The Association between Valuing Popularity and Relational Aggression: The Moderating Effects of Actual Popularity and Physiological Reactivity to Exclusion

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Abstract

The association between having a reputation for valuing popularity and relational aggression was assessed in a sample of 126 female children and adolescents ($M_{age} = 12.43$) at a 54-day residential summer camp for girls. Having a reputation for valuing popularity was positively related to relational aggression. This association was moderated by both popularity and physiological reactivity to social exclusion (i.e., respiratory sinus arrhythmia reactivity [RSAR] and heart rate reactivity [HRR]). Popular girls with a reputation for valuing popularity were at greater risk for engagement in relational aggression when they also exhibited blunted reactivity to social exclusion. Conversely, girls who had a reputation for valuing popularity, but were not popular (i.e., the wannabes, Adler & Adler 1998), were at risk for engaging in relational aggression when they exhibited heightened reactivity to exclusion.

Key words: valuing popularity; popularity; physiological reactivity; relational aggression
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There is a growing body of literature investigating the association between relational aggression and social and psychological adjustment throughout childhood and adolescence. This work has provided important insight into the complex factors underlying social behavior during these developmental periods. Relational aggression involves the use of behaviors that intentionally harm others’ interpersonal relationships (e.g., spreading negative gossip, purposeful exclusion; Crick & Grotpeter, 1996). Extant research investigating the psychological correlates of relational aggression indicates that these behaviors are associated with a range of maladjustment indices such as loneliness, isolation, peer rejection (Crick & Grotpeter, 1995), and internalizing symptoms (Murray-Close, Ostrov, & Crick, 2007). However, relational aggression appears to confer some benefits, including popularity in the peer group (LaFontana & Cillessen, 2002; Rose, Swenson, & Waller, 2004), suggesting that these behaviors may be used to achieve social status (Hawley et al., 2008). Moreover, although the focus on popularity during the transition to adolescence is commonplace (LaFontana & Cillessen, 2010), ethnographic reports of social interactions during late elementary school indicate that there is variability in the extent to which individuals appear to value popularity (Adler & Adler, 1998). Adler and Adler (1998) posit that this variability may differentially inform behavior in peer relationships and recent work indicates that the extent to which adolescents prioritize popularity is positively associated with relational aggression (Cillessen, deBruyn, & LaFontana, 2009).

As such, an important topic for empirical study is the possible association between the reputations that individuals have for valuing popularity and relationally aggressive behavior. To address this question, the central purpose of the present study was to examine the association
between having a reputation for valuing popularity and relational aggression among a sample of (pre)adolescent girls. In addition, we examined two potential moderators of this association: popularity and physiological reactivity to social exclusion. Adler and Adler (1998) suggest that although all adolescents who appear to value popularity may be at increased risk for engaging in aggression, popularity may influence the nature of these aggressive behaviors. For example, those who are viewed as popular by their peers appear to engage in strategic aggression to maintain their status within the group, whereas unpopular individuals who have a reputation for striving for popularity seem to use aggression in desperate attempts to impress popular peers (Adler & Adler, 1998). Moreover, social exclusion may be a particularly relevant stressor for those with reputations for valuing popularity and recent work indicates that variation in physiological reactivity to social exclusion is associated with relational aggression (see Sijtsema, Shoulberg, & Murray-Close, in press, for previous analyses of the current data set). Thus, the current study explored if physiological reactivity to social exclusion further moderated the association between having a reputation for valuing popularity and relational aggression.

Social Status and Relational Aggression

Social status has been widely examined as a correlate of behavior in peer relationships during childhood and adolescence. Over the past decade, developmental researchers have begun to differentiate between two distinct dimensions of social status (Cillessen & Rose, 2005). Sociometric popularity has traditionally been used as a measure of preference or likeability. Conversely, perceived popularity reflects a consensus among the peer group regarding who is deemed cool and socially central (Cillessen & Rose, 2005; Lease, Kennedy, & Axelrod, 2002). Following the suggestions of Cillessen and Marks (in press), the current study will use the term preference to describe sociometric popularity and popularity to describe perceived popularity to
provide semantic differentiation between these distinct measures of social status. Although many studies report that popularity and preference are strongly related (e.g., .74, Sandstrom & Cillessen, 2006), research suggests that they are distinct constructs conferring unique meaning on adolescent adjustment. For example, a growing body of research reveals that popularity is positively associated with relational aggression (e.g., Cillessen & Mayeux, 2004). However, high social status is not uniformly associated with relational aggression (Heilbron & Prinstein, 2008); in fact, preference is negatively associated with relational aggression for adolescent girls (LaFontana & Cillessen, 2002).

