents perceive negative risks as having a more likely bad outcome than good outcome. However, while positive risks do not carry nearly as severe of potential costs, there is still a degree of uncertainty present that could result in a loss. For example, a positive risk such as "speaking out against a popular opinion at school" could result in the loss of friends who may not agree with your stance. Thus, our data suggest that loss and

risk aversion may carry into positive risks as well, which could explain why the difference in outcome perception between negative and positive risk taking was only marginally significant.

Further, we also compared positive and negative risk outcome perceptions *within* the measures of Dospert 2 and Dospert 3. Through this comparison, we found that adolescents perceived negative risks to have a significantly worse outcome when compared to positive risks within Dospert 2, whereas adolescents perceived positive risks to have a significantly better outcome when compared to negative risks within Dospert 3. These results demonstrate that adolescents are aware of the differences in outcome severity between positive and negative risks, yet prior work has shown that adolescents who take positive risks also tend to take negative risks (e.g. Wood et al., 2013; Rutten et al., 2007), such that adolescents inclined toward risk taking may be likely to take both positive and negative risks. These findings clarify that adolescents are able to differentiate the consequences of positive and negative risks, yet still take both types of risk.

It has been thought that adolescents are more likely to take risks as they are more sensitive to the rewards than the punishments of risks (Ernst, 2014), however our findings are inconsistent with this perspective. If adolescents were more sensitive to rewards (i.e. good outcome) than punishments (i.e. bad outcome), adolescents would have indicated a more likely positive outcome for both positive and negative risks, yet we found that adolescents perceive negative risks to have a more likely negative outcome and positive risks to have a more likely positive outcome. However, it is important to note that within our measures of positive and negative risks in Dospert 2 and Dospert 3, there was an uneven number of items for each risk type (3 positive risks and 7 negative risks) resulting in more limited coverage of positive risk

taking compared to negative risk taking. Thus, replication using greater and more equal numbers of positive and negative risks is warranted to provide further support for these results.

Future research should address the limitations of the current study. First, we used a measure of adolescent risk-taking perception, rather than risk-taking behavior, to examine growth in conjunction with peer victimization throughout adolescence. Future studies should examine risk-taking behavior, which may be a more direct measure of risk taking, in adolescence in connection to peer victimization to determine any similarities and differences between associations between the two constructs. Second, our analyses are based on correlational data, thus causal inferences cannot be made. Lastly, both peer victimization and risk-taking variables were based on self-report, thus method variance due to using the same informant may have been inflated. Future work should incorporate reports from multiple informants (e.g. parents or peers) to reduce the possibility of bias.

Limitations notwithstanding, our study demonstrates notable strengths that should be retained in future analyses, namely five waves of data that allowed testing of peer victimization and risk perception growth trajectories across multiple adolescent time points as well as risk taking outcomes in young adulthood. Our study also contributed to the dearth of literature thus far regarding the differences between positive and negative risk taking in adolescence and was the first to examine positive and negative risks specifically in the social context. Importantly, the findings have implications that may be useful for preventing both peer victimization in adolescence and negative risk-taking behavior in young adulthood. We found that higher risk perception of positive social risks is associated with slower declines in relational victimization over time. This finding implies that a lack of social confidence in early adolescence may make young people more vulnerable to relational victimization. Implementing programs into schools

focused on promoting self-confidence may be beneficial to mitigate such trajectories. For example, school-based programs such as Girls on the Run (Galeotti, 2015) and implementing psychological skills training (Heydari et al., 2018) have been successful at increasing self-confidence among adolescents. Further, as we found that relational victimization in early adolescence also predicts negative risk-taking behavior in young adulthood, implementation of anti-bullying programs within schools, starting in early adolescence, may also be beneficial for preventing such outcomes.

Taken together, the present study presents the first longitudinal investigation of how peer victimization and positive and negative risk taking interface from early to late adolescence and predict positive and negative risk-taking behavior in young adulthood. The results highlight the important connection between peer victimization and positive and negative risk perception in adolescence, the potential risk-taking outcomes in young adulthood stemming from peer victimization experiences and risk-taking perception in adolescence, and most importantly, the differential roles of positive and negative risk taking, particularly in socially-related risk taking, in adolescence and young adulthood.

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Table 1.

Descriptive Statistics and Correlations for Positive and Negative Risk Taking and Peer Victimization

	M	*SD*	Min	Max	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. RV Time 1	2.94	3.40	0.00	10.00														
2. RV Time 2	2.72	3.30	0.00	10.00	.85*													
3. RV Time 3	2.28	3.10	0.00	10.00	.68*	.82*												
4. PV Time 1	0.48	1.20	0.00	4.00	.49*	.35*	.27*											
5. PV Time 2	0.23	0.64	0.00	2.00	.39*	.40*	.32*	.58*										
6. PV Time 3	0.25	0.66	0.00	2.00	.36*	.33*	.44*	.37*	.76*									
7. Pos RP Time 1	3.99	0.94	1.50	6.30	-.05	-.03	.04	.01	.08	.06								
8. Pos RP Time 2	3.86	0.91	1.70	6.00	-.12	-.06	-.02	-.13	.03	-.01	.62*							
9. Pos RP Time 3	3.73	0.91	1.40	6.20	-.01	.00	.02	-.07	.00	-.01	.45*	.60*						
10. Pos RT Times 4-5	4.42	0.98	2.30	6.40	.06	.15	.12	.02	.13	.15	-.26*	-.38*	-.51*					
11. Neg RP Time 1	5.41	0.96	2.55	7.00	-.06	-.01	-.01	-.04	-.03	-.06	.67*	.50*	.41*	-.17				
12. Neg RP Time 2	5.34	0.90	2.64	6.91	.00	.06	.11	-.14	-.04	-.04	.41*	.62*	.48*	-.21*	.62*			
13. Neg RP Time 3	5.22	0.95	3.00	6.91	-.01	.09	.11	-.03	.02	.05	.31*	.40*	.67*	-.20*	.53*	.65*		
14. Neg RT Times 4-5	2.41	0.75	1.09	4.36	.20*	.18*	.12	.12	.13	.11	-.14	-.21*	-.24*	.44*	-.32*	-.36*	-.35*	

Note. RV = relational victimization; PV = physical victimization; Pos RP = positive risk-taking perception; Pos RT = positive risk-taking likelihood; Neg RP = negative risk-taking perception; Neg RT = negative risk-taking likelihood

* $p < .05$

Table 2.

