



# The Temporal Precedence of Peer Rejection, Rejection Sensitivity, Depression, and Aggression Across Adolescence

Christina M. L. Beeson<sup>1</sup> · Heather Brittain<sup>1</sup> · Tracy Vaillancourt<sup>1,2</sup>

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## Abstract

We examined the temporal precedence between perceived peer rejection, rejection sensitivity, depression, and aggression in a sample of 544 adolescents (55.7% girls;  $M_{\text{age}} = 14.96$  years at the first measured time point) assessed yearly from Grade 9 to Grade 12. Using developmental cascade modelling to analyze the data, our study supported the symptoms-driven and social process models, in that perceived rejection was preceded by either depression or aggression at different times across adolescence. Similarly, rejection sensitivity was also preceded by depression and/or aggression. Although depression initiated the cascade leading to rejection sensitivity, our model also supported a bidirectional relation across late adolescence as rejection sensitivity also predicted future depression. Overall, our findings provide support that internalizing and externalizing problems lead to interpersonal difficulties with peers, such as perceived rejection and demonstrate the unique role of rejection sensitivity with regard to depression and aggression independent from perceived peer rejection.

**Keywords** Rejection · Rejection sensitivity · Depression · Aggression · Cascade models

The need to belong is universal to all humans, found in all cultures around the world and among all ages of development [1]. Beginning early in childhood, children seek out social interactions with others to form groups and friendships to fulfill this fundamental need. This behaviour increases as children approach middle childhood and early adolescence, when peers increase in importance during social development [2]. Belonging to a group is psychologically protective [1] and solidifies an individual's social identity [3]. When the need for inclusion is not met, and children feel like they are outright rejected by their peers, negative outcomes can ensue, such as hostility, social withdrawal, solitude, and depression in some children [4], or aggression in other children [5]. There is also evidence suggesting that peer rejection can be a consequence rather than a cause of internalizing and externalizing problems [e.g., 6, 7].

## Peer Rejection

Peer rejection is a painful experience which occurs when an individual is actively disliked by his or her peers [8]. Peer rejection may also refer to individuals who are excluded, banished, or not accepted into a social group [9]. Those who are rejected by their peers tend to continue to experience rejection over time [6, 10].

Although some researchers have found that peer rejection is related to a multitude of maladaptive outcomes, such as anxiety, loneliness, social withdrawal, depression, anger, hostility, and aggression [5, 11–13], similar maladaptive traits and behaviour have also been attributed as causes of rejection. Specifically, children who are aggressive, socially withdrawn [6], irritable, impulsive [14], or behaviourally inhibited [15] have been found to have a higher likelihood of being rejected by their peers [6]. These findings present opposing directionality and it follows that there may be a cyclical nature over time to the relation between rejection and depressive or aggressive outcomes. Researchers have also found that the act of being rejected by peers may cause children to be sensitive to future peer rejection, called rejection sensitivity [16].

✉ Tracy Vaillancourt  
tracy.vaillancourt@uottawa.ca

<sup>1</sup> School of Psychology, University of Ottawa, Ottawa, ON, Canada

<sup>2</sup> Counselling Psychology, Faculty of Education, University of Ottawa, 145 Jean-Jacques-Lussier, Ottawa, ON K1N 6N5, Canada

## Rejection Sensitivity

Rejection sensitivity is the tendency for an individual to be more likely to anxiously or angrily expect and perceive rejection in both overt and ambiguous situations [17]. Additionally, those who are higher in rejection sensitivity tend to have stronger emotional reactions to real or perceived rejection [17, 18], resulting in long lasting maladaptive behaviour [17, 19]. Although rejection sensitivity aligns itself closely to social anxiety disorder (i.e., social phobia) in that both touch upon the anxious expectations that one experiences when rejected by others [20, 21], the difference between the two is that rejection sensitivity is made up of the expectation and perception of *rejection*, along with strong emotional reactions to perceived rejection, whereas social anxiety involves the intense fear, anxiety, or avoidance surrounding social situations where one may be judged by others [20]. The DSM-5 does not specify fear of rejection per se in its diagnostic criteria of social anxiety, but it does mention a fear of negative evaluation that occurs in one or more social situations where scrutiny by others is possible, such as meeting unfamiliar people, eating in public, giving a speech, or having a conversation with others [20]. In this study, the focus is on rejection sensitivity with an acknowledgment of its overlap with social anxiety.