Having a Reputation for Valuing Popularity

Although previous research has provided significant insight regarding the associations between peer status and aggression, it is not clear how reputations for popularity motivations are associated with relational aggression. During late elementary and middle school years, conversations about who is cool or who is not popular are pervasive (Adler & Adler, 1998). Being friends with popular individuals is associated with increased popularity during adolescence (Dijkstra et al., 2010) and early adolescents tend to place more value on being a part of the popular crowd as compared with pre- or late-adolescents (Gavin & Furman, 1989). In addition, LaFontana and Cillessen (2010) reported that when participants were faced with scenarios in which they could choose to prioritize popularity over another domain (e.g., friendship, achievement, prosocial behavior), increases in the frequency that popularity was prioritized began during early adolescence.

However, not all adolescents appear to value popularity. In their eight-year ethnographic study of peer relationships during preadolescence, Adler and Adler (1998) suggest that individuals who appear to desire popularity seem to both befriend and demean others in an attempt to gain
favor with other popular peers while trying to establish and maintain power within their social networks. Conversely, socially connected individuals who do not appear to desire inclusion in the popular crowd seem well-adjusted, accepting of others, and enjoy relatively positive peer relationships (Adler & Adler, 1998). These findings suggest that adolescents who are focused on achieving popularity in the peer group may use aggression to achieve their social status goals. Although limited quantitative research has explored this possibility, preliminary research indicates that self-reports of the extent to which individuals prioritize popularity and adolescents’ endorsement of popularity goals are positively linked to relational aggression (Cillessen, deBruyn, & LaFontana, 2009; Ryan & Shim, 2008).

However, to our knowledge, no research has examined the associations between peer-reported reputations for valuing popularity and relational aggression. Although self-reports provide one valuable perspective on the motivations underlying relational aggression, they may be particularly biased as a result of efforts to preserve a positive self-image (see Xie et al., 2005). These self-preservation efforts may be particularly relevant in regard to popularity goals given Adler and Adler’s (1998) observations that individuals whose popularity strivings were obvious appeared more vulnerable to ridicule from their peers. Moreover, Adler and Adler (1998) indicate that preadolescents’ perceptions of their peers’ popularity strivings influence their social interactions. Specifically, they observed that individuals denigrated those who appeared to work too hard to gain popularity within their peer group, especially if those individuals were unpopular. These findings suggest that reputations for valuing popularity may influence adolescents’ social behavior with peers. They also highlight the possibility that relational aggression may only be used to gain control and status in the peer group among adolescents whose goals are transparent to others. In fact, recent research has highlighted the use of a number of strategies for attaining social
status, including prosocial and coercive (e.g., aggressive) behaviors (Hawley et al., 2008). These findings indicate that some adolescents effectively employ positive social behaviors to achieve social status goals. However, adolescents whose social strivings are obvious, overt, and transparent may be particularly likely to employ any method necessary to gain status in the peer group, including negative behaviors such as relational aggression.

Moreover, previous work did not account for the overlap between popularity and preference constructs. Importantly, most investigations examining the correlates of popularity statistically control for preference (e.g., Sandstrom & Cillessen, 2006) to examine the unique association between popularity and relational aggression. However, extant research examining the association between popularity goals and relational aggression has not controlled for preference goals (Cillessen, deBruyn, & LaFontana, 2009) or has focused on social status goals that include both popularity (e.g., “It is important to me that other kids think I am popular”) and preference (e.g., “My goal is to show other kids how much everyone likes me”) strivings (Ryan & Shim, 2008). Thus, in the current study, having a reputation for valuing preference will be controlled in all analyses examining the association between having a reputation for valuing popularity and relational aggression.

*The Wannabes*

Although having a reputation for valuing popularity may be an important factor underlying the use of relational aggression, this association may depend on actual social status in the peer group. In fact, Adler and Adler (1998) highlighted a group of individuals who appeared to highly value being popular, but were viewed by their peers as unpopular. These *wannabes* seemed hyper-focused on achieving status in their social worlds. In their attempts to achieve popularity, wannabes emulated popular peers to extreme levels and were often ridiculed by their peers.
because of their transparent motivations (Adler & Adler, 1998). Wannabes did not experience close and meaningful friendships, were frequent targets of popular students’ aggressive behaviors, and appeared to use aggression as a means to impress the popular crowd (Adler & Adler, 1998). Consistent with this description, Dijkstra et al. (2010) recently reported that female wannabes (i.e., individuals whose friendships nominations of popular students were not reciprocated) were less popular and less liked when compared to individuals who enjoyed mutual friendships with popular individuals.

