

Adolescents' perceptions of social risk and prosocial tendencies: Developmental change and individual differences

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Abstract

Many prosocial behaviors involve social risks such as speaking out against a popular opinion, bias, group norm, or authority. However, little is known about whether adolescents' prosocial tendencies develop over time with their perceptions of social risks. This accelerated longitudinal study used within-subject growth-curve analyses to test the link between adolescents' prosocial tendencies and social risk perceptions. Adolescents completed self-reports annually for 3 years ($N = 893$; $M_{\text{age}} = 12.30$ years, 10–14 years at Wave 1, and 10–17 years across the full study period; 50% girls, 33% White non-Latinx, 27% Latinx, 20% African American, 20% mixed/other race). The association between social risk tolerance and prosocial tendencies changed significantly across adolescence. Specifically, for younger adolescents, more prosocial tendencies were associated significantly with less social risk tolerance, whereas for relatively older adolescents, more prosocial tendencies were associated marginally with more social risk tolerance. Additional individual differences by empathy (but not sensation seeking) emerged. These findings suggest that prosocial tendencies across adolescence may be associated with an underlying ability to tolerate social risks.

KEYWORDS

adolescence, prosocial tendencies, social risk perceptions

1 | INTRODUCTION

Adolescence is a developmental transition marked by the increased salience of peers, and adolescents are highly motivated to avoid social risks (Blakemore, 2018; Tomova et al., 2021). At the same time, adolescents demonstrate an increasing capacity to help peers and family prosocially (Fulgini, 2019), even when helping directly involves social risks such as speaking out against a popular opinion, bias, group norm, or authority (Do et al., 2017). This juxtaposition begs the question of whether adolescents' motivation to avoid social risks is associated with either lower or higher levels of prosocial tendencies (Blakemore, 2018; Tomova et al., 2021). Given the rapid development of perspective-taking skills, self-regulation, and moral reasoning (Dahl et al., 2018), it is likely that the link between social risk perceptions and prosocial tendencies changes across early- to mid-adolescence. In this longitudinal study, we investigated (1) whether adolescents showed more prosocial tendencies during years when they were more or less tolerant of social risks; (2) whether the yearly link between prosocial tendencies and social risk tolerance changed across early- to mid-adolescence, and (3) whether the yearly link between prosocial tendencies and social risk tolerance varied according to individual differences in sensation seeking and empathy. We drew on a large diverse sample of adolescents in a low-income community using an accelerated longitudinal within-subject design.

1.1 | Adolescents' perceptions of social risk and prosocial tendencies

On a regular basis, adolescents show kindness during emotionally evocative situations by helping and comforting peers, family, and strangers in distress (Fulgini, 2018). In recent years, a growing body of research has highlighted that adolescents often help others in risky ways—helping even if it contradicts social expectations and could incur costs to their own social standing (Do et al., 2017). For instance, an adolescent may speak up to defend their friend in a group setting, or voice disagreement with popular opinions or rules when it helps his or her family. This phenomenon – whereby adolescents take social risks in order to help others – has been coined *Prosocial Risk Taking* (Do et al., 2017).

Prosocial risk-taking is particularly intriguing because adolescents are often socially risk averse (i.e., want to conform to social norms due to increased emphasis on peer relationships and social identities), but also sometimes quite socially risk tolerant (i.e., eager to speak out and voice their own opinions). A recent study found that adolescents' self-reports of risk-taking behaviors (e.g., staying out late, drinking alcohol) and prosocial behaviors were correlated positively within a single time point (Blankenstein et al., 2020). Another study found that negative risk-taking behaviors (e.g., texting while driving) were correlated positively with positive risk-taking behaviors (e.g., such as standing up for individual beliefs, initiating new friendships), although the study did not measure prosocial behavior explicitly (Duell & Steinberg, 2020). Building on prior literature, this current study examines how adolescents' perceptions of social risk (rather than demonstrated risk-taking behavior) relate to their prosocial tendencies.

1.2 | The yearly link between social risk perceptions and prosocial tendencies

Investigating how adolescents' perceptions of social risks and prosocial tendencies develop together may shed light on why and how adolescence incurs both vulnerabilities and opportunities for positive development (Do et al., 2017). One way to understand whether adolescents' perceptions of social risk and prosocial tendencies develop together is to test empirically the extent to which they co-occur within years over the course of adolescent development. In

particular, longitudinal research may reveal whether adolescents are more inclined toward prosocial behavior during years when they perceive that their social actions are relatively more or less risky. One possibility is that adolescents are *more* inclined toward prosocial behavior when they are relatively more tolerant of social risks (i.e., less averse to the potential social costs of engaging in risks). For instance, when adolescents perceive that disagreeing with others is not very likely to incur a social cost to themselves, they may be more likely to express empathy and support their friends publicly (Do et al., 2017). Alternatively, another possibility is that adolescents are *less* inclined toward prosocial behavior when they are relatively more tolerant of social risks (i.e., less averse to the potential social costs of engaging in risks), because they feel less concern for the feelings of others around them or social expectations. In other words, when adolescents feel that maintaining social harmony is not a priority, they may engage in personal social risks, but not be inclined to help others. Finally, a third possibility is that social risk-taking and prosocial tendencies are unrelated to one another; adolescents simply exhibit distinct patterns of these behaviors. Investigating these possibilities is important because if adolescents' perceptions of social risks and prosocial tendencies develop together, it would suggest that one way to promote adolescents' capacity to contribute positively to the world around them would be to increase their opportunities to help others even with it comes at a social cost.

