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EMPIRICAL RESEARCH

Relational Aggression, Victimization and Self-Concept: Testing Pathways from Middle Childhood to Adolescence

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Abstract When studying adolescent development, it is important to consider two key areas that are salient for teens, which are self-concept and peer relations. A secondary analysis of the National Institute of Health and Human Development Study of Early Child Care and Youth Development was conducted to examine the prospective bidirectional associations between self-concept and peer relations. To date, how social development broadly and peer relations in particular (e.g., relational aggression and victimization) affect self-concept domains is not fully understood. Using a large sample ($N = 1063$; 532 girls; $M = 11.14$ years; $SD = .59$) with multiple informants, the present study examined whether fifth grade relational aggression and sixth grade relational victimization was associated with adolescent self-concept in three key domains (i.e., academic, sports, physical appearance). A significant direct effect emerged, such that relational aggression in middle childhood was associated with decreases in academic self-concept and increases in sports self-concept in adolescence. Analyses also revealed that having higher levels of domain specific self-concept led to decreases in relational aggression across the transition to adolescence. The findings highlight the importance of examining bidirectional prospective associations between relational aggression, relational victimization, and domain specific self-concept. Implications for future research and clinical intervention are discussed.

Keywords Relational aggression · Relational victimization · Adolescence · Self-concept

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Introduction

Self-concept has long been discussed as being of particular importance for healthy development. Self-concept can broadly be defined as individual's perceptions of their abilities, which includes an affective component (Kuzucu et al. 2014). Findlay and Bowker (2009) highlighted that some in the field distinguish between self-esteem and self-concept. However, these researchers note that these two constructs are hard to separate and at times are used interchangeably. For the purposes of the present study, self-esteem differs from self-concept as self-esteem is a judgment made about how one is doing overall (e.g., well-being) whereas self-concept is more of a description of oneself and judgment of one's abilities (Findlay and Bowker 2009). Harter (2006) asserts that "the self is a cognitive and a social construction" (p. 506). Self-concept is thus a cognitive representation of the self (Taylor et al. 2007). Using this assumption, the cognitive and social construction can either lead to a healthy developmental pathway or a maladaptive developmental pathway.

Domain Specific Self-Concept

Domain specific self-concept can be understood as the way in which individuals assess their strengths and weaknesses, typically in multiple life domains (Thomason and Kuperminc 2014). For children and adolescents, what makes up

self-evaluations is based on domain specific self-evaluation (Findlay and Bowker 2009; Harter 1999). For example, "I am good at sports," reflects a positive view of their athletic abilities. There are many domains that youth can assess themselves on and include cognitive competence, academic competence, sports competence, social competence and perception of physical appearance. For the present secondary analysis, there is a limitation on domains that were available to be assessed within the Study of Early Child Care and Youth Development (SECCYD), which only included academic self-concept, sports self-concept, and physical appearance self-concept.

The development of the self and self-concept for children is a continual process that becomes more complex over time (Harter 2006). What defines the self, in terms of self-concept, is quite different depending on what developmental period is being studied. During adolescence, identity formation is a key developmental task. As children transition to adolescence there is an increased salience of judgments of one's abilities and thus this may be a highly susceptible period of development to experience the ramifications of negative self-evaluations (Fanti and Henrich 2015; Rosenberg et al. 1989). This study focuses on self-concept during middle childhood/early adolescence (ages 10–12) and the changes in self-concept during adolescence (age 15). Self-concept has meaningful implications across development. On the one hand, self-concept has been positively associated with positive outcomes such as life satisfaction (Ye et al. 2012). On the other hand, self-concept is negatively associated with maladaptive outcomes including conduct disorder (Olsson and Hansson 2009), aggression (Taylor et al. 2007), depressive symptoms (Renouf and Harter 1990), academic achievement (Shapka and Keating 2005), and eating disorders (Björck et al. 2007). To date, the predictors and outcomes associated with self-concept as children make the transition to adolescence is limited. Thus, it is important to examine specific pathways that may lead to the development of lower self-concept in children and adolescents as well as the outcomes associated with poor self-concept.

Relational Aggression, Victimization and Self-Concept

Self-concept is theorized to develop through a lens of evaluation from peers (Harter 2006). Moreover, peer relationships play an important role in the differentiation and validation of an individual's self-concept and there is variability across contexts, in particular for adolescents (Harter 2006; Preckel et al. 2013; Shapka and Keating 2005). Therefore, associations with peers may impact and be impacted by various domains of self-concept. Due to the importance of peer relationships, current theory suggests that negative peer relationships and peer difficulties have a myriad of negative consequences impacting healthy development (Harter 1999; Shapka and Keating 2005), including the development of self-concept problems (Boivin and Hymel 1997; Boivin et al. 2001; Prinstein et al. 2001). Boivin and Hymel (1997) proposed a Sequential Social Process Model of Peer Harassment (hereafter social process model) to explain the causes and the role of peer harassment, linking problematic social behaviors, peer relationship difficulties and negative social self-concept. More specifically, Boivin and Hymel (1997) posit that aggression and withdrawal lead to peer harassment (also called victimization or the receipt of peer-based aggression, Ostrov et al. 2011) and ultimately negative social self-concept. Findings from the Quebec Longitudinal Study of Children supports the full social process model (Boivin et al. 2001). Aggressive children increase their chances of becoming the target of victimization in retaliation for their aggressive behavior. This experience, in turn, plays a role in decreasing self-evaluations through the experiences of receiving aggression from their peers, leading to the perception that others do not like them. Through the experience of victimization, children may come to internalize these experiences and judge themselves and their abilities in a negative light.

The study of aggression and associated adjustment outcomes has moved away from solely focusing on physical aggression (i.e., the use of physical force or threat of physical force to hurt or harm another individual such as hitting and kicking; Crick and Dodge 1996; Coie et al. 1990) and contemporary researchers typically now also assess other subtypes, such as relational aggression. Relational aggression can be defined as using one's relationship or the threat of the removal of a relationship as the vehicle of harm to others (e.g., exclusion, spreading rumors or ignoring; Crick and Grotpeter 1995). Relational aggression may play an important role when examining aggression and victimization outcomes regarding self-concept. The social process model was originally developed with a focus on physical aggression, but recent work has extended the model to the study of relational aggression. For example, in support of the model, Ostrov and Godleski (2013) found that relational aggression is associated with future relational victimization (i.e., chronic or regular receipt of relational aggression; Crick and Grotpeter 1996) via feelings of loneliness, even after controlling for physical aggression.