Downey and Feldman [19] postulated the Rejection Sensitivity Model, where an individual who is repeatedly excluded from the peer group may develop expectations of rejection (i.e., rejection sensitivity). Thus, when in a situation where rejection is a possibility, the individual is more likely to interpret ambiguous social cues as evidence of rejection. This, in turn, causes a negative emotional response, such as anger or anxiety, as well as an increased likelihood of maladaptive behaviour. These emotional and behavioural responses, when exaggerated, may lead to actual rejection by the peer group, creating a self-fulfilling prophecy.

Shortly after it was postulated, rejection sensitivity theory was expanded to include two specific and distinct defensive reactions to rejection that are seen in those high on rejection sensitivity [22]. Specifically, a rejected individual will either react anxiously to being rejected, which has been found to be related to internalizing problems such as depression or social anxiety, or they will react in anger, which has been linked to externalizing behaviour such as aggression [17]. In other words, rejected children and youth high on rejection sensitivity either get sad or mad—reactions that were assessed in the present study.

Research to date has provided support for the expanded rejection sensitivity theory in that rejection sensitivity follows experiences of rejection [16, 19, 23] and that

rejection sensitivity is in turn linked to depression [24, 25] and/or aggression in the rejected individual [20, 26]. Interestingly, rejection sensitivity may not always be initiated by experiences of peer rejection directly. In Zimmer-Gembeck et al. [20], where past experiences of rejection were not measured, they found that rejection sensitivity was preceded by higher levels of depression symptoms.

Depression in adolescence is linked to numerous stressors, such as academic achievement [27], family life [e.g., 28, 29], and of relevance to the present study, social status with peers, including rejection [e.g., 13, 30, 31].

## Rejection and Depression: Competing Models

When it comes to explaining the relation between rejection and depression, the general focus in the literature is on depression being the outcome of peer rejection [e.g., 13, 32–36]. As is the case with many variables' relation to depression, internalizing problems are often viewed as the result of negative interpersonal interactions and relationships. This direction of the relation is known as the *interpersonal risk model*.

Fewer studies have found support in the direction of depressive symptoms leading to individuals being rejected by the peer group, known as the *symptoms-driven model* [30, 37]. The guiding theory behind the symptoms-driven model is the *scar hypothesis*, which postulates that individuals who have suffered through internalizing problems such as depression have lasting effects in other areas of their lives, including interpersonal relationships [7, 10, 38–40].

Another theory to consider is the *transactional model*, where there is bidirectionality in the relation between depression and rejection over time [31]. In a transactional model, the changes which naturally occur in the individual's relationships with peers and experiences with peer rejection, as well as the changing depressive symptoms over time, are important. Both the stability and the changes that arise across time influence one another. Some researchers have found support for there being a bidirectional relation between peer rejection and depressive symptoms [18, 41].

## Rejection and Aggression: Competing Models

The perception of being rejected by peers may also lead to increased use of aggression. Peer aggression takes many forms and may be direct or indirect. Although most adolescent aggression by girls and boys is indirect [42], physical aggression is still used by some teens [43], which helps explain the notable correlation between indirect (i.e., relational) and

direct aggression in childhood and adolescence ( $\bar{r} = 0.76$ ) [42]. Given this high degree of intercorrelation, we examined both forms of aggression as a composite when examining links with peer rejection.

There are two theories which explain the association between aggression and peer rejection and how they influence one another over time, the *social process model* [44] and the *peer socialization model* [45]. The social process model postulates that stable behaviour such as withdrawal or aggression may influence the types of peer interactions a person may have, such as being the target of peer rejection [46]. This model has been empirically supported by Ostrov [47] in young children, as well as by Zimmer-Gembeck and Duffy [48] in early adolescent girls, and by Ostrov et al. [49] in young adults, where relational aggression predicted later relational victimization in girls and women. Conversely, the peer socialization model postulates that peer rejection is the catalyst for increased aggressive behaviour over time [45]. That is, individuals who are rejected by their peers are more likely to behave aggressively toward others in the future. This model has been supported in preschool age children [50], preadolescents [51, 52], and adolescents [53]. A meta-analysis conducted by Wu et al. [54] also provided support for the peer socialization model, with a medium effect size ( $r = .25$ ); however, only this direction of the relation was considered. Since there is support for both models, it follows that the association between aggression and peer rejection may be bidirectional and they may influence one another over time. Indeed, one study has found that that aggression and peer rejection were bidirectionally related [55].