Although Adler and Alder (1998) suggest that both popular individuals and wannabes engage in aggressive behaviors as a means to gain status within the peer group, they highlight differences in the psychological contexts that appear to promote the use of relational aggression for popular individuals and wannabes. Specifically, popular individuals appear to strategically aggress against others to maintain their status, whereas wannabes seem to use aggression in desperate attempts to improve their status with popular peers. Given the distinct psychological contexts that may underlie the use of aggression by popular individuals and wannabes, the current study further examined the extent to which popularity moderated the association between reputations for valuing popularity and relational aggression.

*Physiological Reactivity and Relational Aggression*

In recent years, the biosocial framework has yielded significant insight into factors underlying risk for antisocial behavior among children and adolescents. A growing body of literature indicates that physiological reactivity to stress is an important precursor of aggressive behaviors (see Raine, 2002; Rappaport & Thomas, 2004). The existing research suggests that two distinct patterns of physiological reactivity may place individuals at risk for being aggressive. On the one hand, fearlessness theory posits that individuals who display blunted “fight or flight”
responses in stressful situations do not experience fear (Raine, 2002). These fearless individuals may be more likely to engage in risky behaviors because they are not concerned about the consequences that deter more fearful individuals from engaging in such conduct (Raine, 2002). In contrast, individuals who exhibit exaggerated “fight or flight” responses to stress may also be at risk for engagement in aggression (Murray-Close & Crick, 2007; Williams et al., 2003).

Specifically, aggressive behaviors appear to be driven by extreme arousal to situational stressors (e.g., Murray-Close & Crick, 2007).

Preliminary work examining the association between physiological reactivity and relational aggression (Murray-Close & Crick, 1997; Sijtsema, et al., in press) indicates that girls’ physiological reactivity to social stressors is associated with the use of relational aggression. These studies focused on physiological reactivity to relational stressors (e.g., social exclusion) given evidence suggesting that relational provocations such as exclusion are especially likely to elicit physiological reactivity among females (Murray-Close & Crick, 2007). In addition, relational aggression has been shown to be related to hostile attributions regarding relational but not instrumental peer provocations (Crick, 1995; Crick et al., 2002), suggesting that relationally aggressive children may be especially reactive to relational stressors.

Findings from preliminary studies examining the association between physiological reactivity to stress and relational aggression have been mixed. Sijtsema and colleagues (in press) reported that blunted “fight or flight” responses to stress predicted heightened involvement in relational aggression. These findings are consistent with fearlessness theory perspective (Raine, 2002), in which individuals who exhibit relatively blunted reactivity to experiences of social exclusion may be less likely to fear possible negative outcomes associated with relational aggression, such as relational conflicts, relational victimization by friends, and dislike by peers.
(e.g., Cillessen et al., 2005; Crick, 1996; Grotz & Crick, 1996). In contrast, Murray-Close and Crick (2007) found that exaggerated “fight or flight” responses to relational stress predicted girls’ relational aggression. These findings are consistent with the idea that adolescents who exhibit heightened reactivity to indicators of low status, such as exclusion by peers, may be especially likely to respond with relationally aggressive conduct.

These mixed findings highlight the possibility that distinct physiological profiles may place adolescents who have a reputation for valuing popularity at risk for relational aggression depending on their level of popularity. In line with both fearlessness theory (Raine, 2002) and recent work examining physiological factors underlying relational regression (Sijtsema et al., in press), we predicted that popular individuals with reputations for valuing popularity would be at increased risk for engaging in relational aggression when they also exhibited a pattern of blunted reactivity to social exclusion. In effect, as popular individuals are less likely to experience the negative outcomes associated with the use of relational aggression (Rose & Swenson, 2009), it is possible that they do not fear negative repercussions for their aggressive behaviors. In addition, highly popular individuals are effective in their use of relational aggression to gain social status, and it is likely that their use of aggression is relatively strategic (Hawley, 1999). This description fits best with hypoarousal theories of aggression, in which underarousal is associated with goal-directed and planful aggression (Van Goozen, 2005).