1.3 | Developmental change across adolescence

The link between social risk tolerance and prosocial tendencies also may change over the course of adolescence, given the striking developmental shifts that occur quite rapidly during this developmental transition (Dahl et al., 2018). Adolescence is a period of growing social independence, in which youth increasingly face opportunities to evaluate and make their own decisions and manage their own behavior in social settings (Dahl et al., 2018). In particular, during early adolescence, prosocial behavior may be linked to relatively less tolerance of social risks (i.e., social risk aversion), because both helping behavior and social risk aversion reflect the value placed on interpersonal relationships. In contrast, older adolescents may feel comfortable helping others even if they perceive that their actions are risky.

Some research supports the hypothesis that prosocial behavior is linked to greater risk aversion during early adolescence, but prosocial behavior becomes linked to greater social risk tolerance by later adolescence. During middle childhood and early adolescence, youth who display more prosocial behavior also show less tolerance of social risk, in that they show fewer externalizing and aggressive behaviors, which contradict social expectations for appropriate social conduct (e.g., Hay et al., 2021; Zondervan-Zwijenburg et al., 2022). Moreover, 7–9-year-old children generally only are willing to engage in prosocial risks (e.g., try to win a prize for another child), if it does not involve the risk of losing their own prize (Corbett et al., 2021). Further, during early adolescence and childhood, youth's sense of morality is relatively more rule-based and focused on social expectations and exterior cues (Kohlberg, 1976). This stage of moral development could drive younger adolescents both to help others because they "should," and also because they feel averse to social risks that disrupt social norms.

Subsequently, during later adolescence, prosocial behavior may become linked to greater social risk tolerance, in the context of significant moral and cognitive development. First, older adolescents have developed a greater capacity to make moral decisions for themselves, instead of following existing social rules or expectations (Kohlberg, 1976). This, in part, is facilitated by increased perspective-taking and self-regulation skills, which develop rapidly across adolescence (Eisenberg et al., 2016). Second, relatively older adolescents may have more practice taking social risks (e.g., speaking out against unpopular opinions, risking their social status), and learned that social risks can yield positive outcomes. Third, relatively older adolescents have more opportunities for experiencing and evaluating social risks, and also more opportunities to help peers prosocially, because they spend more time with peers and value peer relationships more strongly (Fuligni, 2018). These developmental shifts in moral reasoning, cognitive skills, social priorities, and contextual changes suggest that social risk tolerance and prosocial tendencies may converge over the course of development. Thus, greater prosocial behavior may be associated with social risk aversion during early adolescence, but with social risk tolerance during middle or later adolescence.

1.4 | Individual differences linking risk-taking to prosocial tendencies

Individual differences in adolescents' sensation seeking and empathy may serve as important moderators of the link between social risk perceptions and prosocial tendencies (Blankenstein et al., 2020; Do et al., 2017). Sensation seeking is an eagerness for new and novel experiences (Jensen et al., 2011), and has been associated positively with both risk-taking behaviors and prosocial tendencies (Crone & Dahl, 2012; Telzer, 2016; van Duijvenvoorde et al., 2016). For instance, adolescents who are high in sensation seeking drink more alcohol and stay out late more often (Blankenstein et al., 2020; Braams et al., 2016), and also are more likely to lend money to friends, help friends solve problems (Blankenstein et al., 2020), stand up for individual beliefs, and initiate new friendships (Duell & Steinberg, 2020). Although sensation seeking has been shown to underlie and possibly drive both risk-taking and prosocial tendencies in longitudinal research (Blankenstein et al., 2020), no known studies have investigated whether the link between social risk perceptions and prosocial tendencies varies by levels of sensation seeking. In particular, adolescents who seek out more novel, sensational experiences may be more likely to help others even if they perceive that social risks are high, whereas adolescents who do not seek novel, sensational experiences may not help others when it involves social risk.

Adolescents also differ in their levels of empathy; that is, their ability to understand and share the feelings of another person, and their motivation to understand and comfort others in distress (Overgaauw et al., 2017). Empathy promotes prosocial behavior (Eisenberg et al., 2016), because youth who feel more concern for others attend more to others' emotions, attend less to their own emotions, and experience higher friendship quality (Overgaauw et al., 2017). By demonstrating the importance of empathy for adolescents' social development (Eisenberg et al., 2016), prior research raises the question whether empathy may moderate the link between perceptions of social risk and prosocial tendencies. In particular, highly empathic adolescents may help others regardless of their social risk perceptions because they are highly motivated to help others. In contrast, less-empathic adolescents may be willing to help others *only* when they do not perceive high social risks, because they are unwilling to help if they perceive that helping will incur a social risk. In one laboratory study of 8- to 12-year-old children, children who rated themselves as less agreeable were less likely to lie to help others at their own expense, although the study did not examine empathy explicitly (Demedardi et al., 2021). Thus, adolescents who are less empathetic and highly tolerant of social risks may show lower prosocial tendencies, whereas adolescents who are highly empathetic may not show a link between social risk tolerance and prosocial tendencies.