## Developmental Cascades

In order to test the possibility of bidirectional relations or to test the temporal precedence between variables throughout development, researchers have begun using developmental cascade models. Developmental cascades refer to the interactions across levels, domains, and systems over time, resulting in cumulative outcomes over the course of development across the lifespan [56, p. 491]. Cascade models control for both the stability in constructs over time, as well as concurrent associations across developmental domains [56]. An advantage of this type of analysis is that the directionality of effects can be explored. That is, cascade models can differentiate if relations are direct and unidirectional, direct and bidirectional, or indirect through mediating variables [56].

## Present Study

With the increasing importance of peer relationships across development [2], adolescence is one key developmental period where both rejection sensitivity and depression are

emergent [57]. Further, rejection sensitivity has consistently been found to be one mechanism predicting depression among older adolescents approaching adulthood [18, 57]. As such, the developmental period on which we focussed for this study was adolescence.

To the best of our knowledge no studies have used developmental cascade models to examine the temporal ordering of perceived rejection, rejection sensitivity, depression, and aggression. Accordingly, we examined the directionality of these relations beginning when participants were in Grade 9 and ending when they were in Grade 12. We used a cascade model to explore the role of perceived peer rejection and rejection sensitivity within a more complex developmental system involving mental health and behaviour systems.

Most studies to date looking at rejection sensitivity have found that it increases following experiences of rejection [16, 19, 23]. There is also evidence that individuals who are high on rejection sensitivity are more likely to display higher levels of depressive [24, 25] and/or aggressive symptoms [18, 26]. Likewise, although there have been studies which support depression as the outcome of being rejected by peers [e.g., 13, 32, 33, 35, 36], many recent studies have also supported that mental health problems may explain poorer peer relationships [e.g., 7, 10, 38], and that the relation is reciprocal [18]. The relation between rejection and aggression is also mixed, with some studies supporting that aggression leads to more instances of poor peer relationships [46, 47, 49], whereas other studies provide evidence that rejection precedes aggressive behaviour [e.g., 45, 53, 54].

Given these discrepant findings it is difficult to predict the directionality of associations. As one example, rejection sensitivity may initiate the cascade (i.e., rejection sensitivity  $\rightarrow$  depressive symptoms and/or aggression  $\rightarrow$  perceived peer rejection), it may play a mediating role (i.e., depressive symptoms and/or aggression  $\rightarrow$  rejection sensitivity  $\rightarrow$  perceived peer rejection), or it may be the outcome of the cascade (i.e., depressive symptoms and/or aggression  $\rightarrow$  perceived peer rejection  $\rightarrow$  rejection sensitivity). Therefore, we examined the associations between perceived rejection, rejection sensitivity, depression, and aggression in an exploratory nature. Due to the exploratory nature of our study and the possibility of mediation effects, we also examined potential indirect pathways emerging from our analyses.

Previous studies have found that household income and parental education are related to mental health problems, such as depression, in childhood and adolescence [58]. A meta-analysis has also found that externalizing problems, such as aggression, have a small but significant relation to socioeconomic factors such as household income and parental education [59]. Knowing these variables are related to depression and aggression, we controlled for household income and parental education in our analyses. We also controlled for biological sex, which has been linked to rejection,

depression, and aggression in previous studies. For instance, girls are more likely to have increased symptoms of depression than boys [e.g., 60, 61], and boys are more likely to use direct aggression than girls [42]. Finally, we controlled for race/ethnicity in our analyses, categorized as White and non-White due to the large number of participants who identified as White. Studies have shown that some children may be excluded from groups due to their ethnic identity [62], and thus ethnicity may have an impact on perceived rejection.

## Method

### Participants and Procedure

Participants were drawn from the McMaster Teen Study, an on-going longitudinal study designed to examine the relations between peer victimization, mental health, and academic achievement using a multi-method, multi-informant approach. In the spring of 2008, participants in Grade 5 ( $M_{\text{age}} = 10.91$ ; 53% girls) were recruited from 51 randomly selected public primary schools (87 schools were eligible) located in a large Southern Ontario Public School Board. From the recruitment process, 875 participants agreed to take part in the study, and 544 (55.7% girls) participated in at least one time point between Grade 9 and Grade 12, the time frame used in this study. Parents of participating children provided written annual consent for their child and the students provided written assent for their participation in the study. Participants were compensated for their time with gift cards for completed questionnaires.

Longitudinal data were used beginning in Grade 9, when the average age of participants was 14.96 years, due to the availability of the variables used in this study. Participants were predominantly White (83%) and middle-class, which is representative of the demographic characteristics of the area from which the participants were recruited. Most parents (74%) reported having college or university education at the beginning of data collection.