In contrast, we expected that unpopular individuals with reputations for valuing popularity (i.e., the wannabes) would be at heightened risk for relational aggression when they also exhibited heightened reactivity to exclusion. Wannabes appear to experience a great deal of anxiety as they navigate their social worlds (Adler & Adler, 1998); as a result, these individuals may be especially reactive to experiences such as exclusion. We hypothesized that wannabes would
frequently engage in relational aggression when their apparent desires for popularity were thwarted. This process is most consistent with views of exaggerated “fight or flight” responses to stress, in which emotional and impulsive reactions to (actual or perceived) threat result in aggressive responding (Scarpa & Raine, 1997).

Stressful situations typically affect both parasympathetic nervous system (PNS; “rest and digest” functions) and sympathetic nervous system (SNS; “fight or flight” functions) activity (see El-Sheikh et al., 2009). Specifically, during a stressful experience, individuals typically exhibit SNS activation and PNS withdrawal, reflecting a “fight or flight” response. However, there are individual differences in these physiological stress responses, with some individuals exhibiting exaggerated “fight or flight” responses (i.e., exaggerated SNS activation and/or exaggerated PNS withdrawal) and others exhibiting blunted “fight or flight” responses (i.e., blunted SNS activation and/or blunted PNS withdrawal; Sijtsema et al., in press). To capture these distinct physiological profiles in response to stress, the current study used indices of both branches of the autonomic nervous system to measure reactivity while participants were being excluded from the online ball tossing game Cyberball (Williams et al., 2000). Specifically, we measured respiratory sinus arrhythmia reactivity (RSAR) as an index of PNS functioning and skin conductance level reactivity (SCR) as an indicator of SNS functioning. In addition, heart rate reactivity (HRR) was utilized as a measure of both PNS and SNS functioning (see Sijtsema et al., in press). Blunted reactivity would suggest blunted SNS activation and/or blunted PNS withdrawal following stress. In contrast, heightened reactivity would suggest exaggerated SNS activation and/or exaggerated PNS withdrawal (El-Sheikh et al., 2009). As a result, we expected that having a reputation for valuing popularity would be most strongly associated with relational aggression in the context of blunted SCR and HRR (i.e., lower levels of SCR and HRR) and/or blunted RSA withdrawal (i.e.,
higher levels of RSAR, reflecting a smaller decrease in RSA from baseline to stressor) among individuals who were popular. In contrast, we expected that having a reputation for valuing popularity would be most strongly associated with relational aggression in the context of heightened SCR and HRR and/or exaggerated RSA withdrawal (i.e., lower levels of RSAR, reflecting a greater decrease in RSA from baseline to stressor) among individuals who were relatively unpopular.

**Study Hypotheses**

In sum, we expected that the having a reputation for valuing popularity would be positively associated with relational aggression. We further hypothesized that distinct patterns of physiological reactivity would confer risk for engagement in relational aggression for individuals who had a reputation for valuing popularity depending on their actual popularity. Specifically, we expected that having a reputation for valuing popularity would be most strongly associated with relational aggression among adolescents who were popular and exhibited blunted reactivity to social exclusion. Conversely, we anticipated that having a reputation for valuing popularity would be most strongly associated with relational aggression among adolescents who were rated as not popular by their peer group (i.e., the wannabes) and exhibited heightened reactivity to exclusion. Finally, given evidence that the association between popularity and relational aggression strengthens across adolescence (Cillessen & Mayeux, 2004), exploratory analyses examined age as a potential factor in the association between having a reputation for valuing popularity and relational aggression. These hypotheses were examined with a sample from an all-female, 54-day residential summer camp.

**Method**

*Participants*
One hundred and twenty-six female children and adolescents from a private residential summer camp participated in this study. Participants ranged in age from 9 to 16 years of age ($M = 12.43$, $SD = 1.93$). Campers attended the summer camp for a 54-day session. Within the structure of camp, girls were organized based on the school grade most recently completed. Campers were recruited from seven of the age groups at the camp. Group sizes ranged from 34 to 50 ($M = 40$, $SD = 6.38$). Moreover, within each age group the range of ages were relatively homogenous and reflected variability expected within a school grade ($M_{\text{range}} = 1.20$ years; $SD_{\text{range}} = .28$ years). Throughout the day, campers participated in a majority of their activities with the girls in their entire age group. However, campers lived in the smaller units within the age group (i.e., bunks). Consent rates for the current study were 45%\(^1\). One-hundred percent of consenting campers participated in the study. The majority of participants were European-American (94%), 2% were Latino, 1% were Native American and 3% did not report ethnicity. Informed consent was provided by parents or guardians and assent was provided by participants who were at least 11 years old.