Descriptive Statistics and Correlations for Positive and Negative Socially-Related Risk Taking and Peer Victimization

	M	*SD*	Min	Max	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. RV Time 1	2.94	3.40	0.00	10.00														
2. RV Time 2	2.72	3.30	0.00	10.00	.85*													
3. RV Time 3	2.28	3.10	0.00	10.00	.68*	.82*												
4. PV Time 1	0.48	1.20	0.00	4.00	.49*	.35*	.27*											
5. PV Time 2	0.23	0.64	0.00	2.00	.39*	.39*	.32*	.58*										
6. PV Time 3	0.25	0.66	0.00	2.00	.36*	.33*	.44*	.37*	.76*									
7. Pos Soc RP Time 1	3.33	1.15	1.00	6.33	-.16	-.06	.02	-.07	.02	.06								
8. Pos Soc RP Time 2	3.10	1.20	1.00	6.00	-.02	.07	.16	-.09	.07	.10	.56*							
9. Pos Soc RP Time 3	2.95	1.13	1.00	6.00	-.04	-.02	.04	-.07	.05	.07	.44*	.50*						
10. Pos Soc RT Times 4-5	5.13	1.09	2.33	7.00	.11	.13	.14	.03	.04	.09	-.34*	-.33*	-.40*					
11. Neg Soc RP Time 1	5.81	1.09	2.50	7.00	.04	.11	.11	-.02	.07	.08	.38*	.31*	.10	-.17				
12. Neg Soc RP Time 2	5.67	1.10	2.50	7.00	-.02	.02	.09	.08	-.03	-.07	.20*	.29*	.20*	.00	.34*			
13. Neg Soc RP Time 3	5.62	1.12	3.00	7.00	-.03	.06	.08	.09	.03	.05	.12	.18*	.27*	.03	.40*	.55*		
14. Neg Soc RT Times 4-5	1.62	0.73	1.00	3.50	.19*	.14	.20*	.15	.10	.19*	-.01	-.06	-.03	.04	-.16	-.18	-.22*	

Note. RV = relational victimization; PV = physical victimization; Pos Soc RP = positive socially-related risk-taking perception; Pos Soc RT = positive socially-related risk-taking likelihood; Neg Soc RP = negative socially-related risk-taking perception; Neg Soc RT = negative socially-related risk-taking likelihood

$*p < .05$

Table 3.

Fit Indices of Univariate Growth Curve Models for Positive and Negative Risk-Taking Perceptions and Peer Victimization

Model Label	$\chi 2$	*df*	*p*	RMSEA	CFI	$\Delta\chi 2$	Δdf	*p*(d)
Relational Victimization								
1. No-growth model	56.209	6	0.000	0.246	0.849			
2. Linear growth model	**5.208**	**3**	**0.157**	**0.073**	**0.993**	**51.001**	**3**	**0.001**
3. Latent basis growth model	4.031	2	0.133	0.086	0.994	1.177	1	0.278
Physical Victimization								
1. No-growth model	81.464	6	0.000	0.302	0.606			
2. Linear growth model	27.043	3	0.000	0.241	0.875	54.421	3	0.001
3. Latent basis growth model	**2.860**	**2**	**0.239**	**0.056**	**0.995**	**24.181**	**1**	**0.001**
Positive Risk-Taking Perception								
1. No-growth model	20.668	6	0.002	0.126	0.886			
2. Linear growth model	**0.706**	**3**	**0.872**	**0.000**	**1.000**	**19.962**	**3**	**0.000**
3. Latent basis growth model	0.657	2	0.720	0.000	1.000	0.049	1	0.825
Negative Risk-Taking Perception								
1. No-growth model	14.940	6	0.021	0.099	0.938			
2. Linear growth model	**0.884**	**3**	**0.829**	**0.000**	**1.000**	**14.056**	**3**	**0.001**
3. Latent basis growth model	0.760	2	0.684	0.000	1.000	0.124	1	0.725

Note. CFI = comparative fit index; RMSEA = root mean square error of approximation; $\Delta\chi 2$= difference in likelihood ratio tests; Δdf = difference in df; *p*(d) = probability of the difference tests. Best-fitting baseline model in boldface.

Table 4.

Fit Indices of Univariate Growth Curve Models for Positive and Negative Socially-Related Risk-Taking Perception

Model Label	χ2	df	p	RMSEA	CFI	Δχ2	Δdf	p(d)
Positive Socially-Related Risk-Taking Perception								
1. No-growth model	16.443	6	0.012	0.107	0.892			
2. Linear growth model	**2.289**	**3**	**0.515**	**0.000**	**1.000**	**14.154**	**3**	**0.003**
3. Latent basis growth model	2.288	2	0.319	0.031	0.997	0.001	1	0.975
Negative Socially-Related Risk-Taking Perception								
1. No-growth model	11.275	6	0.080	0.076	0.927			
2. Linear growth model	5.423	3	0.143	0.073	0.966	5.852	3	0.119
3. Latent basis growth model	**0.965**	**2**	**0.617**	**0.000**	**1.000**	**4.458**	**1**	**0.035**

Note. CFI = comparative fit index; RMSEA = root mean square error of approximation; Δχ2 = difference in likelihood ratio tests; Δ*df* = difference in df; *p*(d) = probability of the difference tests. Best-fitting baseline model in boldface.

Table 5.