### Measures

#### Peer Rejection

Perceived peer rejection was measured using items from the interpersonal relations subscale of the Behavioural Assessment System for Children—Second Edition self-report of personality adolescent version [BASC-2 SRP-A; 59], which is designed for use with adolescents still in high school (ages 12–21). There are four items measuring peer rejection in the BASC-2 SRP-A. Two items are rated using *true* or *false* (2 = *true*, 0 = *false*) (e.g., “My classmates don’t like to be with me.”) and two items are rated on a 4-point scale where

0 = *never*, 1 = *sometimes*, 2 = *often*, and 3 = *almost always* (e.g., “Other kids hate to be with me.”). Scores were calculated per the BASC manual using a sum. The interpersonal relations scale has high factor loadings on personal adjustment (0.74). The internal consistency in our study for these items ranged from 0.74 to 0.85.

#### Rejection Sensitivity

Rejection sensitivity was measured starting in Grade 10 using the Brief Fear of Negative Evaluation Scale-II (BFNE-II) through self-reports [63]. This scale has 12 items (e.g., “I am afraid that others will not approve of me”) which are rated on a 5-point scale ranging from 1 = *not at all characteristic of me* to 5 = *extremely characteristic of me*, and were averaged to create a total score, where higher values indicate higher levels of rejection sensitivity. The internal consistency of the BFNE-II was excellent ( $\alpha = 0.95$ ) and the scale fits a 2-factor solution; one theoretical (i.e., social anxiety and fear) and one method. The method-based factor comprises items from the scale that are reverse-worded. The BFNE-II has been validated in undergraduate students 18 years to 39 years of age [64], as well as more recently in adolescents [65]. The internal consistency of the BFNE-II for our study was consistent ( $\alpha = 0.97$ ) across the measured times (Grades 10–12).

#### Depression

Participants’ self-reported symptoms of depression were measured using a subscale of the BASC-2 SRP-A [64]. The depression subscale assesses common symptoms of depression such as loneliness, sadness, and hopelessness through 12 items. True or false (0 = *false*, 2 = *true*; e.g., “Nothing is fun anymore”) and 4-point Likert scale items (0 = *never*, 1 = *sometimes*, 2 = *often*, and 3 = *almost always*; e.g., “I feel sad”) are included. The clinical scales and adaptive scales have good internal consistency,  $\alpha = 0.67$ – $0.86$  and  $\alpha = 0.81$ – $0.83$ , respectively. The depression subscale has high factor loadings on internalizing problems (0.84). Self-reported symptoms of depression were calculated by summing the scores of the items. Higher calculated sums are equivalent to higher symptoms of depression. The internal consistency of the depression composite for our study over time was high ( $\alpha = 0.87$ – $0.91$ ; Grade 9 to Grade 12).

#### Peer Aggression

Peer aggression was assessed using the Aggressive Behaviour Scale [66], a self-report measure which looks at engagement in aggression at each time point. The Aggressive Behaviour Scale assesses both overt and relational aggression. Each of the 24 items were answered on a

4-point scale, where 0 = *not at all true* and 3 = *completely true* (e.g., “I am the kind of person who tells my friends to stop liking someone.”). This measure was initially validated with children ages 11 to 16 and can be used with young adults, and there is good internal consistency for both the overt aggression subscales (from 0.79 to 0.84) and the relational aggression subscales (from 0.62 to 0.78) [65]. Due to the high correlation between types of aggression ( $r_{\text{grade}9} = 0.59, p < .001, r_{\text{grade}10} = 0.50, p < .001, r_{\text{grade}11} = 0.57, p < .001, r_{\text{grade}12} = 0.53, p < .001$ ), as well as the complexity of our analytical model, items were averaged into a single aggression variable. This combining of aggressive forms has also been used as an approach by other researchers [18]. The internal consistency of the Aggressive Behaviour Scale for our study was high ( $\alpha = 0.89\text{--}0.90$ ; Grade 9 to Grade 12).