Procedures

Any camper who had completed 3\(^{rd}\) – 9\(^{th}\) grades was invited to participate in the current study. The study had two separate components. First, campers participated in a 30-minute individual interview to measure physiological reactivity to relational stressors. For the second part of this study, participants completed peer nominations assessing perceptions of the value that their peers placed on social status, popularity, and other measures not relevant to the current study. Rosters for peer nominations were based on age group. Thus, participants only nominated peers who were in their same grade.
In addition, adult camp counselors completed measures about participating campers who lived in their bunks. All counselors living in participants’ bunks were invited to complete reports on participating campers. At least one counselor completed reports on each participant. Counselors lived in the bunks with the participants they rated. There was variability in both the number of counselors who lived in a given bunk ($M = 2.34; \text{range } = 2 - 4$), and the number of counselors who chose to complete reports on each camper ($M = 1.51; \text{range } = 1 - 4$). To minimize the likelihood of variability in the reliability of counselor reports, if there were multiple counselors who reported on a participant’s behaviors, one counselor’s report was randomly selected and utilized for analyses. On average, each counselor reported on the behavior of 5.13 campers. Counselors were paid $10 for the time they spent completing questionnaires about participating campers living in their bunks.

Counselor reports and peer nomination data were collected in the last two weeks of the camp season to assure that participants and counselors had sufficient experience with campers to be able to rate them on the study variables. All participants were provided with a small gift (i.e., pencil and stickers) in return for their participation in this study.

**Measures**

*Relational aggression.* To minimize the limitations associated with including only one perspective on aggressive behaviors, we measured relational aggression using multiple methods (peer nominations and counselor reports in the current study; see Murray-Close et al., 2008, Stormshak et al., 1999 for examples of multi-method measurements of aggression). Peer reports of relational aggression were obtained through limited-choice peer nomination procedures. Participants were asked to nominate up to three peers from the list of campers in their age group for each item. Participants were instructed not to nominate themselves. The peer nomination
questions were administered in a group setting. A trained research assistant read each nomination item aloud to groups of participating campers. In addition, trained research assistants circulated throughout the room to answer any questions. Participants were provided with a cover sheet to maintain confidentiality. The number of nominations each camper received from her peers was summed by item and standardized within each age group.

Peer reports of relational aggression were assessed with the five-item peer nomination relational aggression subscale from the Children’s Social Behavior Scale – Peer Report (α = .92 in the current sample, CSBS-P; Crick, 1997). An example item includes: “Who lets their friends know that they will stop liking them unless the friends do what they want them to do?” Counselor reports of relational aggression were assessed using the five-item relational aggression subscale of the Children’s Social Behavior Scale-Teacher Report (Crick, 1996; α = .91 in the current sample). An example item includes “this camper spreads rumors or gossips about some peers”.

The multi-informant relational aggression composite was created by standardizing each peer nomination and counselor report item and computing the mean of all standardized items. As in previous work (Crick, 1996), peer nomination and counselor report subscales were moderately related (r = .43; p < .001) and the internal consistency of the composite measure was satisfactory (α = .92). In addition, confirmatory factor analysis using Mplus version 5.1 (Muthén & Muthén, 1998 - 2007) indicated that a measurement model with peer nomination and counselor report items underlying a composite relational aggression latent variable (with correlated residuals within informant) yielded a good fit with the data (χ²(17) = 20.99, ns; CFI = .99; NNFI = .99; RMSEA = .04, 90% confidence interval: .00 - .09). Moreover, standardized factor loadings were
positive and significant (all $ps < .001$) suggesting that the latent construct accounted for the underlying indicators well.

_Social status variables._ Reputations for valuing social status were obtained through limited-choice peer nomination procedures. Peer nomination procedures were identical to those previously described for relational aggression. Having a reputation for valuing popularity was assessed by asking participants to nominate “three kids who think it is important to be popular” whereas having a reputation for valuing preference was assessed by asking participants to nominate “three kids who think it is important to be liked”. Popularity was assessed by asking participants to nominate “Who is the most popular?” and “Who is the least popular?” Consistent with prior work (e.g., Sandstrom & Cillessen, 2006), popularity scores were computed by subtracting the standardized number of least popular nominations from the standardized number of most popular nominations.