1.5 | The current study

The goals of the present study were to investigate: (1) Do adolescents report more prosocial tendencies during years when they report more or less social risk tolerance? (2) Does the link between prosocial tendencies and social risk tolerance change across early- to mid-adolescence? (3) Does the link between prosocial tendencies and social risk tolerance vary according to individual differences in sensation seeking and empathy? To answer these questions, we used an accelerated longitudinal design. We drew from a large, diverse sample of adolescents from a low- to middle-income community who provided repeated, self-report measurements over the course of 3 years. Our robust, multilevel model approach isolated within- vs. between-subject associations linking social risk tolerance to prosocial tendencies. We focused specifically on emotional prosocial tendencies – adolescents' tendencies to help others during emotionally evocative situations (Carlo & Randall, 2002) – because we were interested in how it was linked to perceptions of social risks, which often evoke strong emotions (e.g., fear of negative peer evaluations, social rejection). In this way, our aim was to highlight the intersection of social risk tolerance and prosocial tendencies by exploring how they are associated with one another over time, and how this association changes across development and according to individual differences. As exploratory analysis, we examined gender differences in the link between social risk perceptions and prosocial tendencies. Empathy increases across early adolescence in girls but declines in boys (Overgaauw et al., 2017),

and gender expectations for social relationships differ (Rose & Asher, 2017), so the link between social risk perceptions and prosocial tendencies likely varies for adolescent boys and girls.

2 | METHOD

2.1 | Participants

Participants were 893 adolescents in three middle schools in the U.S. rural southeast. At the start of the study, the sample was 50.06% girls ($n = 447$), 49.83% boys ($n = 445$), and .11% missing gender information ($n = 1$). At Wave 1, participants' average age was $M_{\text{age}} = 12.30$ years, $SD = .64$, Range 10–14. Across the full study period, ages ranged from 10 to 17 years. The sample was racially and ethnically diverse (32.81% White, 27.21% Latinx, 19.82% African American, 20.16% mixed/other race). On average, students in the district came from families with low socio-economic status: 66.7%–72.1% were classified as economically disadvantaged according to school reports (North Carolina School Report Cards, 2017) and 69.5% were eligible for free or reduced-price lunch.

2.2 | Procedure

Participants were recruited from three rural public middle schools ($N = 1385$) in one school district. These three middle schools, which include grades 6–8, fed into two public high schools, which include grades 9–12. Letters of consent were mailed to all caregivers of students, with an option to grant or deny consent for their child to participate in the study. Approximately 77% of families ($n = 1059$ families) returned signed forms; 88% ($n = 935$) of these gave consent for their child to participate, yielding a sample that represented 67.5% of the population in this diverse, low-income community.

Data were collected annually across three waves, each 1 year apart. At all waves, participants completed online surveys via laptop computers at school, which were set up and supervised by research staff. At Wave 1 (i.e., a baseline; Winter 2016), 924 students consented and completed the questionnaires. Of the 924 students who completed questionnaires at Wave 1, 798 (86.26%) participated at Wave 2, and 767 (83.00%) participated at Wave 3. Reasons for not participating included moving, school absence, declining participation, or other unknown reasons. The final sample for the current study included 893 students who had both the risk-taking measure and prosocial measure for at least 1 year. Missing data for trait levels of sensation seeking and empathy were low (.34% and 5.71%, respectively). All procedures were approved by the human subjects committee at the Sponsoring Institution. This study was not preregistered. Data and syntax are available upon request.

2.3 | Measures

All measures were administered at Waves 1, 2, and 3.

2.3.1 | Social risk tolerance

To assess adolescents' social risk tolerance, we used the social risk subscale of the adolescent version of the Domain Specific Risk-Taking questionnaire (DOSPERT; Figner et al., 2015). This scale has been used in prior research samples of adolescents (Barkley-Levenson et al., 2013; Blankenstein et al., 2021; Somerville et al., 2019), and the adult version of this scale has also been shown to measure risk-taking and perceptions of risk-taking reliably (Blais & Weber, 2006). Participants were asked to indicate their "gut level assessment of how risky each situation or behavior is" for each of

three statements using a 7-point Likert-type scale ranging from “Not at all Risky” to “Extremely Risky.” The original measure was adapted with minor language changes to clarify language for our participants. Specifically, there were three items: “Telling a friend that you disagree with their opinion,” “Telling your parent or teacher that you disagree with them about an important issue,” “Speaking out against a popular opinion at school.” We created a mean score at each time point, and reverse scored the measure, such that higher scores indicate the adolescent felt relatively more tolerant of social risks (i.e., less averse or concerned about taking risks), and lower scores indicate the adolescent felt relatively more averse to social risks (i.e., more concerned about taking risks). Cronbach alphas within each of the 3 years ranged from .50 to .55, and the alpha across years was .53. The low alphas within each of the 3 years are a limitation that we address in the discussion. The alpha across years indicates that there was substantial variability in social risk tolerance across adolescence, which is useful for our research questions about longitudinal change.