Victimization and social psychological adjustment problems are associated with one another. In particular, for girls, relational aggression and victimization contribute uniquely to the prediction of internalizing problems (Crick and Bigbee 1998). Further, links between relational victimization and self-concept are supported in the literature

(e.g., Bellmore and Cillessen 2006). A meta-analysis by Hawker and Boulton (2000) supported associations between victimization and social psychological maladjustment (i.e., depression, loneliness, anxiety, and low self-evaluation). Hanish and Guerra (2002), using a fourth grade sample, found that both aggression and peer victimization resulted in poorer adjustment outcomes. Furthermore, Prinstein et al. (2001) found that relational victimization predicted more internalizing problems. Thus, prior research has tested paths articulated within the model but no known research has examined prospective links between relational aggression/victimization and self-concept domains.

Although the social process model (Boivin and Hymel 1997) does not suggest that there is a bidirectional effect between aggression, victimization and self-concept, there is some evidence that the alternate direction of effect (i.e., lower levels of self-concept may promote aggression) may exist. Whereas previous researchers (e.g., Bellmore and Cillessen 2006) have found that victimization negatively predicts social self-concept, it may also be the case that individuals with low domain specific self-concept may behave and draw out certain responses of individuals. For example, individuals who have a low self-concept have been found to have an association with depression (Harter 1999; Kuzucu et al. 2014). Behaviors associated with depression may cause them to withdraw and could foster a lack of social support and peer stress and thus increase the likelihood to experience victimization (Caldwell et al. 2004; Harter 2006). This peer victimization experience may further promote aggressive behavior via social learning mechanisms (see Ostrov 2010). In support of this prediction, Taylor et al. (2007) identified that there was a direct association between academic self-concept and physical aggression (measured indirectly by assessing discipline for aggression at school) for youth in middle school. This association suggested that for the majority of the children, lower academic self-concept was associated with an increase in engaging in physical aggression. Seminal research conducted by Rosenberg et al. (1989) suggested that the association between aggression and self-concept is due to individuals with negative self-evaluations being more aggressive in an attempt to improve their feelings of well-being. Marsh et al. (2001) also suggested that aggressive behavior may be used in an attempt to increase self-concept. Despite the lack of an organizing theoretical framework to posit a priori hypotheses, given the prior literature and aforementioned assertions both directions of effect are important to examine in the present study.

Notwithstanding the importance of the initial concurrent studies, for several years there has been a standing call for future longitudinal work to examine the relations between relational aggression, victimization, and self-concept (Prinstein et al. 2001). Longitudinal data are needed, as suggested by Prinstein et al. (2001), in order to clarify the direction of effect between social psychological adjustment (such as a poor self-concept) and relational aggression and victimization. Past research has often only examined links with social self-concept and/or global (general) self-concept (Boivin et al. 2001; Prinstein et al. 2001). Malti (2006) suggested that future studies examine cognitive aspects of self-understanding. Furthermore, Damon and Hart (1988) argue that finding low global self-evaluations provides no discernment into the specific domains of the self that youth find undesirable about them and they further call for an examination of multiple self-concept domains rather than examining a more general self-concept. The present study will examine limitations from previous research by testing theoretically informed empirical questions concerning the association between relational aggression, peer victimization, and several self-concept domains, for girls and boys in middle childhood and adolescence.

Considering Gender and Self-Concept

Relational aggression and victimization have been found to be the modal form of behavior displayed and experienced by girls in childhood and adolescence (e.g., Ostrov et al. 2014; Putallaz et al. 2007). Moreover, relational aggression is often associated with psychopathology and adjustment problems for girls (Ostrov and Houston 2008; Prinstein et al. 2001; Werner and Crick 1999). Previous researchers examining aggressive behavior have suggested that future research should address gender specific findings for self-concept and types (forms) of aggression (Kuzucu et al. 2014; Malti 2006). The prior literature suggesting gender moderation effects suggests the importance of examining how the proposed bidirectional pathways may manifest differently for boys and girls. Thus, we explored the possibility that gender may moderate the associations in our model.

The Present Study

There is a need for more longitudinal research on prospective associations between relational aggression, relational victimization and its association with maladaptive pathways using theoretical models to inform predictions during adolescence. Thus, the present study examines the bidirectional pathways between relational aggression, relational victimization and self-concepts for girls and boys to replicate and extend previous findings in the developmental literature. This study examines girls and boys during middle childhood/early adolescence (ages 10–12) and adolescence (age 15) where the self is rapidly changing and becoming more complex and dynamic (Harter 2006). The present study is innovative because although previous

researchers have found associations between aggression and victimization and poor self-concepts, prior published research has not identified key domains that are particularly affected by aggression and victimization. Furthermore, to date, how relational aggression and relational victimization affect and are affected by self-concepts for specific domains is not fully understood. We will also be examining this pathway longitudinally over approximately a 5-year period that crosses two developmental periods, marked by the transition from childhood to adolescence.

We predict support for the previous findings that relational aggression and relational victimization are both negatively associated with domain specific self-concepts from middle childhood/early adolescence (10–12 years) to adolescence (15 years). We predict that relational aggression during middle childhood (fifth grade) will be positively associated with relational victimization during the sixth grade. We also predict that relational victimization will mediate the association between relational aggression and self-concepts as supported by the social process model (Boivin et al. 2001). This pathway will show a negative association with self-concepts. We also hypothesize that relational aggression will be directly negatively associated with all self-concept domains (Marsh et al. 2001; Taylor et al. 2007) and that these will be particularly noted among girls. Age, gender, physical aggression, and physical victimization are statistically controlled in our conservative model. The alternate direction of effect will also be examined, such that we posit domain specific self-concepts will significantly predict relational aggression at age 15. We also predict that this association will be mediated by victimization. Rosenberg et al. (1989) suggested that individuals with positive self-evaluations would not be aggressive. Thus, we predict a negative association between domain specific self-concepts and relational aggression at age 15, such that self-concepts will predict decreases in relational aggression over time. For both models, age, gender, physical aggression, and physical victimization are statistically controlled. Gender will also be examined as a moderator in these pathways. Given the current state of the literature, there are no a priori predictions about how gender will moderate the reverse associations.