_Reactivity to social exclusion._ To assess physiological reactivity to social exclusion, participants completed a 30-minute individual interview. During this interview, three measures of physiological reactivity were measured: skin conductance reactivity (SCR), heart rate reactivity (HRR), and respiratory sinus arrhythmia reactivity (RSAR). Participants were escorted to an interview room at camp by two female trained research assistants. One research assistant monitored the physiology equipment while the other research assistant administered study tasks to the participant.

Following an overview of the study procedures, participants positioned skin conductance and electrocardiogram leads with guidance from the research assistants. To assess skin conductance, physiological sensors (Biolog UFI 3991) were attached to the palmar surface of the middle phalanges of the second and fourth fingers of the nondominant hand. A gel solution was
placed on the fingers to increase conduction, and skin conductance was measured in microsiemens. Heart rate and interbeat interval were assessed using an electrocardiogram (EKG; Biolog UFI 3991). Each participant placed electrode stickers in a bipolar configuration on opposite sides of her ribcage and a ground lead was placed on the sternum. Cardiac inter-beat intervals (IBI) were measured as time in milliseconds between successive R waves of the electrocardiogram. Heart rate (HR), reflecting beats per minute, was calculated using the following standard formula: HR = (1/IBI) X 60,000 ms. To calculate respiratory sinus arrhythmia (RSA), IBI artifacts due to movement or digitizing error were manually edited in CardioEdit (Brain-Body Center, 2007), and RSA estimates were calculated using CardioBatch in procedures outlined by Porges (1985).

Baseline physiological activity (heart rate, respiratory sinus arrhythmia, and skin conductance) was assessed during a 3-minute period of rest. To assess children’s physiological reactivity to social exclusion, participants played Cyberball, a 3-minute ball-throwing game. This method usually involves deception where participants are told that they are playing an online game with other players and are then excluded (Williams et al., 2000). However, in the current study, we adapted this game so that participants knew that they were not actually playing with other people. Adolescents were told that they were going to play a computer game that involves ball throwing. Participants were told that they were playing against the computer, but that they should imagine that they were playing with their three best friends from camp. Although this procedure likely does not elicit as robust reactions as if the participant actually believed that she was being excluded, preliminary research suggest that participants do react to this game even when they know that there are not actually other players (Zadro et al., 2004). Participants were
then logged onto a provided laptop computer and asked to read the following instructions on the screen:

“In this part of the study, we want to know how people react to playing a computer ball-tossing game. The game is very simple. When the ball is tossed to you, simply click on the name of the player you want to throw it to. Although you are just playing against the computer, we want you to imagine that you are playing with your three best friends from camp. What is important is not your ball tossing performance, but that you picture the entire experience in your mind. Imagine what the others look like. Where are you playing? Is it warm and sunny or cold and rainy? Create in your mind a complete mental picture of what might be going on if you were playing this game in real life.”

In the game, each player is represented by a drawing and a name. In the version of Cyberball used in this study, the names of the other three players were the names of the participant’s three best friends at camp (participants were asked to provide this information when they were logged on). Throughout the game, the ball is thrown between players. When the participant receives the ball, she chooses a player to throw the ball to and clicks on that player’s name. The computer game is programmed to exclude the participant after she receives the ball twice. For the rest of the game, the other three players only throw the ball to each other. Following the game, participants engaged in a number of additional tasks not included in the present study. Participants were then debriefed and provided a small prize to thank them for their participation.

Physiological reactivity to Cyberball was calculated by subtracting the mean levels of skin conductance, RSA, and heart rate respectively, during baseline from mean scores during the Cyberball game. As the “fight or flight” response reflects sympathetic activation and
parasympathetic withdrawal, higher heart rate and skin conductance reactivity scores constitute heightened physiological responses to stress. However, lower RSA reactivity scores (exaggerated decrease in RSA from baseline to stress) constitute heightened parasympathetic reactivity to stress. In contrast, blunted “fight or flight” responses reflect lower heart rate and skin conductance reactivity and higher RSA reactivity scores (i.e., smaller decreases in RSA from baseline to stress).