2.3.2 | Prosocial tendencies

To assess prosocial tendencies, we used the Prosocial Tendency Measure (PTM) emotional subscale, which reflects the tendency to help others prosocially specifically during emotionally evocative situations (Carlo & Randall, 2002). We focused on the emotional subscale because social risk-taking can evoke strong emotions (e.g., fear of negative peer evaluations, social rejection), so we expected prosocial tendencies during emotionally evocative situations to be more closely associated with it (compared with general prosocial tendencies in less emotional situations, for example). The measure has been used and validated in previous samples of adolescents (Carlo & Randall, 2002). Participants completed four items by responding with a 5-point Likert-type scale ranging from “Does not describe me at all” to “Describes me greatly.” The items included: “It is most fulfilling to me when I can comfort someone who is very distressed,” “I tend to help others particularly when they are emotionally distressed,” “I respond to helping others best when the situation is highly emotional,” and “Emotional situations make me want to help needy others.” We created a mean score at each time point, with higher scores indicating that the adolescent was relatively more likely to engage in prosocial behavior or help out during emotional situations (i.e., showed more prosocial tendencies). Cronbach alphas within each of the 3 years ranged from .54 to .57, and the alpha across years was .69. Again, although the relatively low alphas within years are a limitation that we address in the discussion, the alpha across years indicates there was substantial variability in prosocial tendencies across adolescence which is helpful for predictive models.

2.3.3 | Sensation seeking

To assess trait-level sensation seeking, we used the Sensation Seeking for Children scale (Jensen et al., 2011). Participants were asked to respond to seven questions using a 5-point Likert-type scale ranging from “Strongly disagree” to “Strongly agree.” Example items include: “I’m the first one in my group of friends to try new things” and “If somebody dares me to do something, I do it.” We created a mean score at each time point, then averaged across all time points to create a trait-level score. Cronbach alphas within each of the 3 years ranged from .77 to .82, and the alpha across years was .82.

2.3.4 | Empathy

To assess trait-level empathy, we used the Interpersonal Reactivity Index (IRI) Empathy subscale (Davis, 1983). Participants were asked to indicate how well each of the five statements describes them. Participants responded via a 5-point Likert scale ranging from “Does not describe me at all” to “Describes me very well.” Specifically, there were seven items: “I often have caring feelings for people who have less than me,” “Sometimes I don’t feel very sorry for

other people when they are having problems”, “When I see someone being taken advantage of, I feel kind of protective toward them”, “Other people’s troubles do not usually disturb me a great deal”, “When I see someone being treated unfairly, I sometimes don’t feel very much pity for them”, “I am often quite touched by things that I see happen”, and “I would describe myself as a pretty soft-hearted and sensitive person”. Negative items were reverse coded, and we created a mean score at each time point, then averaged across all time points to create a trait-level score. Cronbach alphas within each of the 3 years ranged from .61 to .69, and the alpha across years was .78.

2.4 | Statistical analysis

This study used an accelerated longitudinal design, so each participant had only three waves of data, but the data set included grades 6–10, which corresponded to the age of –ten to fourteen years approximately at Wave 1, and 10–17 years across the full study period. As a preliminary first step, we conducted participation analyses examining differences between adolescents according to their degree of participation in the study, and bivariate correlations. To answer our primary research questions, we used linear mixed-effects models with years (Level 1) nested within participants (Level 2). We person-centered all Level 1 predictors, and we included on the intercept person-mean values for each of the yearly predictors (Curran & Bauer, 2011; Hoffman & Stawski, 2009). This approach helps to isolate within-subject vs. between-subject effects. In the tables, “Level 1 Same Year” variables reflect mean-centered variables from the same year (i.e., within subject), whereas “Level 2 Person-Average” variables reflect levels averaged across all years across individuals (i.e., between subject). We standardized all outcome variables to make the beta-coefficients interpretable as effect sizes. All models included random intercepts and slopes. Between-subject covariates are not needed because these were within-subject models that controlled for between-subject effects (Curran & Bauer, 2011; Hoffman & Stawski, 2009).

Model 1 tested direct associations, that is, the yearly association between social risk tolerance and prosocial tendencies. We tested social risk tolerance at Level 1 (within-person) and Level 2 (between-person) as simultaneous predictors of prosocial tendencies in the same year. Specifically, we used the following equations:

$$\text{Level 1 : } \textit{prosocial}_{ij} = \beta_{0j} + B_{1j}\textit{Risk}_{ij} + r_{ij} \quad (1)$$

$$\text{Level 2 : } \beta_{0j} = \gamma_{00} + \gamma_{01}m\textit{Risk}_j + u_{0j} \quad (2)$$

$$\beta_{1j} = \gamma_{10} + u_{1j} \quad (3)$$

Prosocial tendencies in a particular year (i), for a particular adolescent (j), were modeled as a function of the average prosocial tendencies of the adolescent across years (β_{0j}), and their individual mean-centered social risk tolerance (B_{1j}). In addition, at Level 2, we modeled the individual’s person-mean value of social risk tolerance across all years (γ_{01}) on the intercept. We included random effects on the intercept and the slopes (i.e., mean-centered social risk tolerance) to allow social risk tolerance to vary significantly across years.

Model 2 tested whether the yearly association between social risk tolerance and prosocial tendencies changed across development from early- to mid-adolescence. Specifically, we tested the same model 1, but included an additional Level 1 interaction term between social risk tolerance and grade ($B_{2j}\textit{Risk}_{ij} * \textit{Grade}_{ij}$), and the corresponding main effect of grade, with grade centered at grade 6 ($B_{3j}\textit{Grade}_{ij}$). To probe significant interactions, we re-ran the same model re-centering at each grade. Re-centering at each grade provides the mean and standard errors for the intercept and slope for each grade, and thereby allowed us to probe the effect at each age group in the model (Curran et al., 2004). This approach indicated whether the yearly association between social risk tolerance and prosocial tendencies changed across adolescence from grade 6 (approximately the age of –eleven to twelve) to grade 10 (approximately the age of –fifteen to sixteen).