Method

Participants

Data used in this study comes from the 1991–2007 National Institute of Child Health and Human Development (NICHD) SECCYD. The original study was conducted to answer questions in relation to childcare experiences and characteristics and developmental outcomes for children. Recruitment was from hospitals in ten urban and suburban areas throughout the United States and began in January 1991 and continued through to November 1991 (NICHD ECCRN 2004). A total of 8,986 mothers were originally screened in the hospital at birth of their children (NICHD ECCRN 2004). Of all the mothers that were screened, 60 %, or a total of 5,416 mothers were eligible and agreed to a follow-up phone call after 2 weeks (NICHD ECCRN 2004). Using a conditionally randomized sample, working mothers and non-working mothers, along with single and two parent households were included (for details see NICHD ECCRN and Duncan 2003; Ostrov and Godleski 2013). After follow up, the sample size was reduced to 3,015 participants. The exclusion criteria used for families was that they were dropped either after 3 follow up attempts were made, but no contact was made if at the time of the follow up call there was an expected move to take place within 3 years or if the infant after birth had remained in the hospital for longer than 7 days. In the end, a sample size of 1,364 women and their infants participated in the study (NICHD ECCRN 2004). At this time, the mothers and their infants completed a 1-month interview. The longitudinal study was conducted in four phases, based on the ages of the children.

In this particular secondary analysis, data from the third and fourth phases will be used. Phase three includes children in 2nd to 6th grade and 15-year-olds make up phase four. Specific focus will be with three time points between 5th grade and age 15. As the study carried on, attrition occurred and was documented. By phase three, in the 5th grade, there were 1063 children still participating in the study. It is important to note that the sample is not nationally representative as a whole due to the fact the researchers did not sample from the nation as a whole, but from those who gave birth in 24 hospitals in 1991 (NICHD ECCRN 2004). Although the sample may not be statistically representative of the whole nation, it is demographically diverse (Dearing et al. 2006).

In phase three of data collection, the data was collected not on the basis of age during this phase; rather, it was collected on the basis of school grade. The average age of the participants was 8 years and 4 months (NICHD EECRN 2004). For the present study, ages 10 and 11 in the fifth grade are the initial time points. It is also important to note that the families that remained in the study at this time were more likely white/Caucasian families and had a higher socioeconomic status (NICHD ECCRN 2004). The data collected in the fourth phase was at age 15, which serves as the outcome assessment in the current study. Comparisons to the original sample noted that those who left the study were boys with lower math scores and mothers who were less educated (Vandell et al. 2010).

The subset of participants within this study are children who have child-report, parent- report and/or teacher-report data on the variables of interest to the present study. The final sample for the present study was 1063 (532 girls) adolescent participants ($M = 11.14$ years; $SD = .59$). The majority of the sample is Caucasian totaling 84 % of the total sample. The remainder includes African American at 9.5 %, American Indian, Eskimo, Aleutian, at 0.1 %, Asian or Pacific Islander at 1.2 % and Other/unknown ethnicities making up 5.2 %.

Measures

Relational Aggression

Teachers reported relational aggression in fifth grade, using the measure from SECCYD referred to as "Child Behaviors with Peers". The measure was designed to measure a child's social behaviors. The measure was derived from the Children's Social Behavior Scale—Teacher Report (Crick 1997; Crick et al. 1996). In this scale, six items were included for relational aggression out of the 43 items in the questionnaire. These items included such questions as "ignoring another child when s/he is mad at him or her" or "telling friends that s/he will not like them if they don't do what s/he says." Teachers rated these items on a 3-point scale (0 = Not True, 1 = Sometimes True, and 2 = Often True), which was modified from the original 5-point scale (Crick 1997). Items were averaged to create scores for relational aggression. The relational aggression scale specifically in the past has demonstrated a Cronbach's α of .89 (Crick et al. 1996; Ostrov and Godleski 2013). Items for the present study demonstrated acceptable reliability (α = .86). Relational aggression was self-reported at age 15 using a scale adapted from Crick and Grotpeter (1995) and Dodge and Coie (1987). In this scale six items were included for relational aggression. The items included questions such as "I'm the kind of person who ignores others or stops talking to them." Youth reported on a 4-point scale (1 = not at all true; 4 completely true). Items for the present study demonstrated acceptable reliability (Cronbach's α = .76).

Physical Aggression

This study controls for physical aggression. It is important to control for physical aggression as it has been found in previous research that there is a moderate association between relational and physical aggression (e.g., Crick and Grotpeter 1995; Crick et al. 2007; Ostrov et al. 2011). During the fifth grade, teachers reported on children's physically aggressive behavior with the Aggressive Behavior Subscale of the Teacher Report Form (TRF; Achenbach 1991). This measure of aggression is a commonly used assessment of social competency and behavioral issues of children ages 4–18 years of age. The measure consists of 118 items rated on a 3-point scale (e.g. from 0 being not true to 2 being very true for that child). Five items of the 118 items were selected as they reflected physical aggression (see NICHD ECCRN 2004 for review). These items include: (a) destroys own things, (b) destroys others' things, (c) gets in many fights, (d) cruel, bully, mean to others, and (e) physically attacks people. Items were averaged and showed good reliability (α = .77).