Missing Data

Seven of the 126 participants did not participate in the individual interview component of this study and are thus missing data for all of the physiological measurements in the current study. Moreover, because of technical difficulties with physiological equipment, a few participants are missing data for one or more of the physiological measures (four missing for RSA and SCL, two missing for HR). Missing data analyses indicated that missing data were not systematically related to any variables in the current study as no mean differences emerged across study variables based on whether or not a participant was missing data on any one of the physiological measures. Thus, to maximize power, any participant with relevant data was included in the following analyses.

Data Analysis Strategy

Hierarchical regression analyses were utilized to test the hypotheses in the current study. Given the conceptual overlap between having a reputation for valuing popularity and having a reputation for valuing preference, all regression analyses were conducted controlling for participants’ reputation for valuing preference. This data analytic approach is common in research examining the differential effects of actual social status variables on behavior and will highlight the unique influence of having a reputation for valuing popularity on relational
aggression in the current study. To this end, having a reputation for valuing preference was entered in the first step of the regression model and having a reputation for valuing popularity and additional factors central to study hypotheses were entered in the second step of the regression model. Two-way interaction terms were entered at step three, and the three-way interaction term was entered in step four of the model. All variables were mean-centered at entry into the model. In addition, follow up analyses to decompose significant interactions examined effects at low (-1SD) and high (+1SD) levels of the moderators following procedures outlined by Aiken and West (1991). Following the framework outlined by Dawson and Richter (2006), significant three-way interactions were plotted using the Dawson and Richter (2006) online template (http://www.jeremydawson.co.uk/slopes.htm) and slope difference tests were analyzed as necessary to aid in the interpretation of the three-way interactions.

Results

Preliminary Analyses

Means, standard deviations, and intercorrelations among study variables are presented in Table 1. Correlational analyses were conducted to establish if having a reputation for valuing popularity and having a reputation for valuing preference were distinct constructs. The zero-order correlation between having a reputation for valuing popularity and having a reputation for valuing preference was strong and positive ($r = .66, p < .001$). However, this relation was not of a magnitude that would suggest multicollinearity or singularity and the magnitude of this relation is similar to previous work investigating the association between popularity and preference.

Additional correlation analyses revealed that the association between having a reputation for valuing popularity and popularity was moderate and positive ($r = .45, p < .001$) indicating that these two constructs are distinct and only share 22% of variability. In addition, this finding is
similar in magnitude to the association reported with the same variables in previous work (Shoulberg, McQuade, & Murray-Close, 2010). Moreover, having a reputation for valuing popularity was positively associated with relational aggression ($r = .54, p < .001$), and, as previously reported with this dataset (Sijtsema et al., in press), lower HRR and SCR were associated with increased relational aggression (both $rs = -.23, p < .05$).

**Preliminary Regression Analyses**

As predicted, regression analyses indicated that having a reputation for valuing popularity was positively associated with relational aggression ($\beta = .42, p < .001$) whereas there was no unique effect of having a reputation for valuing preference on relational aggression (see Table 2). Exploratory analyses including age as a factor yielded a significant interaction between having a reputation for valuing popularity and age ($\beta = -.19, p < .05$; Table 2). The association between having a reputation for valuing popularity and relational aggression was positive for both younger ($\beta = .60, p < .001$) and older ($\beta = .24, p < .05$) girls; however, the magnitude of this association was significantly stronger for younger girls. Additional analyses examined if the association between any potential moderators (i.e., popularity, SCR, HRR, and RSAR) and relational aggression varied based on the age of the participants. Popularity was the only moderator conditionally associated with relational aggression based on age ($\beta = -.23, p = .01$; Table 2). Specifically, the association between popularity and relational aggression was positive for younger girls only ($\beta = .30, p < .05$). Moreover, the three-way interaction between having a reputation for valuing popularity, popularity, and age was significant ($\beta = .25, p < .05$). Follow up analyses revealed that regardless of popularity or age, the association between having a reputation for valuing popularity and relational aggression was positive. However, the magnitude
of this association was significantly stronger for younger girls who were not popular (Figure 1). No other two- or three-way interactions including age were significant.

*Moderators of the Association between Importance of Popularity and Relational Aggression*

As some preliminary analyses including age yielded significant effects, a series of hierarchical regression analyses examined if the four-way interactions between having a reputation for valuing, popularity, age, and physiological reactivity to social stress predicted variability in relational aggression. None of the four-way interactions including age were significant. Thus, we controlled for age in the subsequent three-way interaction analyses utilized to test the study hypotheses.