Model 3 tested how the yearly association between social risk tolerance and prosocial tendencies varied by trait-level individual differences in sensation seeking and empathy (i.e., between subjects). To assess individual differences, we used Model 1 and additionally included two cross-level interaction terms with sensation seeking and empathy as simultaneous predictors in the model. Specifically, we added effects for person-centered sensation seeking and person-centered empathy onto the intercept in Equation (2) ($\gamma_{02}SensationSeeking_j + \gamma_{03}Empathy_j$) and as cross-level interactions in Equation (3) ($\gamma_{11}SensationSeeking_j + \gamma_{12}Empathy_j$) at Level 2.

Finally, we tested whether the longitudinal change in the association between social risk tolerance and prosocial tendencies varied by trait sensation seeking and empathy. Specifically, we combined models 2 and 3, such that we included one Level 1 interaction term ($B_{2j}Risk_{ij} * Grade_{ij}$), and two additional cross-level interaction terms ($\gamma_{21}SensationSeeking_j$ and $\gamma_{22}Empathy_j$). As additional exploratory analysis, we examined gender differences in the link between social risk perceptions and prosocial tendencies, as described below. To probe significant interactions, we used the simple slopes technique at 1SD above and below the mean value of the moderator (Aiken & West, 1991). Analyses were conducted using Stata (StataSE, Version 17).

3 | RESULTS

3.1 | Participation analyses

To investigate potential bias in our study sample, we conducted preliminary analyses to examine differences between adolescents according to their degree of participation in the study. The sample included adolescents who participated in at least 1 year of the study ($N = 924$). Most adolescents participated in all 3 years (82.08%; $N = 733$). A variable was created to indicate the percentage of possible years each adolescent participated in the study. Overall, participants participated in the study in 92.68% ($SD = 16.13\%$) of their possible years. We tested differences in the degree of participation by demographic characteristics via *t*-tests for gender and ANOVAs for race/ethnicity. Boys ($M = 93.41\%$, $SD = 3.96\%$) participated in more years than girls ($M = 92.15\%$, $SD = 4.11\%$; $t(3,116) = 2.21$, $p = .03$). Adolescents from Latinx backgrounds participated in more years ($M = 96.11\%$, $SD = 11.72\%$) than adolescents from African American backgrounds ($M = 93.32\%$, $SD = 16\%$), $F(1,249) = .11$, $p < .05$) and White backgrounds ($M = 92.68\%$, $SD = 16\%$), $F(1,249) = .14$, $p < .05$). We then tested differences in degree of participation by study variables via linear regressions, which accounted for multiple observations. Adolescents who participated in more years of the study had higher sensation-seeking tendencies ($B = .06$, $p < .05$) compared with adolescents who participated in fewer years of the study. There were no other differences based on the degree of participation.

3.2 | Descriptive analyses and bivariate correlations

Table 1 displays descriptive statistics and bivariate correlations separately by years. On average across years, adolescents who reported greater prosocial tendencies and greater empathy were less socially risk tolerant (i.e., more averse to social risks). Adolescents who were more empathic experienced lower levels of sensation seeking. There were no other significant correlations. In addition, independent samples *T*-tests revealed that there was a significant gender difference in levels of empathy, $t(887) = -6.53$, $p < .001$, such that girls reported higher levels of empathy ($M = 12.52$, $SE = .15$) compared with boys ($M = 11.15$, $SE = .15$). Similarly, there was a significant gender difference in prosocial tendencies, $t(887) = -3.30$, $p = .001$, such that girls reported higher levels of prosocial tendencies ($M = 5.06$, $SE = .05$) compared with boys ($M = 5.13$, $SE = .05$). There were no significant gender differences in social risk perceptions or sensation seeking ($ps > .05$).

We also tested whether social risk tolerance and prosocial tendencies each changed across adolescence using a multilevel model, which tested whether grade predicted social risk tolerance and prosocial tendencies. Social risk

TABLE 1 Descriptive statistics and correlations with variables each year

	1	2	3	4	5	6	7	8
1 Prosocial Wave 1	1							
2 Prosocial Wave 2	.46***	1						
3 Prosocial Wave 3	.32***	.49***	1					
4 Social risk tolerance Wave 1	.26***	.13***	.12**	1				
5 Social risk tolerance Wave 2	.07	.10**	.11**	.25***	1			
6 Social risk tolerance Wave 3	.06	.09*	.12***	.20***	.40***	1		
7 Empathy (Trait)	.40***	.48***	.45***	.27***	.14***	.13***	1	
8 Sensation seeking (Trait)	.11***	.15***	.17***	.05	.00	.02	.17***	1
<i>mean</i>	3.42	3.40	3.46	3.55	2.53	2.50	15.47	3.15
<i>sd</i>	1.04	1.02	.99	1.29	1.22	1.21	3.83	.77
<i>min</i>	1.00	1.00	1.00	1.00	1.00	1.00	4.00	1.00
<i>max</i>	5.00	5.00	5.00	7.00	7.00	7.00	29.00	5.00

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

tolerance increased linearly across adolescence ($\beta = .34$, $SE = .02$, $p < .001$), whereas prosocial tendencies did not change ($p = .160$).