Results of Bivariate Growth Curve Models of Positive and Negative Risk Taking and Peer Victimization

	b	S.E.	p	b*
Positive Risk Taking and Relational Victimization				
Regression Effects Predicting Outcome				
Relational Vic Intercept → Pos RT Times 4-5	0.038	0.029	0.191	0.129
Pos RP Intercept → Pos RT Times 4-5	-0.680*	0.129	0.000	-0.550
Relational Vic Slope → Pos RT Times 4-5	0.129	0.114	0.258	0.138
Pos RP Slope → Pos RT Times 4-5	-1.972*	0.610	0.001	-0.591
Factor Covariances				
Relational Vic Int ↔ Relational Vic Slope	-1.613*	0.413	0.000	-0.470
Relational Vic Int ↔ Pos RP Int	-0.200	0.293	0.495	-0.077
Relational Vic Int ↔ Pos RP Slope	0.044	0.153	0.774	0.046
Pos RP Int ↔ Pos RP Slope	-0.093*	0.046	0.044	-0.406
Pos RP Int ↔ Relational Vic Slope	0.148	0.109	0.173	0.181
Relational Vic Slope ↔ Pos RP Slope	-0.052	0.056	0.357	-0.171
Positive Risk Taking and Physical Victimization				
Regression Effects Predicting Outcome				
Physical Vic Intercept → Pos RT Times 4-5	0.258	0.154	0.095	0.306
Pos RP Intercept → Pos RT Times 4-5	-0.697*	0.129	0.000	-0.563
Physical Vic Slope → Pos RT Times 4-5	0.393*	0.173	0.023	0.421
Pos RP Slope → Pos RT Times 4-5	-2.056*	0.619	0.001	-0.616
Factor Covariances				
Physical Vic Int ↔ Physical Vic Slope	-1.048*	0.150	0.000	-0.869
Physical Vic Int ↔ Pos RP Int	-0.023	0.101	0.822	-0.025
Physical Vic Int ↔ Pos RP Slope	-0.034	0.052	0.516	-0.101
Pos RP Int ↔ Pos RP Slope	-0.093*	0.046	0.044	-0.406
Pos RP Int ↔ Physical Vic Slope	0.052	0.092	0.573	0.064
Physical Vic Slope ↔ Pos RP Slope	0.021	0.048	0.653	0.070
Negative Risk Taking and Relational Victimization				
Regression Effects Predicting Outcome				
Relational Vic Intercept → Neg RT Times 4-5	0.063*	0.023	0.007	0.277
Neg RP Intercept → Neg RT Times 4-5	-0.377*	0.096	0.000	-0.393
Relational Vic Slope → Neg RT Times 4-5	0.067	0.088	0.448	0.093
Neg RP Slope → Neg RT Times 4-5	-0.625	0.389	0.108	-0.239
Sex → Neg RT Times 4-5	-0.316*	0.128	0.014	-0.211
Factor Covariances				
Relational Vic Int ↔ Relational Vic Slope	-1.655*	0.428	0.000	-0.491

Relational Vic Int ↔ Neg RP Int	-0.270	0.288	0.348	-0.112
Relational Vic Int ↔ Neg RP Slope	0.141	0.149	0.344	0.150
Neg RP Int ↔ Neg RP Slope	-0.074	0.043	0.087	-0.353
Neg RP Int ↔ Relational Vic Slope	0.018	0.105	0.866	0.024
Relational Vic Slope ↔ Neg RP Slope	0.052	0.054	0.334	0.178
Sex Effects Predicting Growth Factors				
Sex → Relational Vic Intercept	0.515	0.584	0.377	0.078
Sex → Neg RP Intercept	0.529*	0.143	0.000	0.339
Sex → Relational Vic Slope	0.341	0.219	0.119	0.163
Sex → Neg RP Slope	-0.019	0.079	0.814	-0.032
Negative Risk Taking and Physical Victimization				
Regression Effects Predicting Outcome				
Physical Vic Intercept → Neg RT Times 4-5	0.162	0.113	0.152	0.251
Neg RP Intercept → Neg RT Times 4-5	-0.380*	0.098	0.000	-0.397
Physical Vic Slope → Neg RT Times 4-5	0.132	0.130	0.308	0.185
Neg RP Slope → Neg RT Times 4-5	-0.535	0.367	0.145	-0.205
Sex → Neg RT Times 4-5	-0.241	0.124	0.052	-0.161
Factor Covariances				
Physical Vic Int ↔ Physical Vic Slope	-1.047*	0.150	0.000	-0.870
Physical Vic Int ↔ Neg RP Int	-0.058	0.099	0.560	-0.068
Physical Vic Int ↔ Neg RP Slope	0.007	0.051	0.885	0.022
Neg RP Int ↔ Neg RP Slope	-0.074	0.043	0.086	-0.354
Neg RP Int ↔ Physical Vic Slope	0.027	0.091	0.766	0.035
Physical Vic Slope ↔ Neg RP Slope	0.023	0.046	0.619	0.077
Sex Effects Predicting Growth Factors				
Sex → Physical Vic Intercept	-0.137	0.203	0.499	-0.059
Sex → Neg RP Intercept	0.528*	0.144	0.000	0.338
Sex → Physical Vic Slope	0.045	0.190	0.812	0.022
Sex → Neg RP Slope	-0.018	0.079	0.822	-0.031

Note. Pos RP = positive risk-taking perception; Pos RT = positive risk-taking likelihood; Negative RP = negative risk-taking perception; Neg RT = negative risk-taking likelihood
p < .05.

Table 6.