Relational/Physical Victimization

Peer victimization measures for sixth grade were reported by parent report, specifically mothers. A common method to collect victimization data is through self-reports, however, there is utility in using multiple methods and informants such as parents or teachers (Cullerton-Sen and Crick 2005). Different informants are privy to different information and accounts for some of the variance in the predictions (Cullerton-Sen and Crick 2005). Self-reports or teacher-reports were not available for this time point and as noted in Ostrov and Godleski (2013) parents may have more insight into their child's experiences of peer victimization than teachers during this developmental period. Parent -reports of relational victimization have been found to be moderately correlated with self-reports and peer-reports of relational victimization (Cole et al. 2010). Parent-reports of peer victimization in the past have been found to be a reliable and valid measure of peer victimization, over longer time intervals (Ladd and Kochenderfer-Ladd 2002; Ostrov and Godleski 2013). Furthermore, in the present study, time of collection of data is prior to adolescence and parents may still be more likely to be involved with the children's social interactions and experiences. The "My Child's Behavior with Other Children (Mother) Relationships with Peers and Afterschool Caregivers" (adapted from and cited in Crick et al. 1996; Kochenderfer and Ladd 1996a, b; Ladd and Profilet 1996) was used in the current study. In this scale, three items from a 43-item scale were included measuring relational victimization. Two items from the 43-item scale were included measuring physical victimization. The possible score range from 0 to 2 (from "not true" to "often true"), with the higher scores indicating a higher tendency of being victimized by peers. Items for relational victimization included "is picked on by other children" and "peers say negative things about him/her to other children." Items for physical victimization included "is hit or kicked by others." It is important to control for physical victimization as it has been found in previous research that there is a moderate association between relational and physical victimization (Ostrov and Godleski 2013; Putallaz et al. 2007). Items were averaged.

In a previous study, reliability was acceptable for parent-reported relational victimization (Cronbach's $\alpha = .76$; Ostrov and Godleski 2013). In the present study, items showed acceptable reliability for both relational victimization ($\alpha = .79$) and physical victimization ($\alpha = .66$), although the physical victimization variable was under the typical .70 threshold and warrants some caution.

Self Concept: Academics

The same scale of self-concept was used to measure self-concept in the academic domain for children in 6th grade and at age 15. The NICHD study used the "How I Do In School" scale, which was adapted from Cook et al. (1996) work as well as Eccles and Midgley (1989). Specifically, "How I Do in School" is a 19-item instrument, using 15 items from Eccles and Midgley (1989) and three items from Cook et al. (1996). The 15 items from Eccles and Midgley (1989) are about the child's belief of their abilities in math, English and sports. Each question was rated on a 7-point scale (1 = not at all good, 4 = ok, 7 = very good). Each domain of academics (including English and math) were separated out from the measure and averaged together. Items on the math scale included "How good are you at math?" and "How good would you be at learning something new in math?". The English items included items such as "How good are you at reading" and "How good would you be at learning something new in English class?". Out of the 19 items in the measure, 8 items in total addressed academic self-concept. Items demonstrated acceptable reliability at both the sixth grade (α's = .76) as well as at age 15 (α's = .74). We use domain specific self-concept on a continuous scale with lower and higher scores, but there is no cut-off for the purposes of this study.

Self Concept: Sports

The same scale of self-concept was used to measure self-concept in the sports domain for children in 6th grade and at age 15. As with the scales for academic self-concept the NICHD SECCYD used the "How I Do In School" scale (Cook et al. 1996; Eccles and Midgley 1989). Each question was rated on a 7-point scale (1 = not at all good, 4 = ok, 7 = very good). There were six items on the sports scale and included "How good are you at sports?". Items were averaged and demonstrated acceptable reliability at both the sixth grade ($\alpha = .87$) and at age 15 ($\alpha = .92$).

Self Concept: Physical Appearance

Child reports of self-concept for physical appearance were derived from the NICHD scale "My Eating Habits" and "The Way I Feel". These measures were adapted from the Self Perceptions Profile for Adolescents (Harter 1988). This child self-report questionnaire consisted of 27 items regarding children's body satisfaction with appearance and weight, along with questions regarding eating habits. Out of the 27 items, 6 items addressed physical appearance (e.g., "how happy are you about the way you look" and "how happy are you about how good looking you are"). The response scale was on a 4-point likert scale (1 = very unhappy, 2 = somewhat unhappy, 3 = somewhat happy, 4 = very happy). In this study child reports of self-concept for physical appearance at age 15 were derived from the NICHD scale Physical Appearance Profile. This measure was also adapted from the Self Perceptions Profile for Adolescents (Harter 1988). Six items for physical appearance were averaged. Items show good reliability at sixth grade ($\alpha = .91$) and at age 15 ($\alpha = .91$).

Results

Data Cleaning

Data went through several phases of cleaning before data analysis was complete as per the guidelines by Kline (2010). For all key study variables less than 10 % of the data was missing, and given this low level of missing data, maximum likelihood estimation procedures were used allowing for all participants who were retained in the SECCYD to Phase 3 but had missing data on the key study variables to be included within the models. Descriptive statistics indicated that measures of skew and kurtosis were within acceptable range (Kline 2010). Skew ranged from −1.12 to 2.70. Kurtosis ranged from 0.84 to 6.58 suggesting that non-normality of the data was not a concern (Kline 2010).

Preliminary Analyses

The descriptive statistics and ranges from all variables included within the current study can be found in Table 1. The correlations between the constructs ranged from low to moderate (r's ranging from .00 to .57). Physical aggression in the fifth grade was associated with male gender and relational aggression in the fifth grade was associated with female gender. Relational aggression and victimization were significantly positively correlated. Domain specific self-concept demonstrated stability from the sixth grade to age 15.

Hypothesized Models

Cross-lagged path analyses were conducted using maximum likelihood estimation in Mplus 5.21 (Muthen and Muthen 1998). Covariances among exogenous variables

Table 1 Descriptive statistics and correlations

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1. PAGG G5	X												
2. RAGG G5	.53***	X											
3. RAGG 15	.06	.10**	X										
4. PVICT G6	.14***	.12**	.05	X									
5. RVICT G6	.10**	.11**	.10**	.57***	X								
6. SCAC G6	−.05	−.02	−.15***	−.03	−.07*	X							
7. SCSP G6	.09**	.09*	−.09**	−.11***	−.12***	.12***	X						
8. SCPA G6	.06	.02	−.15***	−.07*	−.12***	.14***	.16***	X					
9. SCAC 15	−.03	−.06	−.11***	−.01	−.12	.40***	−.01	.07*	X				
10. SCSP 15	.11**	.09**	−.09**	−.06	−.07*	.05	.54***	.11***	.14***	X			
11. SCPA 15	.14***	.04	−.14***	−.04	−.07*	.07*	.15***	.41***	.11**	.23***	X		
12. Gender	−.13***	.11**	.04	−.09**	.02	.09**	−.09**	−.09**	.08*	−.17***	−.15***	X	
13. Age	−.03	−.02	−.03	−.07	−.03	.01	.05	−.05	.01	−.01	−.02	.00	X
M	.08	.34	1.34	.13	.28	5.75	5.90	3.43	5.34	5.43	3.17	.50	11.14
SD	.20	.42	.36	.33	.42	.82	1.17	.62	.88	1.50	.68	.49	.59
Range	0.00–0.65	0.00–1.38	1.00–2.37	0.00–1.42	0.00–1.33	0.00–7.00	2.30–7.00	1.60–4.00	1.10–7.00	1.00–7.00	1.20–4.00	0.00–1.00	10.35–12.35