3.3 | The yearly link between social risk tolerance and prosocial tendencies

Table 2 displays results of multilevel models linking social risk tolerance to prosocial tendencies. First, model 1 tested direct associations linking social risk tolerance to prosocial tendencies within each year, controlling for average levels of social risk tolerance across all years. Social risk tolerance was associated negatively with prosocial tendencies in the same year ($\beta = -.06$, $SE = .02$, $p < .001$), such that adolescents were more prosocial during years when they were more averse to social risks.

3.4 | Change across adolescence

Model 2 tested whether the yearly association between social risk tolerance and prosocial tendencies changed across the adolescent years (see Table 2). The interaction between social risk tolerance and grade significantly predicted prosocial tendencies in the same year ($\beta = .07$, $SE = .02$, $p = .001$). As shown in Figure 1, greater social risk tolerance was associated significantly with lower prosocial tendencies at 6th grade (corresponding to, approximately, the

TABLE 2 Multilevel models illustrating the intersection of social risk tolerance and prosocial tendencies

	Prosocial tendencies							
	Model 1		Model 2		Model 3		Model 4	
	β	SE	β	SE	β	SE	β	SE
Social risk tolerance same year	-.06***	(.02)	-.16***	(.03)	-.26**	(.08)	-.23	(.14)
Social risk tolerance average across years	-.18***	(.03)	-.18***	(.03)	-.03	(.02)	-.04	(.02)
Grade	-	-	.06**	(.02)	-	-	.01	(.10)
Grade \times social risk tolerance same year	-	-	.07***	(.02)	-	-	-.01	(.09)
Sensation seeking trait level	-	-	-	-	.05	(.03)	.04	(.05)
Empathy trait level	-	-	-	-	.15***	(.01)	.14***	(.01)
Social risk tolerance same year \times sensation seeking	-	-	-	-	.02	(.02)	-.01	(.04)
Social risk tolerance same year \times empathy	-	-	-	-	.01*	(.01)	.01	(.01)
Grade \times sensation seeking	-	-	-	-	-	-	.00	(.03)
Grade \times empathy	-	-	-	-	-	-	.00	(.01)
Grade \times social risk tolerance same year \times sensation seeking	-	-	-	-	-	-	.02	(.03)
Grade \times social risk tolerance same year \times empathy	-	-	-	-	-	-	-.00	(.01)
Constant	.90***	(.14)	.81***	(.15)	-1.74**	(.19)	-1.73***	(.24)
Observations	2420		2420		2369		2369	
Number of groups	893		893		842		842	

Note: Standard errors in parentheses. Model 1 illustrates that on average, lower social risk tolerance is related to higher prosocial tendencies within each year of study. Model 2 illustrates that the association between social risk tolerance and prosocial tendencies varies significantly across grades (see Figure 1). Model 3 illustrates that the association between social risk tolerance and prosocial tendencies varies significantly by individual differences in empathy (but not sensation seeking; see Figure 2). Model 4 illustrates that the change in the association between social risk tolerance and prosocial tendencies across grades does not vary significantly by individual differences in sensation seeking or empathy. In model 2, prosocial tendencies reflect prosocial tendencies in grade 6.

+ $p < .06$.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

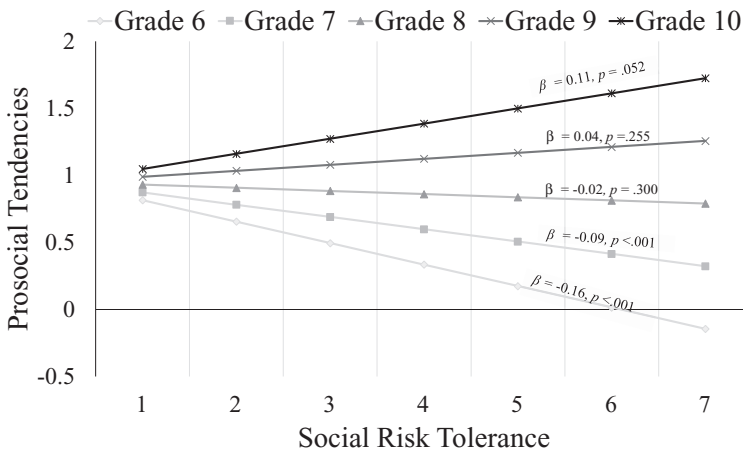


FIGURE 1 The yearly association between social risk tolerance and prosocial tendencies changes across development

age of eleven to twelve), but marginally *higher* prosocial tendencies by 10th grade (corresponding to, approximately, the age of 15-16). These results suggest that social risk tolerance and prosocial tendencies are associated negatively during early adolescence, but become related more positively by later adolescence, such that older adolescents were marginally more prosocial during years when they were more socially risk-tolerant.

3.5 | Individual differences

Model 3 tested whether the association between social risk tolerance and prosocial tendencies in the same year varied by trait levels of sensation seeking and empathy (see Table 2). The yearly association between social risk tolerance and prosocial tendencies varied significantly by trait levels of empathy ($\beta = .01$, $SE = .01$, $p = .034$), but not sensation seeking ($\beta = .02$, $SE = .02$, $p = .286$). Specifically, as shown in Figure 2, social risk tolerance was associated negatively with prosocial tendencies in the same year only for adolescents who were low in empathy ($\beta = -.14$, $SE = .04$, $p < .001$), and not for adolescents who were high in empathy ($\beta = .02$, $SE = .03$, $p > .588$). There were no other significant direct or interactive results.