Results of Bivariate Growth Curve Models of Positive and Negative Socially-Related Risk Taking and Peer Victimization
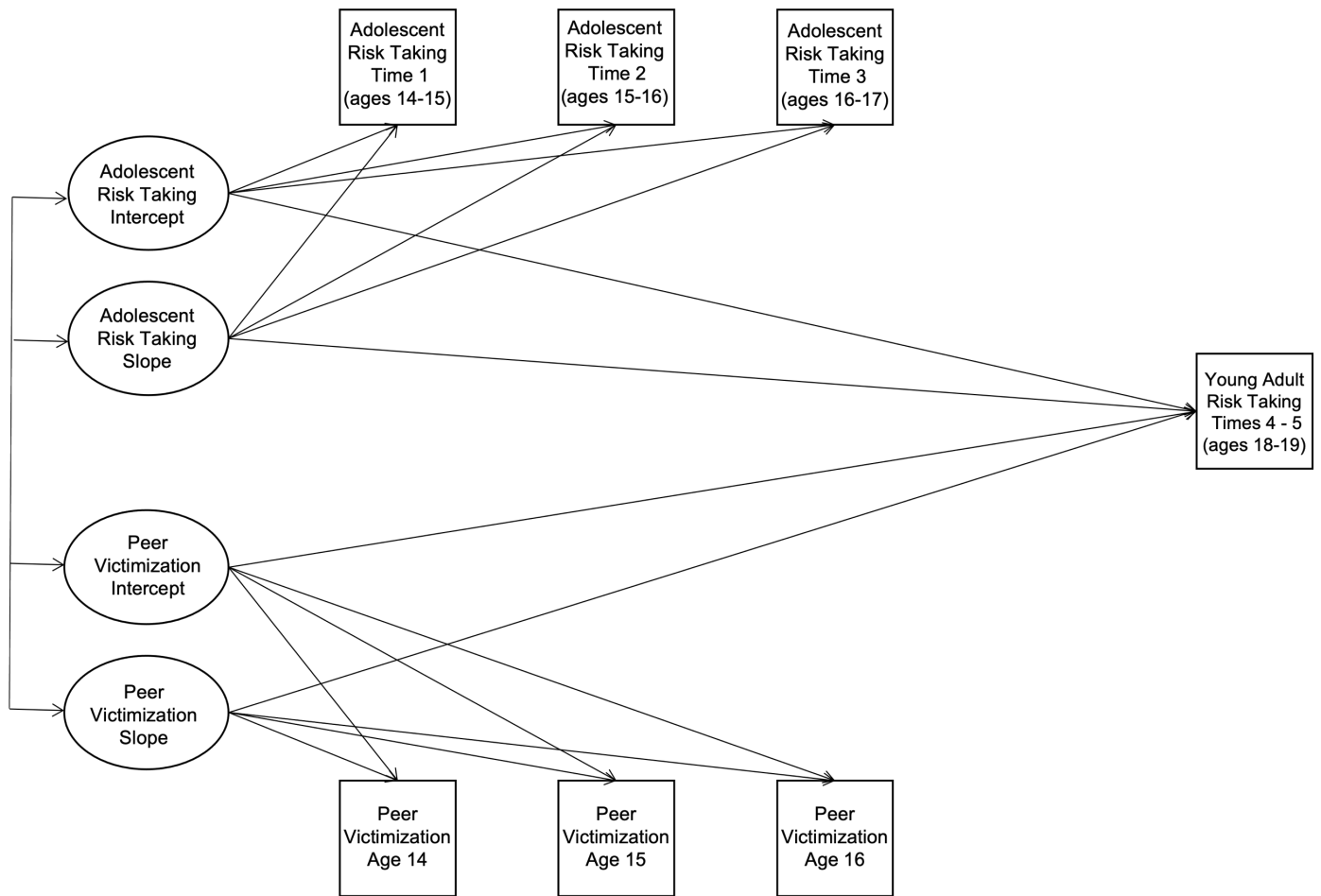
	b	S.E.	p	b*
Positive Socially-Related Risk Taking and Relational Victimization				
Regression Effects Predicting Outcome				
Relational Vic Intercept → Pos Soc RT Times 4-5	0.062	0.035	0.074	0.186
Pos Soc RP Intercept → Pos Soc RT Times 4-5	-0.720*	0.145	0.000	-0.581
Relational Vic Slope → Pos Soc RT Times 4-5	0.199	0.215	0.355	0.191
Pos Soc RP Slope → Pos Soc RT Times 4-5	-1.491	1.869	0.425	-0.300
Factor Covariances				
Relational Vic Int ↔ Relational Vic Slope	-1.624*	0.433	0.000	-0.471
Relational Vic Int ↔ Pos Soc RP Int	-0.515	0.364	0.157	-0.178
Relational Vic Int ↔ Pos Soc RP Slope	0.202	0.197	0.305	0.280
Pos Soc RP Int ↔ Pos Soc RP Slope	-0.069	0.075	0.355	-0.358
Pos Soc RP Int ↔ Relational Vic Slope	0.340*	0.137	0.013	0.369
Relational Vic Slope ↔ Pos Soc RP Slope	-0.108	0.073	0.139	-0.468
Positive Socially-Related Risk Taking and Physical Victimization				
Regression Effects Predicting Outcome				
Physical Vic Intercept → Pos Soc RT Times 4-5	0.260	0.197	0.188	0.275
Pos Soc RP Intercept → Pos Soc RT Times 4-5	-0.725*	0.170	0.000	-0.558
Physical Vic Slope → Pos Soc RT Times 4-5	0.351	0.230	0.126	0.337
Pos Soc RP Slope → Pos Soc RT Times 4-5	-1.800	1.864	0.334	-0.358
Factor Covariances				
Physical Vic Int ↔ Physical Vic Slope	-1.049*	0.150	0.000	-0.869
Physical Vic Int ↔ Pos Soc RP Int	-0.093	0.126	0.461	-0.091
Physical Vic Int ↔ Pos Soc RP Slope	0.001	0.067	0.984	0.005
Pos Soc RP Int ↔ Pos Soc RP Slope	-0.070	0.075	0.348	-0.367
Pos Soc RP Int ↔ Physical Vic Slope	0.132	0.115	0.253	0.143
Physical Vic Slope ↔ Pos Soc RP Slope	0.006	0.061	0.919	0.027
Negative Socially-Related Risk Taking and Relational Victimization				
Regression Effects Predicting Outcome				
Relational Vic Intercept → Neg Soc RT Times 4-5	0.059*	0.022	0.006	0.268
Neg Soc RP Intercept → Neg Soc RT Times 4-5	-0.300*	0.105	0.004	-0.326
Relational Vic Slope → Neg Soc RT Times 4-5	0.124	0.084	0.138	0.178
Neg Soc RP Slope → Neg Soc RT Times 4-5	-0.189	0.165	0.251	-0.170
Factor Covariances				
Relational Vic Int ↔ Relational Vic Slope	-1.610*	0.430	0.000	-0.470
Relational Vic Int ↔ Neg Soc RP Int	0.187	0.329	0.570	0.072
Relational Vic Int ↔ Neg Soc RP Slope	-0.188	0.345	0.585	-0.088

Neg Soc RP Int ↔ Neg Soc RP Slope	-0.181	0.137	0.186	-0.353
Neg Soc RP Int ↔ Relational Vic Slope	0.106	0.122	0.387	0.129
Relational Vic Slope ↔ Neg Soc RP Slope	0.071	0.128	0.580	0.104