## Analytic Plan

Analyses were performed using Mplus v8.0 [67] using maximum likelihood robust estimation with missing data. In order to test for fit in a cascade model, a series of nested models were performed and statistical fit between the models was assessed at each step. Models were assessed using the  $\chi^2$  test of significance, the root mean square error of approximation (RMSEA), the comparative fit index (CFI), and the Tucker–Lewis Index (TLI). Non-significant  $\chi^2$  values indicate good fit, RMSEA values  $< 0.06$  indicate close fit, and CFI and TLI values  $> 0.95$  indicate adequate fit, [68, 69]. Nested models were compared using the Satorra-Bentler scaled chi-square test. After testing each model, the most parsimonious one with the best statistical fit was identified [70]. Once the final model was identified, selected indirect effects that were of theoretical interest were tested using maximum likelihood estimation with bootstrapped confidence intervals (with 5000 draws) since the distributions of indirect effects are often non-normal. Household income, parental education, race/ethnicity, and biological sex were included in each of the models as control variables. Model 1 included covariance terms between each of the variables assessed at the same time point (e.g., Grade 9 depression and Grade 9 rejection). In Model 2, one-year stability paths were added between repeated variables at consecutive time points (e.g., Grade 9 aggression to Grade 10 aggression), and in Model 3, two-year stability paths were added (e.g., Grade 9 aggression to Grade 11 aggression). Cross lagged paths between different variables at consecutive time points were added in Model 4 (e.g., Grade 9 depression to Grade 10 rejection). In Model 5, non-significant covariate paths were trimmed.

## Results

### Missing Data

The analytic sample ( $n = 544$ ) was compared to those who were not included but who participated in at least one of the follow up waves (i.e., Grades 6 to 8) of the study ( $n = 159$ ) on prior perceived peer rejection, depression, aggression, family income, and parental education using independent  $t$ -tests and on gender and ethnicity using chi-square tests. Participants in the analytic sample were more likely to be from families with higher household incomes,  $t(201.353) = 3.974, p < .001$ , and to have parents with higher education levels,  $t(676) = 4.873, p < .001$ . Girls were more represented in the analytic sample than those who only participated in earlier waves,  $\chi^2(1) = 8.255, p = .003$ . No other differences were found.

In the analytic sample, Little’s Missing Completely at Random test of study variables indicated that data from Grades 9–12 were not missing completely at random,  $\chi^2(374) = 463.238, p = .001$ . We further investigated  $t$ -tests between those with missing data on one variable with data present on others. Of 196 tests conducted, we found that only two were significant after applying the Benjamini-Hochberg false discovery rate procedure [71]. Those who were missing reports of depression in Grade 10 had lower rates of aggression in the same year and those missing Grade 10 aggression had lower rates of Grade 10 rejection. It should be noted that both of the comparisons involved less than 5% of the sample in the missing group and may not be valid comparisons, and due to the low percentage of missing data, there is likely no meaningful impact on our results.

### Descriptive Statistics

Data were tested for assumptions of normality. All values of skewness and kurtosis were under the acceptable range of 3 for skewness and 10 for kurtosis [72]. Correlations, means, and standard deviations of all the study variables can be found in Table 1. All correlations were statistically significant between our variables of interest.

Sex differences were examined using independent  $t$ -tests. Across all four years girls had higher scores on depression than boys,  $ps < 0.001$ . Girls also reported higher peer rejection,  $ps < 0.01$ , and rejection sensitivity,  $ps < 0.001$ , than boys across all assessments. Girls and boys did not differ on their levels of aggression,  $ps > 0.05$ .

**Table 1** Descriptive statistics

	DEP9	DEP10	DEP11	DEP12	REJ9	REJ10	REJ11	REJ12	AGG9	AGG10	AGG11	AGG12	RS10	RS11	RS12
DEP9	1														
DEP10	0.64	1													
DEP11	0.52	0.65	1												
DEP12	0.47	0.51	0.59	1											
REJ9	0.67	0.39	0.31	0.29	1										
REJ10	0.47	0.67	0.47	0.34	0.53	1									
REJ11	0.35	0.44	0.61	0.31	0.46	0.61	1								
REJ12	0.37	0.35	0.49	0.54	0.30	0.40	0.53	1							
AGG9	0.38	0.27	0.29	0.25	0.28	0.21	0.18	0.25	1						
AGG10	0.23	0.31	0.27	0.23	0.20	0.29	0.18	0.29	0.64	1					
AGG11	0.21	0.23	0.34	0.28	0.18	0.22	0.25	0.30	0.66	0.73	1				
AGG12	0.30	0.34	0.32	0.38	0.21	0.24	0.21	0.34	0.56	0.68	0.74	1			
RS10	0.31	0.49	0.39	0.40	0.25	0.37	0.28	0.25	0.31	0.33	0.28	0.34	1		
RS11	0.25	0.34	0.50	0.41	0.21	0.28	0.44	0.33	0.25	0.18	0.29	0.28	0.63	1	
RS12	0.29	0.36	0.41	0.51	0.25	0.30	0.28	0.46	0.17	0.18	0.26	0.33	0.52	0.64	1
<i>M</i>	4.44	5.17	5.09	5.21	0.83	0.97	1.00	0.97	0.34	0.33	0.31	0.31	2.64	2.61	2.61
<i>SD</i>	5.69	6.01	5.67	5.41	1.62	1.81	1.82	1.59	0.32	0.33	0.33	0.33	1.08	1.06	1.07