Finally, Model 4 tested whether the developmental change in the yearly association between social risk tolerance and prosocial tendencies varied by trait sensation seeking and empathy. These interactions were not significant ($ps > .05$), suggesting that the change in the yearly association between social risk tolerance and prosocial tendencies over adolescence does not differ for adolescents who vary in levels of sensation seeking or empathy.

3.6 | Exploration of gender differences

As an exploratory analysis, we examined gender differences in the link between social risk perceptions and prosocial tendencies. Specifically, we first tested whether the association between social risk tolerance and prosocial tendencies in the same year varied for boys and girls (i.e., a cross-level interaction). To do this, we tested the same model 3 described above, but replaced trait levels of sensation seeking and empathy with adolescent gender (0 = boys, 1 = girls). This interaction was not significant ($p = .158$), suggesting that the yearly association between social risk tolerance and prosocial tendencies was consistent for boys and girls. We next tested whether the developmental change in

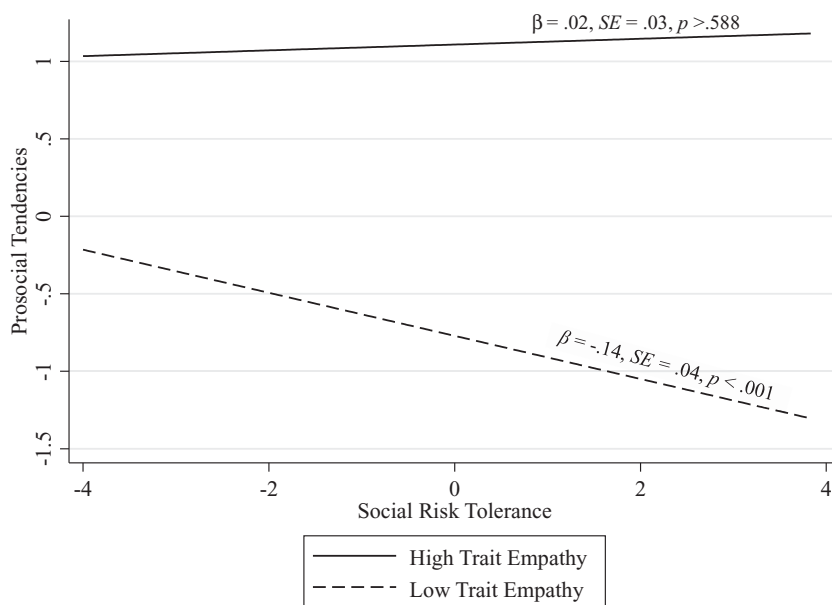


FIGURE 2 Adolescents who are low in empathy show greater prosocial tendencies during years when they are less tolerant of social risks. Adolescents who are high in empathy do not show a yearly link between prosocial tendencies and social risk tolerance.

the yearly association between social risk tolerance and prosocial tendencies varied by adolescent gender (i.e., Model 4). This interaction also was not significant ($p = .882$), suggesting that the change in the yearly association between social risk tolerance and prosocial tendencies over adolescence also was consistent for boys and girls.

4 | DISCUSSION

The goal of this study was to understand how adolescents' perceptions of social risks intersect with their tendencies to behave prosocially in emotionally evocative situations. We found that during early adolescence, youth were more inclined toward prosocial behavior during years when they felt more averse to social risks. However, by later adolescence, youth were more inclined toward prosocial behavior when they felt more tolerant of social risks. This finding suggests that prosocial tendencies emerge initially during early adolescence in the context of social risk aversion but are linked to greater tolerance of social risks by mid-adolescence. Moreover, although adolescents who were high in empathy showed high levels of prosocial tendencies regardless of their social risk perceptions, adolescents who were low in empathy showed higher levels of prosocial tendencies only during years when they felt more social risk aversion. Perceptions of social risk develop in tandem with prosocial tendencies over the course of adolescent years and may vary according to individual differences in empathy.

4.1 | Social risk tolerance and prosocial tendencies converge over time

Our primary finding was that early adolescents in 6th grade were more inclined toward prosocial behavior during years when they were more averse to social risks, such as disagreeing with a popular opinion or speaking out. Further, the link between social risk aversion and prosocial tendencies persisted when controlling for the within-person stability

of these characteristics over time, illustrating that social risk aversion and prosocial tendencies fluctuated together *within* individuals across development. However, the association between social risk perceptions and prosocial tendencies also changed significantly across development, such that it reversed by mid- to late-adolescence. Specifically, by grade 10 approximately 16 years old in the United States, adolescents were relatively more inclined toward prosocial behavior during years when they were more *tolerant* of social risks (i.e., felt that disagreeing or speaking out was relatively more acceptable). These findings suggest that prosocial tendencies converge with social risk tolerance over the course of adolescence—likely in the context of moral reasoning and cognitive maturation, as well as shifting social priorities.

Prosocial tendencies may converge with greater social risk tolerance across the course of adolescence for several reasons. First, this convergence across time could reflect adolescents' growing friendships, budding relationships with classmates, more meaningful interactions with peers, and growing peer acceptance, because both social risk perceptions and prosocial tendencies are deeply embedded in adolescents' social contexts. For example, during early adolescence, prosocial behavior may be linked to greater social risk aversion because both may reflect value placed on interpersonal relationships. In prior research, prosocial behaviors were correlated negatively with externalizing and aggressive behaviors during middle childhood (Hay et al., 2021; Zondervan-Zwijenburg et al., 2022). In contrast, relatively older adolescents may be more willing to help others even when they perceive that their actions are risky, in part because they have higher moral reasoning skills, which enable them to evaluate and judge independently the morality of their social actions (Kohlberg, 1976).