Negative Socially-Related Risk Taking and Physical Victimization

Regression Effects Predicting Outcome

Physical Vic Intercept → Neg Soc RT Times 4-5	0.237	0.123	0.054	0.378
Neg Soc RP Intercept → Neg Soc RT Times 4-5	-0.278*	0.106	0.009	-0.306
Physical Vic Slope → Neg Soc RT Times 4-5	0.168	0.151	0.266	0.242
Neg Soc RP Slope → Neg Soc RT Times 4-5	-0.171	0.231	0.460	-0.134
Race → Neg Soc RT Times 4-5	-0.009	0.196	0.964	-0.005

Factor Covariances

Physical Vic Int ↔ Physical Vic Slope	-1.042*	0.149	0.000	-0.869
Physical Vic Int ↔ Neg Soc RP Int	0.029	0.111	0.797	0.033
Physical Vic Int ↔ Neg Soc RP Slope	0.081	0.107	0.450	0.131
Neg Soc RP Int ↔ Neg Soc RP Slope	-0.113	0.122	0.354	-0.279
Neg Soc RP Int ↔ Physical Vic Slope	0.038	0.101	0.706	0.048
Physical Vic Slope ↔ Neg Soc RP Slope	-0.143	0.098	0.142	-0.258

Race Effects Predicting Growth Factors

Race → Physical Vic Intercept	0.176	0.240	0.463	0.062
Race → Neg RP Intercept	-0.595*	0.212	0.005	-0.304
Race → Physical Vic Slope	-0.210	0.224	0.348	-0.082
Race → Neg RP Slope	0.508*	0.202	0.012	0.362

Note. Pos Soc RP = positive socially-related risk-taking perception; Pos Soc RT = positive socially-related risk-taking likelihood; Neg Soc RP = negative socially-related risk-taking perception; Neg Soc RT = negative socially-related risk-taking likelihood
*p < .05

Figure 1.

Bivariate Growth Curve Model of Peer Victimization and Risk Taking

Maltreatment and Abuse Chronology of Exposure Scale

MACE

Sometimes parents, stepparents or other adults living in the house do hurtful things. **If this happened during your childhood (first 18 years of your life) please provide your best estimate of your age at the time(s) of occurrence.** **Please check all ages that apply.**	

For example item 1. Swore at you, called you names, said insulting things like your "fat", "ugly", "stupid", etc. more than a few times a year.

If at ages 6-8 your father swore at you and at ages 8-10 your mother insulted you, and at age 17 your mother's new live-in boyfriend called you names; you would check off as follows:

● Yes   ○ No

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
					✓	✓	✓	✓	✓							✓	

1. Swore at you, called you names, said insulting things like your "fat", "ugly", "stupid", etc. more than a few times a year.

   Please check all ages that apply.

   ○ Yes_1 ○ No_0

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

2. Said hurtful things that made you feel bad, embarrassed or humiliated more than a few times a year.

   Please check all ages that apply.

   ○ Yes_1 ○ No_0

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

3. Acted in a way that made you afraid that you might be physically hurt.

   Please check all ages that apply.

   ○ Yes_1 ○ No_0

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

4. Threatened to leave or abandon you.
   Please check all ages that apply.

   ○ Yes   ○ No_0

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

5. Locked you in a closet, attic, basement or garage.

   Please check all ages that apply.

   ○ Yes_1 ○ No_0

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

6. Intentionally pushed, grabbed, shoved, slapped, pinched, punched or kicked you.
   Please check all ages that apply.

   ○ Yes_1 ○ No_0

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

7.	Hit you so hard that it left marks for more than a few minutes.																		Yes[1]	No[0]

Please check all ages that apply.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

8.	Hit you so hard, or intentionally harmed you in some way, that you received or should have received medical attention.	Yes[1]	No[0]

Please check all ages that apply.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

9.	Spanked you on your buttocks, arms or legs.	Yes[1]	No

Please check all ages that apply.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

10.	Spanked you on your bare (unclothed) buttocks.	Yes[1]	No[0]

Please check all ages that apply.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

11.	Spanked you with an object such as a strap, belt, brush, paddle, rod, etc.	Yes[1]	No[0]

Please check all ages that apply.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

12.	Made inappropriate sexual comments or suggestions to you.	Yes[1]	No[0]

Please check all ages that apply.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

13.	Touched or fondled your body in a sexual way.	Yes[1]	No[0]

Please check all ages that apply.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

14.	Had you touch their body in a sexual way.	Yes[1]	No[0]

Please check all ages that apply.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

Sometimes parents, stepparents or other adults living in the house do hurtful things to your siblings (brother, sister, stepsiblings).
If this happened during your childhood (first 18 years of your life) please provide your best estimates of your age at the time(s) of occurrence.
Please check all ages that apply.

15. Hit your sibling (stepsibling) so hard that it left marks for more than a few minutes.
Please check all ages that apply.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

○ Yes_1 ○ No_0

16. Hit your sibling (stepsibling) so hard, or intentionally harmed him/her in some way, that he/she received or should have received medical attention.
Please check all ages that apply.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

○ $\text{Yes}_.$ ○ No_0

17. Made inappropriate sexual comments or suggestions to your sibling (stepsibling).

Please check all ages that apply.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

○ Yes_1 ○ No_0

18. Touched or fondled your sibling (stepsibling) in a sexual way.
Please check all ages that apply.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

○ Yes_1 ○ No_0

Sometimes adults or older individuals NOT living in the house do hurtful things to you.
If this happened during your childhood (first 18 years of your life) please provide your best estimates of your age at the time(s) of occurrence.
Please check all ages that apply.

19. Had you touch their body in a sexual way.
Please check all ages that apply.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

○ Yes_1 ○ No_0

20. Actually had sexual intercourse (oral, anal or vaginal) with you.
Please check all ages that apply.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

○ Yes_1 ○ No_0

Sometimes intense arguments or physical fights occur between parents, stepparents or other adults (boyfriends, girlfriends, grandparents) living in the household.
If this happened during your childhood (first 18 years of your life) please provide your best estimates of your age at the time(s) of occurrence.
Please check all ages that apply.