DEP Depression, REJ rejection, AGG aggression, RS rejection sensitivity

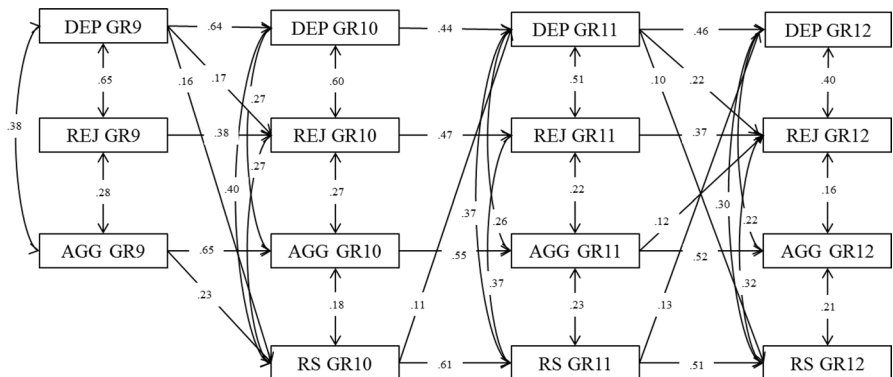
**Developmental Models**

Model fit statistics for each model are found in Table 2. The baseline model included all covariates and the within-time covariances between variables; this model had poor fit to the data. In Model 2, all the one-year across-time stability paths were added, which resulted in a significantly better fit,  $\Delta\chi_{SB}^2(11) = 533.829, p < .001$ . In Model 3, we added the two-year stability pathways, which was a significantly better fit than Model 2,  $\Delta\chi_{SB}^2(7) = 53.645, p < .001$ . In Model 4, the cross-lagged paths between perceived peer rejection, rejection sensitivity, depression, and aggression at adjacent time points were included, which was a significantly better fit than Model 3,  $\Delta\chi_{SB}^2(33) = 102.214, p < .001$ . In Model 5 non-significant covariate paths were trimmed. The resulting model did not significantly differ from Model 4,  $\Delta\chi_{SB}^2(47) = 39.047, p = .789$ ,

and was chosen as the final model. The standardized model parameters are displayed in Fig. 1.

In the final model there were positive concurrent associations between all variables. All of the 1-year stability paths and all but one of the 2-year stability paths (rejection Grade 10 to Grade 12) were statistically significant. We also found a number of longitudinal associations. Reciprocal relations emerged between depression and rejection sensitivity, that is, in Grades 9 and 11 depression was positively associated with rejection sensitivity the following year and in Grades 10 and 11 rejection sensitivity predicted depression one year later. Depression in Grade 9 and Grade 11 also predicted perceived rejection in each of the following years, that is, in Grade 10 and Grade 12. Grade 9 aggression was positively associated with Grade 10 rejection sensitivity. Grade 11 aggression predicted perceived rejection in Grade 12.

**Fig. 1** Cascade model of depression, aggression, rejection, and rejection sensitivity. DEP Depression, REJ rejection, AGG aggression, RS rejection sensitivity. Standardized parameter estimates in the model are significant at  $p < .05$ . All non-significant paths, two-lag paths, and those involving significant (untrimmed) covariates are included in the model but not shown for ease of interpretation



**Table 2** Model fit statistics

	$\chi^2$	df	c	p	RMSEA (90% CI)	CFI	TLI	cd	vs.	$\Delta\chi^2$	p	$\Delta df$
Model 1: within-time covariances	1281.808	84	1.708	< 0.001	0.162(0.154, 0.170)	0.546	0.108	–	–	–	–	–
Model 2: within-time covariances and one-year stability	229.888	73	1.441	< 0.001	0.063(0.054, 0.072)	0.941	0.866	3.481	2 vs. 1	533.829	< 0.001	11
Model 3: within-time covariances, one- and two-year stability	159.616	66	1.372	< 0.001	0.051(0.041, 0.061)	0.965	0.911	2.093	3 vs. 2	53.645	< 0.001	7
Model 4: within-time covariances, and one- and two-year stability paths, cross-lagged paths	56.180	33	1.335	0.007	0.036(0.019, 0.052)	0.991	0.956	1.408	4 vs. 3	102.214	< 0.001	33
Model 5: trimmed covariates	100.011	80	1.448	0.065	0.021(0.000, 0.034)	0.992	0.984	1.011	4 vs. 5	39.047	0.789	47