PAGG physical aggression, *RAGG* relational aggression, *PVICT* physical victimization, *RVICT* relational victimization, *SCAC* academic self-concept, *SCSP* sports self-concept, *SCPA* physical appearance self-concept, *G5* fifth grade, *G6* sixth grade, *15* age 15, *Gender* males coded 0 and females coded 1

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

and among endogenous variables were freely estimated. The standardized root mean square residual (SRMR), and comparative-fit index (CFI) were used to evaluate model fit as they provide an appropriate balance between type I and II error (Hu and Bentler 1999; Tabachnick and Fidell 2007). SRMR below 0.08 and CFI above .95 were considered indicators of good model fit (Hu and Benter 1999; Kline 2010). The root mean square error of approximation (RMSEA) value was also reported in keeping with standard practice and values below .06 were considered indicators of acceptable fit (Hu and Bentler 1999).

For the first hypothesized model, all three-domain specific self-concept variables (academic, sports, and physical appearance) at age 15 were regressed onto the mediator (relational victimization in the sixth grade) as well as relational aggression in the fifth grade. This model included the reverse direction of effect where relational aggression at age 15 was also regressed onto the mediator and the three domain specific self-concept variables in the sixth grade. The four theorized covariates (physical aggression in the fifth grade, physical victimization in the sixth grade, age, and gender) were also included in the model. For this model, the goodness of fit indices were good (SRMR = .01; CFI = .99; RMSEA = .04; χ^2 (6) = 13.89, $p < .05$; Hu and Bentler 1999).

Relational aggression in the fifth grade was significantly negatively associated with academic self-concept at age 15. Relational aggression in the fifth grade was also a significant positive predictor of sports self-concept at age 15. Relational aggression in the fifth grade was not significantly associated with physical appearance self-concept at age 15. Both academic self-concept and physical appearance self-concept in the sixth grade showed a significant negative association with relational aggression at age 15 (see Fig. 1).

Five thousand bootstrap samples and the 95 % bias-corrected confidence intervals (CI's) were used to test the significance of hypothesized indirect effects (Hayes 2013). The indirect effects were not significant for the indirect path of relational aggression in the fifth grade to academic self-concept at age 15 mediated by relational victimization in the sixth grade ($\beta = .00$, 95 % CI = −.004 to .01). The indirect effects were not significant for the indirect path of relational aggression in the fifth grade to sports self-concept at age 15 mediated by relational victimization in the sixth grade ($\beta = .00$, 95 % CI = −.005 to .004). The indirect effects were not significant for the indirect path of relational aggression in the fifth grade to physical appearance self-concept at age 15 mediated by relational victimization in the sixth grade ($\beta = -.001$, 95 % CI = −.01 to .004). Overall in the adopted model 1.1 % of the variance in academic self-concept at age 15 was accounted for by its predictors. In addition, 5.0 % of the variance in sports self-concept at age 15 in the overall adopted model was accounted for by the predictors. For physical appearance self-concept at age 15, 4.3 % of the variance was accounted for by its predictors. The other direction of effect for academic self-concept in the sixth grade to relational aggression at age 15 via relational victimization was also not significant ($\beta =$ -.003, 95 % CI = −.01 to .003). The path from sports self-concept in the sixth grade to relational aggression at age 15 via relational victimization was also not significant ($\beta = -.003$, 95 % CI = .01 to .003). The other direction of effect for physical appearance self-concept in the sixth grade to relational aggression at age 15 via relational victimization was also not significant ($\beta = -.004$, 95 % CI = −.01 to .002). Overall, in the adopted model 5.5 % of the variance in relational aggression at age 15 was accounted for by its predictors.

Moderation by gender was also examined using multiple group comparisons in Mplus 5.21. We used a cross-lagged multi-group path model to examine prospective associations between relational aggression, relational victimization and domain specific self-concept by gender when controlling for physical aggression, physical victimization, and age. A significant χ^2 difference test between the constrained and free to vary models suggested a model with less constrained parameters fits the data better than the alternative [$\Delta\ \chi^2$ (32) = 643, $p < .001$]. For the adopted model, the goodness of fit indices were good (SRMR = .01; CFI = .99; RMSEA = .04; χ^2 (12) = 22.01, $p < .05$; Hu and Bentler 1999).

For boys, relational aggression in the fifth grade was not a significant predictor of academic self-concept, sports self-concept, and physical appearance self-concept at age 15 (see Fig. 2). Academic self-concept and physical appearance self-concept in the sixth grade was negatively associated with relational aggression at age 15 (see Fig. 2). There were no indirect effects found for males supporting the overall general model findings. For girls, relational aggression in the fifth grade predicted a decrease in academic self-concept at age 15. Such that as girls relational aggression levels increased, girls academic self-concept scores decreased (see Fig. 3). Furthermore, academic self-concept in the sixth grade and physical appearance self-concept in the sixth grade were found to be negatively associated with relational victimization in the sixth grade (see Fig. 3). This finding suggests that for girls during the sixth grade the higher their self-concept is in academics and physical appearance, the less likely they would be to experience relational victimization. Domain specific self-concept for all three domains in the sixth grade for girls were not found to be associated with relational aggression at age 15 (see Fig. 3). Consistent with our overall model, there were no indirect effects found for girls.