21. Saw adults living in the household push, grab, slap or throw something at your mother (stepmother, grandmother).
Please check all ages that apply.

Yes[1]   No.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

22. Saw adults living in the household hit your mother (stepmother, grandmother) so hard that it left marks for more than a few minutes.
Please check all ages that apply.

Yes[1]   No[0]

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

23. Saw adults living in the household hit your mother (stepmother, grandmother) so hard, or intentionally harm her in some way, that she received or should have received medical attention.
Please check all ages that apply.

Yes.   No.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

24. Saw adults living in the household push, grab, slap or throw something at your father (stepfather, grandfather).
Please check all ages that apply.

Yes[1]   No.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

25. Saw adults living in the household hit your father (stepfather, grandfather) so hard that it left marks for more than a few minutes.
Please check all ages that apply.

Yes[1]   No.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

Sometimes children your own age or older do hurtful things like bully or harass you.
If this happened during your childhood (first 18 years of your life) please provide your best estimates of your age at the time(s) of occurrence.
Please check all ages that apply.

26. Swore at you, called you names, said insulting things like your "fat", "ugly", "stupid", etc. more than a few times a year.
Please check all ages that apply.

Yes[1]   No[0]

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

27. Said hurtful things that made you feel bad, embarrassed or humiliated more than a few times a year.

	Please check all ages that apply.																		Yes$_1$	No$_0$
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18		

28. Said things behind your back, posted derogatory messages about you, or spread rumors about you.
Please check all ages that apply.   Yes$_1$ No$_0$ ◯   ◯

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

29. Intentionally excluded you from activities or groups.
Please check all ages that apply.   Yes$_1$ No$_0$ ◯   ◯

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

30. Acted in a way that made you afraid that you might be physically hurt.
Please check all ages that apply.   Yes.   No..   ◯   ◯

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

31. Threatened you in order to take your money or possessions.
Please check all ages that apply.   Yes$_1$ No$_0$ ◯   ◯

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

32. Forced or threatened you to do things that you did not want to do.
Please check all ages that apply.   ◯   ◯   Yes$_1$ No$_0$

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

33. Intentionally pushed, grabbed, shoved, slapped, pinched, punched, or kicked you.
Please check all ages that apply.   ◯   ◯   Yes$_1$ No$_0$

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

34. Hit you so hard that it left marks for more than a few minutes.
Please check all ages that apply.   ◯   ◯   Yes$_1$ No$_0$

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

35. Hit you so hard, or intentionally harmed you in some way, that you received or should have received medical attention.
Please check all ages that apply.   ◯   ◯   Yes$_1$ No$_0$

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

36. Forced you to engage in sexual activity against your will.
Please check all ages that apply.   ◯   ◯   Yes$_1$ No$_0$

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

37. Forced you to do things sexually that you did not want to do.
Please check all ages that apply.   ◯   ◯   Yes$_1$ No

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

Please indicate if the following happened during your childhood (first 18 years of your life). Please provide your best estimates of your age at the time(s) of occurrence.

Please check all ages that apply.

38. You felt that your mother or other important maternal figure was present in the household but emotionally unavailable to you for a variety of reasons like drugs, alcohol, workaholic, having an affair, heedlessly pursuing their own goals.
Please check all ages that apply.

◯ Yes$_1$ ◯ No$_0$

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

39. You felt that your father or other important paternal figure was present in the household but emotionally unavailable to you for a variety of reasons like drugs, alcohol, workaholic, having an affair, heedlessly pursuing their own goals.
Please check all ages that apply.

◯ Yes$_1$ ◯ No$_0$

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

40. A parent or other important parental figure was very difficult to please.
Please check all ages that apply.

◯ Yes$_1$ ◯ No$_0$

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

41. A parent or other important parental figure did not have the time or interest to talk to you.
Please check all ages that apply.

◯ Yes$_1$ ◯ No$_0$

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

42. One or more individuals in your family made you feel loved.
Please check all ages that apply.

◯ Yes$_1$ ◯ No$_0$

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

43. One or more individuals in your family helped you feel important or special.
Please check all ages that apply.

◯ Yes$_1$ ◯ No$_0$

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

44. One or more individuals in your family were there to take care of you and protect you.
Please check all ages that apply.

◯ Yes$_1$ ◯ No$_0$

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

45. One or more individuals in your family were there to take you to the doctor or Emergency Room if the need ever arose, or would have if needed.
Please check all ages that apply.

◯ Yes$_1$ ◯ No$_0$

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

Please indicate if the following statements were true about you and your family during your childhood, and your age at the time(s) you felt this to be true.

Please check all ages that apply.

46. You didn't have enough to eat.
Please check all ages that apply.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

Yes_1 No_0

47. You had to wear dirty clothes.

Please check all ages that apply.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

Yes_1 No_0

48. You felt that you had to shoulder adult responsibilities.

Please check all ages that apply.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

Yes_1 No_0

49. You felt that your family was under severe financial pressure.
Please check all ages that apply.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

Yes_1 No_0

50. One or more individuals kept important secrets or facts from you.

Please check all ages that apply.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

Yes_1 No_0

51. People in your family looked out for each other.

Please check all ages that apply.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

Yes_1 No_0

52. Your family was a source of strength and support.
Please check all ages that apply.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

Yes_1 No_0

Appendix B

Domain Specific Risk Taking Questionnaire (Times 1-3)

DOSPERT

We are interested in <u>how risky you feel</u> each of the following situations or behaviors is. In other words, we want you to give a rating <u>based on your gut feeling of how risky</u> each situation or behavior is. Please do this by filling in the bubble for one of the seven ratings beside each question ranging from *Not at all risky* (1) to *Extremely risky* (7).