Relatedly, adolescents spend increasing amounts of time with peers and increasingly value peer relationships (Dahl et al., 2018). Increased experience may lead older adolescents to gain confidence, learn from their experiences taking social risks, and learn that social risks can yield positive outcomes and benefit others. In these ways, both developmental changes within the adolescent (i.e., maturation in cognitive and socio-emotional skills) and changes in the environment surrounding the adolescent (i.e., increased social connection with peers) may contribute to social risk tolerance and prosocial tendencies converging from early to mid-adolescence. This intersection of social risk tolerance and prosocial tendencies may represent the emergence of prosocial risk-taking.

Finally, risk-taking is relatively less common during early adolescence compared with later adolescence. Until risk-taking becomes more common later in development, it may be developmentally appropriate for young adolescents to avoid social risks, and also orient toward more prosocial behavior. This could be in part because prosocial tendencies develop prior to social risk tolerance, as illustrated by our longitudinal finding that prosocial tendencies remained high across the adolescent years, whereas social risk tolerance increased longitudinally over time. This finding suggests that social risk tolerance may be more developmentally normative later in adolescence, which could explain why it then becomes linked to greater prosocial tendencies.

4.2 | Individual differences

We also found that the association between social risk perceptions and prosocial tendencies differed by individual empathy. Consistent with our hypothesis, highly empathic adolescents tended toward high levels of prosocial behavior regardless of their perception of social risks. However, contrary to our hypothesis, relatively less empathic adolescents tended toward more prosocial behavior only during years when they were more averse to social risks. Adolescents who are low in empathy are more self-focused (Eisenberg et al., 2016), so they may evaluate social risks based on the potential to promote their own interests. They may help others more when they are concerned about their own social standing and reputation (i.e., averse to social risks), and help others less when they are more tolerant of social risks, because they focus on more self-oriented advantages. For instance, adolescents who are low in empathy may speak out or tell a parent or teacher that they disagree with them about an issue that only impacts themselves, but not their peers.

We found no evidence that the link between social risk perceptions and prosocial tendencies varied according to individual differences in sensation seeking (i.e., eagerness for new and novel experiences). This finding could be considered surprising because prior research has linked sensation seeking positively to both risk-taking behavior and prosocial tendencies (Crone & Dahl, 2012; Duell & Steinberg, 2020; Telzer, 2016; van Duijvenvoorde et al., 2016). Moreover, adolescents' baseline levels and longitudinal changes in fun seeking (a specific aspect of sensation seeking focused on enjoyment) predict both risky and prosocial behaviors (Blankenstein et al., 2020). Given that underlying perceptions of social risk likely shape risk-taking behavior (e.g., alcohol use), future research should measure both perceptions of social risk and risk-taking behavior simultaneously and examine their unique associations with prosocial tendencies, and should replicate our null finding. It is feasible that sensation seeking is associated directly with higher levels of social risk tolerance and prosocial tendencies individually, but sensation seeking does not moderate the link between social risk tolerance and prosocial tendencies. For example, sensation seeking may be a precursor or underlying motivation/drive for social risk tolerance and prosocial behavior (Blankenstein et al., 2020), rather than mark individual differences in the association between social risk tolerance and prosocial tendencies between youth.

4.3 | Limitations and future directions

We acknowledge limitations. First, although we used previously validated scales for social risk tolerance and prosocial tendencies, the internal reliability for these measures was relatively low in our study within years. Future work should investigate whether our findings persist using other measures of these two constructs. Second, although the change in the yearly association between social risk tolerance and prosocial tendencies was significant, the positive link between social risk tolerance and prosocial tendencies (i.e., simple slope) was only on the threshold of significance at grade 10. Future longitudinal research, which follows participants past grade 10 would provide more evidence to support the interpretation that social risk tolerance converges with prosocial behavior across adolescence. Finally, our study used only adolescents' self-reports, which contributes to shared method variance. Although our within-subject analysis approach partially accounts for adolescents' personal biases in reporting, future research should replicate and extend our findings using other metrics of social risk perceptions and prosocial tendencies—for example, using task-based measures, peer-nominations, or observer reports.

5 | CONCLUSION

Adolescents demonstrate remarkable prosocial competencies and frequently help others even when it could incur risk to themselves (Do et al., 2017). Prior research has shown that risk-taking behaviors and prosocial behaviors are correlated positively (Blankenstein et al., 2020), and our study built on this knowledge by revealing that underlying perceptions of social risks and prosocial tendencies develop in tandem and fluctuate dynamically together over time. Our results suggest that youth show more prosocial tendencies when they are less tolerant of social risks during early adolescence, but by mid- to later-adolescence, show more prosocial tendencies when they are more tolerant of social risks. This finding may reflect the emergence of prosocial risk-taking, in the context of adolescents' increasing brain maturation, moral reasoning skills, and ability to evaluate social risks independently. The ability to tolerate social risks may promote opportunities to help peers and contribute positively to the lives of others.

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CONFLICT OF INTEREST

The authors have no conflict of interest to declare.

DATA AVAILABILITY STATEMENT

Data and syntax are available upon request.

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