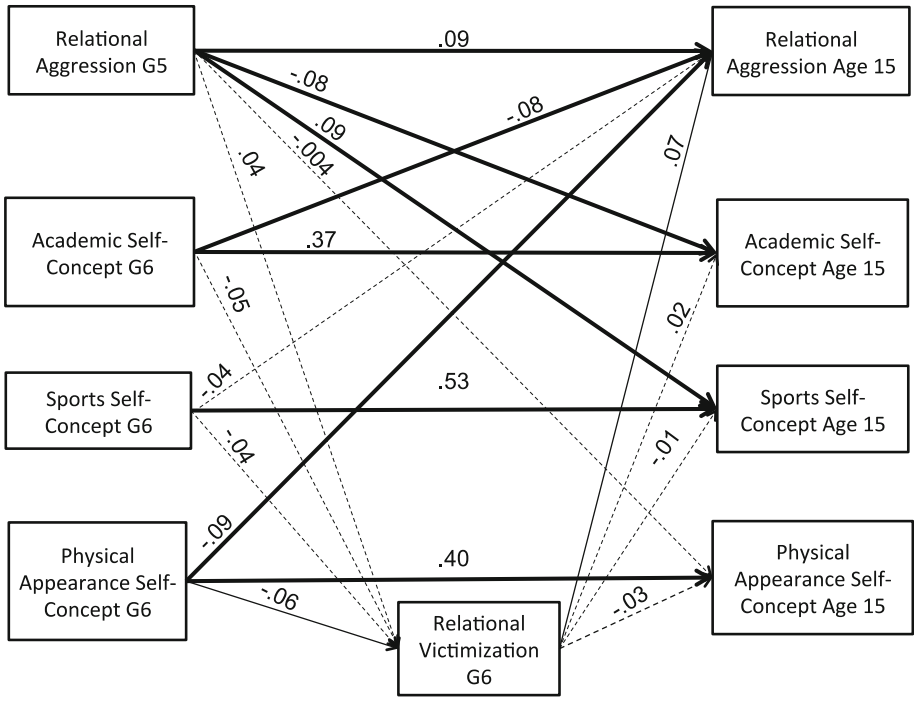

Fig. 1 Overall adopted model testing the direct and indirect paths between relational aggression, relational victimization and domain specific self-concept. *Note* Relational aggression is from teacher-report in the fifth grade and self-report at age 15. Relational victimization is from sixth grade and is from maternal report. Academic self-concept, sports self-concept and physical appearance self-concept are child-reported for both time points. Standardized path coefficients are presented. Physical aggression from fifth grade teacher-report, physical victimization from sixth grade maternal report, age, and gender were added as covariates (see text) and are not presented for ease of communication. Covariances among exogenous variables and among endogenous variables were freely estimated and are not shown for ease of communication. *G* Grade. *Thick lines* are significant ($p < .05$), thin *solid lines* represent trends ($p < .08$) and *dotted lines* are not significant

Discussion

Self-concept plays a role for healthy social development (Harter 2006; Kuzucu et al. 2014). Moreover, self-concept is affected by and affects peer relations (Boivin et al. 2001; Fanti and Henrich 2015; Prinstein et al. 2001). Given what we know about the importance of peer relationships during adolescence coupled with the key developmental task of identity formation (Harter 2006; Fanti and Henrich 2015; Rosenberg et al. 1989), we know that this is an important time to examine how theoretically informed links with peer relation constructs such as relational aggression and victimization are impacted by and impact self-concept. Key questions in the present study relate to the prospective associations between relational aggression, relational victimization, and self-concept. In particular, work that further explores these relations longitudinally during the transition to adolescence, with a focus on specific domains of self-concept was called for (Findlay and Bowker 2009; Kuzucu et al. 2014; Malti 2006; Prinstein et al. 2001) and is the focus of the current study.

The present study examined prospective associations between relational aggression, relational victimization, and domain-specific self-concepts. There were several main hypotheses for the current study. First, we predicted indirect effects, such that the association between relational aggression at the fifth grade and domain-specific self-concepts at age 15 would be mediated by relational victimization in the sixth grade (Boivin et al. 2001; Ostrov 2010; Prinstein et al. 2001, 1997). Second, we predicted the association between domain specific self-concepts in the sixth grade and relational aggression at age 15 would be mediated by relational victimization. We did not find support for either indirect effect. Although we did not find an indirect association, we did find meaningful bidirectional associations between relational aggression and domain-specific self-concepts.

In our overall conservative model, controlling for physical aggression, physical victimization, gender, and age, we found that relational aggression in the fifth grade was negatively associated with academic self-concept and positively associated with sports self-concept. The first findings support some previous concurrent findings by Taylor et al. (2007) who found that aggressive behavior was negatively associated with academic self-concept. Furthermore, relational aggression has been found to be