Model 5 is the final model, *df* degrees of freedom; *c* = weighting constant under maximum likelihood robust estimation, *RMSEA* root mean square error of approximation, *CFI* comparative fit index, *TLI* Tucker–Lewis index, *cd* weighting constant for the Satorra–Bentler scaled chi-square test

**Indirect Effects**

A number of possible indirect effects of theoretical interest were tested using bootstrapped confidence intervals (N = 5000; with 95% confidence intervals). None of the four-lag indirect effects were statistically significant. Of the three-wave indirect effects, two were statistically significant: Grade 9 depression to Grade 10 rejection sensitivity to Grade 11 depression, *b* = 0.019 [0.001, 0.047],  $\beta$  = 0.018 [0.001, 0.045]; and Grade 10 rejection sensitivity to Grade 11 depression to Grade 12 perceived rejection, *b* = 0.036 [0.003, 0.081],  $\beta$  = 0.025 [0.002, 0.054].

**Discussion**

The purpose of this study was to examine the directionality of the relations between perceived peer rejection, rejection sensitivity, depression, and aggression across adolescence. To do this, we built an integrated cascade model using all four of these variables across 4 years of adolescent development. Our study is the first to our knowledge to use an integrated cascade model to study these variables and their relation over time.

There were no paths in the direction of perceived rejection leading to rejection sensitivity, a relation that has been found in previous research [16, 19, 23]. Our measure of rejection sensitivity looks specifically at the fear of being rejected by others, which is a defining feature of social anxiety [73]. Research has shown that those who are high on social anxiety are less likely to display negative emotions and behaviour when faced with negative interpersonal experiences [74]. A possible explanation for our findings may be that although the adolescents in our study may be preoccupied with being rejected, that preoccupation may cause them to work harder by suppressing negative emotions and behaviour to ensure they are not rejected by their peers [74]. Although this may be a reaction that is protective against peer rejection, the suppression of negative emotions may also have a more general impact on interpersonal interactions in that even positive experiences are avoided with this technique [75]. It is possible that there may be other unmeasured social interactions which suffer from this preoccupation with rejection.

We found that rejection sensitivity predicted depression at two time points, from Grade 10 to Grade 11 and from Grade 11 to Grade 12 and depression was also a predictor of rejection sensitivity across two time points (i.e., Grade 9 to Grade 10 and Grade 11 to Grade 12). This suggests that rejection sensitivity and depression may have a bidirectional relation across time. Indeed, we found a statistically significant indirect pathway from Grade 9 depression to Grade 10 rejection sensitivity to Grade 11 depression. This significant

indirect pathway provides evidence that there is a reciprocal relation between depression and rejection sensitivity across adolescence, which has been previously found [57]. Depressed individuals are more likely to recall memories of everyday experiences in a negative way [76, 77], creating a mental framework of depressive cognitive schemas [78] and leading to the belief that the relationship is or will be rejecting, thus increasing rejection sensitivity [17, 18]. In turn, as those who are high on rejection sensitivity are more likely to perceive and overreact to perceived rejection or threats of rejection [17, 18], rejection sensitivity may lead to more consistent negative social interactions which threaten belonging, and in turn, lead to increased future depression [24, 25]. Alternatively, our measure of rejection sensitivity, the fear of negative evaluation, is reflective of anxious rejection sensitivity and shares features with social anxiety, which is commonly comorbid with depression [79–81]. This could explain why rejection sensitivity and depression predict one another across time.

In our study, depression preceded perceived rejection at one time point, from Grade 11 to Grade 12, providing support for the symptoms-driven model. Depressed adolescents can develop a mental scar from depressive symptoms, which can lead to them experiencing negative peer interactions, including perceived or actual rejection. For example, adolescents who are depressed may struggle with developing social skills [82], or may be less adept at handling negative social interactions and interpersonal challenges [83], creating situations where they are rejected by their peers as a result of these deficits.

Additionally, there was also a significant indirect path from Grade 10 rejection sensitivity to Grade 11 depression to Grade 12 perceived rejection. Individuals high on rejection sensitivity are more likely to interpret ambiguous social cues as evidence of rejection, invoking an exaggerated, anxious negative emotional response which is linked to increased depression [24, 25]. In turn, through the mental scar caused by depression, individuals may perceive themselves to be rejected by their peers [40]. Essentially, experiencing rejection sensitivity can lead to a self-fulfilling prophecy, where individuals perceive themselves as rejected by their peers, through the mediating role of depression.