1--------------2--------------3--------------4--------------5--------------6--------------7

| Not at all risky | Slightly risky | Somewhat risky | Moderately risky | Risky | Very risky | Extremely risky |

1. Admitting that your tastes are different from those of a friend.   1 2 3 4 5 6 7

2. Going camping in the wilderness.   1 2 3 4 5 6 7

3. Betting your pocket money on a videogame contest between two of your friends who are equally good.   1 2 3 4 5 6 7

4. Telling your friend a lie.   1 2 3 4 5 6 7

5. Spending a small amount of your savings to enter a talent competition   1 2 3 4 5 6 7

6. Drinking at a party.   1 2 3 4 5 6 7

7. Stealing something from the newsstand.   1 2 3 4 5 6 7

8. Disagreeing with an authority figure on a major issue.   1 2 3 4 5 6 7

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9. Betting all your pocket money on an online gambling game.　　　1　2　3　4　5　6　7

10. Dating someone else's girlfriend/boyfriend.　　　1　2　3　4　5　6　7

11. Passing off somebody else's work as your own.　　　1　2　3　4　5　6　7

12. Going down a ski run that is beyond your ability.　　　1　2　3　4　5　6　7

13. Engaging in unprotected sex.　　　1　2　3　4　5　6　7

14. Spending a small amount of your savings on a limited edition sports card that does not include a certificate of authenticity.　　　1　2　3　4　5　6　7

15. Going on the highest and fastest rollercoaster.　　　1　2　3　4　5　6　7

16. Dropping out of school to pursue your dream.　　　1　2　3　4　5　6　7

17. Crossing a busy street when the light is red.　　　1　2　3　4　5　6　7

18. Betting all your pocket money on the outcome of a sporting event.　　　1　2　3　4　5　6　7

19. Having sex.   1 2 3 4 5 6 7

20. Revealing a close friend's secret to someone else. 1 2 3 4 5 6 7

21. Not fastening your seat belt in the car.   1 2 3 4 5 6 7

22. Spending a small amount of your savings for a lifeguard
    certificate.   1 2 3 4 5 6 7

23. Taking a skydiving class.   1 2 3 4 5 6 7

24. Riding a motorcycle without a helmet.   1 2 3 4 5 6 7

25. Choosing a job you enjoy over going to school.   1 2 3 4 5 6 7

26. Cheating on an exam.   1 2 3 4 5 6 7

27. Speaking out against a popular opinion at school.   1 2 3 4 5 6 7

28. Sunbathing without sunscreen.   1 2 3 4 5 6 7

29. Bungee jumping off a tall bridge.   1 2 3 4 5 6 7

30. Downloading pirated music on the Internet. (Not paying for
    music files that you were supposed to pay for.)   1 2 3 4 5 6 7

31. Walking home alone at night in an unsafe area of town.   1 2 3 4 5 6 7

32. Spending a semester somewhere far away from your extended
    family.   1 2 3 4 5 6 7

33. Going whitewater rafting at high water in the spring.   1 2 3 4 5 6 7

34. Choosing to spend more time on a hobby than studying for
    school.   1 2 3 4 5 6 7

35. Spending all your pocket money on raffle tickets.   1 2 3 4 5 6 7

36. Failing to watch your younger siblings when told to.   1 2 3 4 5 6 7

37. Not returning a wallet you found that contains $50.   1 2 3 4 5 6 7

38. Jumping off a 10 m diving platform into a pool.   1 2 3 4 5 6 7

39. Skateboarding down a steep hill.   1 2 3 4 5 6 7

Note. Items 1, 2, 8, 12, 23, 25, 27, 29, 32, 33 are positive risks; Items 6, 10, 11, 13, 20, 21, 24, 28, 31, 36, 37 are negative risks; Items 1, 8, 27 are positive socially-related risks; Items 10, 20 are negative socially-related risks

Appendix C

Domain Specific Risk Taking Questionnaire (Times 4-5)

DOSPERT

For each of the following statements, please indicate the **likelihood** that you would engage in the described activity or behavior if you were to find yourself in that situation. Provide a rating from *Extremely Unlikely* to *Extremely Likely*, using the following scale:

1	2	3	4	5	6	7
Extremely Unlikely	Moderately Unlikely	Somewhat Unlikely	Not Sure	Somewhat Likely	Moderately Likely	Extremely Likely

1. Admitting that your tastes are different from those of a friend.   ① ② ③ ④ ⑤ ⑥ ⑦

2. Going camping in the wilderness.   ① ② ③ ④ ⑤ ⑥ ⑦

3. Betting a day's income at the horse races.   ① ② ③ ④ ⑤ ⑥ ⑦

4. Investing 10% of your annual income in a moderate growth diversified fund.   ① ② ③ ④ ⑤ ⑥ ⑦

5. Drinking heavily at a social function.   ① ② ③ ④ ⑤ ⑥ ⑦

6. Taking some questionable deductions on your income tax return.   ① ② ③ ④ ⑤ ⑥ ⑦

7. Disagreeing with an authority figure on a major issue.   ① ② ③ ④ ⑤ ⑥ ⑦

8. Betting a day's income at a high-stake poker game.   ① ② ③ ④ ⑤ ⑥ ⑦

9. Having an affair with a married man/woman.   ① ② ③ ④ ⑤ ⑥ ⑦

10. Passing off somebody else's work as your own.   ① ② ③ ④ ⑤ ⑥ ⑦

11. Going down a ski run that is beyond your ability.   ① ② ③ ④ ⑤ ⑥ ⑦

12.	Investing 5% of your annual income in a very speculative stock.	① ② ③ ④ ⑤ ⑥ ⑦
13.	Going whitewater rafting at high water in the spring.	① ② ③ ④ ⑤ ⑥ ⑦
14.	Betting a day's income on the outcome of a sporting event.	① ② ③ ④ ⑤ ⑥ ⑦
15.	Engaging in unprotected sex.	① ② ③ ④ ⑤ ⑥ ⑦
16.	Revealing a friend's secret to someone else.	① ② ③ ④ ⑤ ⑥ ⑦
17.	Driving a car without wearing a seat belt.	① ② ③ ④ ⑤ ⑥ ⑦
18.	Investing 10% of your annual income in a new business venture.	① ② ③ ④ ⑤ ⑥ ⑦
19.	Taking a skydiving class.	① ② ③ ④ ⑤ ⑥ ⑦
20.	Riding a motorcycle without a helmet.	① ② ③ ④ ⑤ ⑥ ⑦
21.	Choosing a career that you truly enjoy over a more secure one.	① ② ③ ④ ⑤ ⑥ ⑦
22.	Speaking your mind about an unpopular issue in a meeting at work.	① ② ③ ④ ⑤ ⑥ ⑦
23.	Sunbathing without sunscreen.	① ② ③ ④ ⑤ ⑥ ⑦
24.	Bungee jumping off a tall bridge.	① ② ③ ④ ⑤ ⑥ ⑦
25.	Piloting a small plane.	① ② ③ ④ ⑤ ⑥ ⑦
26.	Walking home alone at night in an unsafe area of town.	① ② ③ ④ ⑤ ⑥ ⑦
27.	Moving to a city far away from your extended family.	① ② ③ ④ ⑤ ⑥ ⑦
28.	Starting a new career in your mid-thirties.	① ② ③ ④ ⑤ ⑥ ⑦
29.	Leaving your young children alone at home while running an errand.	① ② ③ ④ ⑤ ⑥ ⑦
30.	Not returning a wallet you found that contains $200.	① ② ③ ④ ⑤ ⑥ ⑦