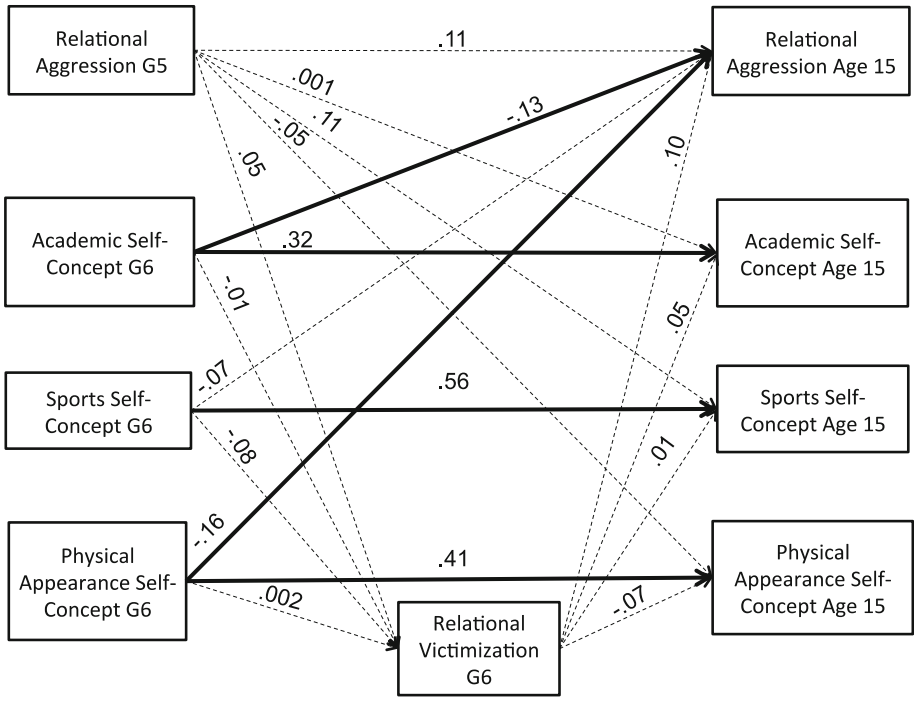

Fig. 2 Adopted model testing the direct and indirect paths between relational aggression, relational victimization and domain specific self-concept for boys. *Note* Relational aggression is from teacher-report in the fifth grade and self-report at age 15. Relational victimization is from sixth grade and is from maternal report. Academic self-concept, sports self-concept and physical appearance self-concept are child-reported for both time points. Standardized path coefficients are presented. Physical aggression from fifth grade teacher-report, physical victimization from sixth grade maternal report, age, and gender were added as covariates (see text) and are not presented for ease of communication. Covariances among exogenous variables and among endogenous variables were freely estimated and are not shown for ease of communication. *G* Grade. *Thick lines* are significant ($p < .05$), *thin solid lines* represent trends ($p < .08$) and *dotted lines* are not significant

associated with perceived popularity (i.e., a socially central individual regarded as being influential among their peers, but not necessarily well-liked; Cillessen and Rose 2005; Sandstrom and Cillessen 2010). Importantly, it may not be perceived as "cool" to be associated with and excel in academics, and thus this domain is perhaps devalued during adolescence (Schwartz et al. 2006). These youth may also be investing much more time in social activities and attempting to achieve or maintain social status. Furthermore, previous research with the NICHD SECCYD and the same time points as the present study has found that relational aggression during middle childhood is associated with delinquency in adolescence (Kamper and Ostrov 2013). These findings support the idea that individuals who use higher levels of relational aggression may be more delinquent and thus their academic self-concept may be lower due to actual poor performance or lack of time spent focusing on academics, which are important hypotheses for future research to test.

The second documented direct association between relational aggression and sports self-concept was somewhat surprising. However, this finding may also be considered consistent with the aforementioned notion that individuals who are engaging in higher levels of relational aggression may be the perceived popular adolescents (Cillessen and Rose 2005). Sports may be considered a "cool" domain and thus adolescents may be more willing and likely to judge themselves positively. This could potentially be true for many popular boys who could be categorized as the stereotypical "jocks" in high school (Rodkin et al. 2000). The first two findings taken together suggest that the use of relational aggression may have an impact on different domains of self-concept during adolescence. The present pattern of findings are also consistent with the notion of the "double-edge sword" interpretation of relational aggression use (Banny et al. 2011; Sandstrom and Cillessen 2010). That is, using relational aggression may have some positive consequences, such as gaining peer status, but it may also be leading to more problematic outcomes such as delinquency and possibly academic problems.

Direct effects between domain specific self-concepts and future relational aggression were found such that academic self-concept in the sixth grade and physical appearance self-concept predicted decreases in relational aggression at age 15. These findings are consistent with previous research suggesting that a lower self-concept may

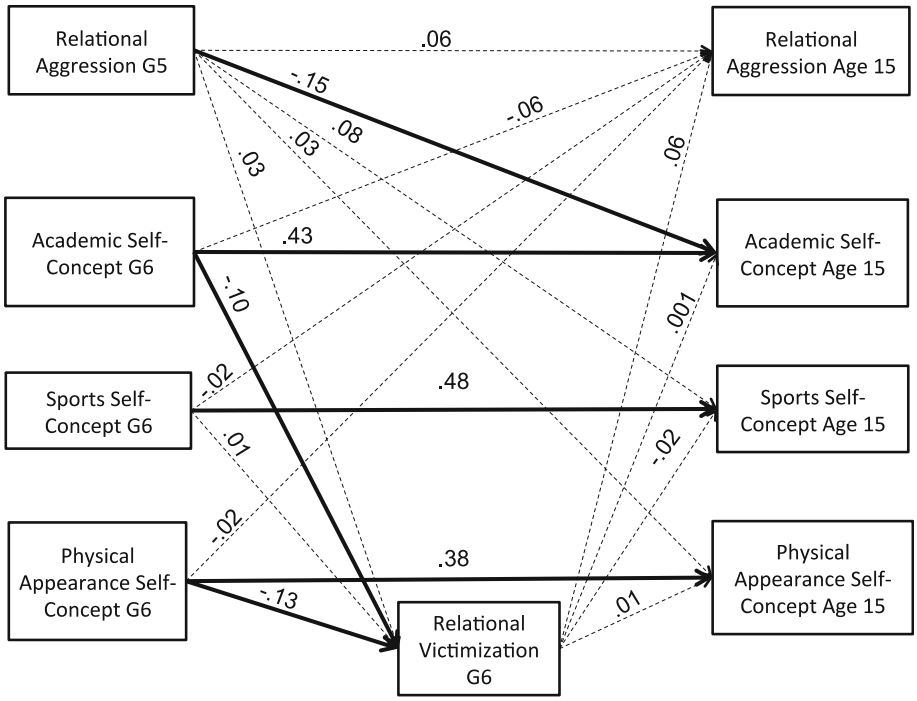

Fig. 3 Adopted model testing the direct and indirect paths between relational aggression, relational victimization and domain specific self-concept for girls. *Note* Relational aggression is from teacher-report in the fifth grade and self-report at age 15. Relational victimization is from sixth grade and is from maternal report. Academic self-concept, sports self-concept and physical appearance self-concept are child-reported for both time points. Standardized path coefficients are presented. Physical aggression from fifth grade teacher-report, physical victimization from sixth grade maternal report, age, and gender were added as covariates (see text) and are not presented for ease of communication. Covariances among exogenous variables and among endogenous variables were freely estimated and are not shown for ease of communication. *G* Grade. *Thick lines* are significant ($p < .05$), *thin solid lines* represent trends ($p < .08$) and *dotted lines* are not significant

lead to higher use of aggression as an attempt to increase one's self-worth (Fanti and Henrich 2015; Rosenberg et al. 1989). These attempts to increase their self-worth may not always lead to the anticipated positive outcomes. In regards to physical appearance self-concept, it may be that individuals who do not feel good about their physical attractiveness may attempt to use relational aggression as a way to gain status. However, it may be that individuals who report a higher sense of academic competence are not socially central and do not have the social capital or desire to engage in relationally aggressive behavior with their peers. Alternatively, perhaps those adolescents who do judge themselves as doing well in either domain may be well adjusted and have positive peer relations, which protect them from engaging in relationally aggressive behavior during the transition to adolescence.