With regard to aggression, we found support for the social process model, where individuals who are aggressive subsequently perceive themselves to be rejected by their peers. This relation was found specifically for aggression from Grade 11 to Grade 12. Although we did find one association from aggression to perceived rejection in our sample of both boys and girls, we may not have found as many pathways between these variables because we controlled for sex in our analyses. It is possible that separate analyses for girls would have revealed this relation at other time points of our model, which was found in one previous study [48].

## Limitations

Although the use of cascade modelling is an important strength for the current study and provides support for the direction of the relations of interest, it still cannot determine causality and is not without weakness. For instance, some researchers have criticized cross-lagged panel models, such as cascade models, as representing a weighted blend of between- and within-person effects as opposed to actual within-person relations over time, which may have an impact on their interpretation [84, 85]. Researchers should aim to replicate the findings from the current study using other analytical methods which distinguish between- and within-person effects, such as random intercept cross-lagged panel models, in order to provide stronger evidence of the directionality of our findings. Another potential limitation of our study was that rejection sensitivity was only measured starting in Grade 10 and thus we cannot determine the temporal precedence before Grade 10 on this variable. For instance, a child could already be attuned to sensing rejection in situations before perceiving higher levels of rejection, depression, or aggression as measured in Grade 9. Based on prior research coupled with our findings starting from Grade 10, we would expect that Grade 9 rejection sensitivity would predict Grade 10 depression. It would be beneficial for future studies to have a measurement of this variable earlier in development in order to increase confidence in this pathway. Additionally, the measure we used for rejection sensitivity may be argued to be a component of social anxiety, which shares features with rejection sensitivity. It may be beneficial for future researchers to replicate these findings using another measure of rejection sensitivity. A further limitation of our study was that we were unable to examine sex as a moderator. Due to the number of variables in our model, our sample size was not large enough to include a minimum of five cases per model parameter and examining sex as a moderator would be underpowered. As a result, we controlled for sex as a covariate in our model. Similarly, due to the complexity of our model and our sample size, we were unable to separate types of aggressive behaviour in our model and we therefore created an aggregate aggression variable. Researchers should include larger sample sizes in order to test sex as a moderator, to separate types of aggressive behaviour, and to test for indirect effects. As all measures used in this study were self-reports, shared-method variance is also a possible limitation of this study, which may have inflated the results. Finally, despite the fact that our dataset was representative of the geographic area from which our sample was drawn in terms of household income and education at the time the overall study began, attrition may mean



that the sample may not be representative of the random sampling as it was at the first time point. Future studies should include a random sampling from differing areas to fully represent a range of socioeconomic status to confirm if our results are generalizable across a wider population.

## Summary

Rejection has been linked with internalizing (e.g., depression) and externalizing (e.g., aggression) difficulties, but until recently, the directionality of this relation was assumed to be rejection as the cause of these problems. However, this directionality may not always be the case. Our study provides support to the growing literature on perceived rejection as the outcome of negative internalizing and externalizing behaviour. Using developmental cascade modelling, we found that both depression and aggression are precursors to perceived peer rejection, providing support for the symptoms-driven model and the social process model, respectively. Further, we found that rejection sensitivity also plays a role in the persistence of depressive symptoms across adolescence, with depressive symptoms predicting rejection sensitivity, but the two measures contributing to each other at future time points across development. This is an interesting finding, as it is the fear of and preoccupation with rejection that is consistently related to depressive symptoms, and not solely perceived rejection on its own.

These findings provide a broader and more comprehensive view of internalizing and externalizing problems as predictors of interpersonal difficulties, such as perceived peer rejection. Further, our study demonstrates the unique role of rejection sensitivity with regard to depression and aggression independent from perceived peer rejection. Perhaps rejection sensitivity is more than a measure of, or an outcome of, rejection and plays a role in the maintenance of depression in adolescence, when acceptance by peers is of utmost importance.

Depression and depressive symptoms in adolescence can have serious consequences for the affected individuals. There are many known causes and outcomes of depression in adolescence, but how they are linked to depression or to one another are not always clear, especially developmentally. With the knowledge of our finding that rejection sensitivity and depression influence each other over time across adolescence, one could look to treat symptoms of rejection sensitivity in order to also decrease symptoms of depression. Understanding this relation between depressive symptoms and rejection sensitivity may provide another tool in the treatment of adolescent depression.

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## Compliance with Ethical Standards

**Conflict of interest** The authors declare no conflict of interest.

**Ethical Approval** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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