Note. Items 1, 2, 7, 11, 13, 19, 21, 22, 24, 27 are positive risks; Items 5, 9, 10, 15, 16, 17, 20, 23, 26, 29, 30 are negative risks; Items 1, 7, 22 are positive socially-related risks; Items 9, 16 are negative socially-related risks

Appendix D

Domain-Specific Risk Taking Questionnaire Part 2 (Times 2-4)

DOSPERT 2

Imagine each of the situations described below, as well as potential outcomes of each situation. Then for each situation, tell us <u>how bad could this situation turn out for you</u>. In other words, how harmful could each situation be?

1--------------2--------------3--------------4--------------5--------------6--------------7

| Not bad at all | Slightly bad | Somewhat bad | Moderately bad | Bad | Very bad | Extremely bad |

1. Cheating on an exam.   1 2 3 4 5 6 7

2. Speaking out against a popular opinion at school.   1 2 3 4 5 6 7

3. Engaging in unprotected sex.   1 2 3 4 5 6 7

4. Not fastening your seatbelt in the car.   1 2 3 4 5 6 7

5. Skateboarding down a steep hill.   1 2 3 4 5 6 7

6. Riding a motorcycle without a helmet.   1 2 3 4 5 6 7

7. Drinking at a party.   1 2 3 4 5 6 7

8. Not returning a wallet you found that contains $50.   1 2 3 4 5 6 7

9. Going on the highest and fastest rollercoaster. 1   2   3   4   5   6   7

10. Sunbathing without sunscreen. 1   2   3   4   5   6   7

Imagine each of the situations described below, as well as potential outcomes of each situation. Then for each situation, tell us <u>how likely is it that this bad outcome will actually occur.</u> In other words, how likely is that to happen?

1--------------2-------------3-------------4-------------5-------------6-------------7

| Extremely unlikely | Moderately unlikely | Somewhat unlikely | Not sure | Somewhat likely | Moderately likely | Extremely likely |

1. Cheating on an exam. 1   2   3   4   5   6   7

2. Speaking out against a popular opinion at school. 1   2   3   4   5   6   7

3. Engaging in unprotected sex. 1   2   3   4   5   6   7

4. Not fastening your seatbelt in the car. 1   2   3   4   5   6   7

5. Skateboarding down a steep hill. 1   2   3   4   5   6   7

6. Riding a motorcycle without a helmet. 1   2   3   4   5   6   7

7. Drinking at a party.	1	2	3	4	5	6	7
8. Not returning a wallet you found that contains $50.	1	2	3	4	5	6	7
9. Going on the highest and fastest rollercoaster.	1	2	3	4	5	6	7
10. Sunbathing without sunscreen.	1	2	3	4	5	6	7

Note. Items 2, 5, 9 are positive risks; Items 1, 3, 4, 6, 7, 8, 10 are negative risks.

Domain-Specific Risk Taking Questionnaire Part 3 (Times 2-4)

DOSPERT 3

Imagine each of the situations described below, as well as potential outcomes of each situation. Then for each situation, tell us <u>how good could this situation turn out for you.</u> In other words, how beneficial could each situation be?

1--------------2--------------3--------------4--------------5--------------6--------------7

| Not good at all | Slightly good | Somewhat good | Moderately good | Good | Very good | Extremely good |

1. Skateboarding down a steep hill.　　　1　2　3　4　5　6　7

2. Riding a motorcycle without a helmet.　　　1　2　3　4　5　6　7

3. Not returning a wallet you found that contains $50.　　　1　2　3　4　5　6　7

4. Going on the highest and fastest rollercoaster.　　　1　2　3　4　5　6　7

5. Engaging in unprotected sex.　　　1　2　3　4　5　6　7

6. Sunbathing without sunscreen.　　　1　2　3　4　5　6　7

7. Cheating on an exam.　　　1　2　3　4　5　6　7

8. Speaking out against a popular opinion at school.　　　1　2　3　4　5　6　7

9. Drinking at a party.		1	2	3	4	5	6	7
10. Not fastening your seatbelt in the car.		1	2	3	4	5	6	7

Imagine each of the situations described below, as well as potential outcomes of each situation. Then for each situation, tell us <u>how likely is it that this good outcome will actually occur.</u> In other words, how likely is that to happen?

1-------------2-------------3-------------4-------------5-------------6-------------7

Extremely unlikely	Moderately unlikely	Somewhat unlikely	Not sure	Somewhat likely	Moderately likely	Extremely likely

1. Skateboarding down a steep hill.		1	2	3	4	5	6	7
2. Riding a motorcycle without a helmet.		1	2	3	4	5	6	7
3. Not returning a wallet you found that contains $50.		1	2	3	4	5	6	7
4. Going on the highest and fastest rollercoaster.		1	2	3	4	5	6	7
5. Engaging in unprotected sex.		1	2	3	4	5	6	7
6. Sunbathing without sunscreen.		1	2	3	4	5	6	7

7. Cheating on an exam.	1	2	3	4	5	6	7
8. Speaking out against a popular opinion at school.	1	2	3	4	5	6	7
9. Drinking at a party.	1	2	3	4	5	6	7
10. Not fastening your seatbelt in the car.	1	2	3	4	5	6	7

Note. Items 1, 4, 8 are positive risks; Items 2, 3, 5, 6, 7, 9, 10 are negative risks.