Gender was a significant moderator of our effects, and thus the previously discussed results are qualified and require further interpretation. For boys, there was not a significant association between relational aggression in the fifth grade and academic self-concept at age 15. Consistent with the overall findings, both academic self-concept and physical appearance self-concept were significantly negatively associated with relational aggression at age 15 for boys. Girl's patterns of results differed from boys in a few ways. Consistent with overall results, unlike boys, girls were found to have a significant negative association with relational aggression and academic self-concept. Thus, the overall finding that relational aggression in the fifth grade predicted a decrease in academic self-concept over time appears to be present only for girls. This finding is consistent with the notion that relational aggression is the modal form of aggression for girls and may be a more salient behavior for girls during adolescence. As we suggested with the overall effects, girls who may be perceived as popular typically use high levels of relational aggression (Borch et al. 2011; Cillessen and Rose 2005) and these girls may in turn have a reduction in academic self-concept during the transition to adolescence. As mentioned above, it could be that relationally aggressive girls do not value academics and do not want to be associated with academics. We know from prior research that adolescents exposed to high levels of relational aggression perceive their school as less safe (Goldstein et al. 2008), which might impact their academic standing and school engagement. In addition, prior literature has shown that aggressive

adolescents who demonstrate an increase in popularity have decreases in school attendance and grade point average (Schwartz et al. 2006). Theoretically, academic goals may be negatively evaluated in peer groups that value antisocial and delinquent behavior (see Schwartz et al. 2006). It could also be that devoting so much time and resources to either increasing and maintaining status takes away time from studying and thus lead to poor grades and subsequently low judgments of their abilities in academics. Furthermore, these girls may be engaging in more delinquent behavior and may not be doing well in school as they might be highly disengaged from their school. This speculation certainly requires replication and greater focus in future research.

Although domain specific self-concepts did not significantly predict relational aggression at age 15 for girls, two domains were negatively associated with relational victimization. This supports previous findings that lower self-concept may lead to increased risk for experiencing relational victimization (Caldwell et al. 2004). Those who do not judge themselves to be attractive could be engaging in behaviors that lead to further victimization (e.g., disengagement and isolation; Caldwell et al. 2004). However, girls who are more confident in their appearance may not be as easily targeted by their peers. Overall, these findings suggest support for the importance of domain-specific self-concept examination. A focus on multiple domains could help to identify individual profiles or specific areas adolescents believe are problematic, which provides potential intervention points for clinicians.

Our study did have many strengths including use of one of the longest known longitudinal studies on relational aggression within the extant literature and provides novel contributions to the developmental literature, it also has several additional limitations. The first being that for the present study we could not test actual peer nomination status, perceived popularity, or actual academic performance and thus we hope future work will test these hypotheses. Furthermore, not finding indirect effects may be due to the variables and reporters that were selected for the present secondary analysis. It is possible that the methodological limitations associated with our victimization measures in the current dataset limit the ability to test the hypothesized indirect pathway. Mothers may not be the best reporters of relational victimization (Ostrov and Godleski 2013) and unfortunately peer informants were not available in the NICHD SECCYD. Although teacher-reports were available for this construct, given concerns with shared method variance, mother-report was selected for victimization assessments as teachers were already reporting on aggression. Future work should test the social process model with different assessment techniques. Further studies may also want to examine multiple reporters of victimization including self-report, parent- or teacher-report and peer perceptions of victimization. Third, the sample, although taken from across the USA, still consisted of mostly Caucasian participants and was not nationally representative. This may make the findings less generalizable to other populations and future research should be conducted with a more diverse sample. Another limitation is the length of time between assessments. Potential studies might increase assessments between fifth grade and the outcome data at age 15 in order to better approximate the dynamic fluctuations for both aggressive behavior and self-concept. Future research could do yearly assessment of all key variables to examine associations concurrently and longitudinally. This study also focused on a time period where self-evaluations may be showing more stability over time (Harter 2006); therefore, future studies should test this model earlier in development and examine differences across different developmental periods. Future researchers may also want to examine children and adolescents aggressive behavior and subsequent interpretation and internalization of how others view their aggressive behaviors and how this may impact their self-concept directly without first experiencing victimization. Finally, future research that examines not only forms, but functions of aggressive behavior may help to better understand relational aggression.

Overall, there are a few important implications to this study regarding associations between relational aggression, relational victimization and domain specific self-concepts. Future research should consider using a multidimensional approach to better understand the complex nature of self-judgments. Additionally, although previous researchers such as Card et al. (2008) have suggested that rates of relational aggression may not differ between genders, our findings may suggest that although rates may not differ, the use and experience of relational aggression may be more salient for girls during this developmental period. Thus, gender will continue to be an important factor when considering outcomes of relational aggression use, experiences of relational victimization and how one judges their abilities and competence (Kling et al. 1999; Malti 2006; Ostrov and Houston 2008; Werner and Crick 1999).

Conclusion

The present study is the first to test prospective bidirectional associations among relational aggression, victimization, and self-concept during the transition to adolescence and we document direct paths that have implications for clinical intervention. Understanding how self-concept develops and theoretically informed links with peer relations constructs may enhance intervention efforts

during adolescence. In the present study, if we did not examine domains, we would not have been able to determine the more nuanced associations between relational aggression, relational victimization, and particular self-concept domains. In conclusion, future researchers should continue to strive to understand the relation between relational aggression and self-concept to assist in building more effective and more tailored interventions for adolescents.

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Author contributions SB conceived of the study, participated in its design, performed the statistical analyses and drafted the manuscript; JO participated in the design of the study, assisted with statistical analysis and interpretation, and helped to draft the manuscript. All authors read and approved the final manuscript.

Conflicts of interest The authors report no conflicts of interest.

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