A series of hierarchical regression analyses examined if the three-way interactions between having a reputation for valuing popularity, popularity, and physiological reactivity to social exclusion accounted for a significant increase in the variance explained in relational aggression. In particular, we were interested in examining whether the association between having a reputation for valuing popularity was strongest among adolescents who were popular and exhibited blunted reactivity to social exclusion and among unpopular adolescents (i.e., the wannabes) who exhibited heightened reactivity to social exclusion.

Findings revealed that the three-way interactions including HRR and RSAR were both significant (Table 3). In line with our hypotheses, the association between having a reputation for valuing popularity and relational aggression was significant ($\beta = .86, p < .001$) for girls at low levels of popularity and elevated HRR. The same association was not significant for girls at low levels of popularity who exhibited low levels of HRR to social exclusion ($\beta = .11, ns$; Figure 2). At high levels of popularity, links between having a reputation for valuing and relational aggression were significant at both low ($\beta = .77, p < .001$) and high ($\beta = .29, p < .05$) levels of
HRR. However, the magnitude of this relation was significantly stronger for girls with low HRR to social exclusion ($t = 2.89; p < .01$; Figure 2).

When RSAR was in the model, at low levels of popularity, the association between having a reputation for valuing popularity and relational aggression was significant when girls also exhibited exaggerated RSA withdrawal (i.e., low RSAR, reflecting greater decreases from baseline to stressor) to exclusion ($\beta = .95, p < .001$), but not when girls exhibited blunted RSA withdrawal (i.e., high RSAR, reflecting smaller decreases from baseline to stressor) to exclusion ($\beta = .06, ns$). Conversely, at high levels of popularity, having a reputation for valuing popularity was a significant predictor of relational aggression at both low ($\beta = .37, p < .01$) and high ($\beta = .83, p < .001$) levels of RSAR. However, slope difference tests reveal that this association was significantly stronger among girls who exhibited blunted RSA withdrawal (high RSAR; $t = 2.23; p < .05$; see Figure 3).  

The three-way interaction involving SCR was not significant, indicating that the positive association between having a reputation for valuing popularity and relational aggression did not vary as a function of SCR and popularity (Table 3).

Discussion

There are many psychological costs for engaging in relational aggression (e.g., Murray-Close et al., 2007); however, some research suggests that girls may actually benefit, in the form of popularity, from using relational aggression (e.g., Rose et al., 2004). The central goal of the present study was to investigate whether having a reputation for valuing popularity was a correlate of relational aggression in the hopes of better understanding children’s and adolescents’ motivations for engaging in negative behaviors with their peers. Although there is a dearth of quantitative work examining if having a reputation for valuing popularity is an important factor
underlying relational aggression, ethnographic work suggests that a more comprehensive examination of social status motivations could provide novel insight into children’s and adolescents’ social behaviors (e.g., Adler & Adler, 1998).

Thus, the current study examined if having a reputation for valuing popularity was associated with relational aggression in a sample of female children and adolescents at an all-girls summer camp. As expected, we found that having a reputation for valuing popularity was positively associated with relational aggression. In addition, this association was moderated by popularity and physiological reactivity to social exclusion. Specifically, although findings suggest that having a reputation for valuing popularity was associated with relational aggression for popular girls regardless of their reactivity to social exclusion, this association was strongest among popular girls who exhibited blunted “fight or flight” responses to social exclusion (lower HRR, heightened RSAR). Conversely, wannabes were most likely to engage in relational aggression if they also exhibited exaggerated “fight or flight” responses to social exclusion (heightened HRR; lower RSAR). Although SCR was negatively associated with relational aggression, it is important to note that the three-way interaction between having a reputation for valuing popularity, popularity, and SCR was not significant.

As RSAR is an index of PNS functioning and SCR is an indicator of SNS functioning, these results imply that the association between having a reputation for valuing popularity and relational aggression among popular and unpopular girls may depend on PNS, rather than SNS, reactivity to social stress. As HRR is a measure of both PNS and SNS reactivity, these findings suggest that the interactions involving HRR reflect differences in PNS rather than SNS functioning. RSA activation (higher RSAR) is elicited when social engagement and attention are required, whereas RSA withdrawal (lower RSAR) occurs in preparation for fighting or fleeing.
(Beauchaine et al., 2007). In addition, RSA activity is theorized to underlie emotion regulation functions such as self-soothing, calming, and inhibiting arousal (Porges, 2007). Thus, the ability to quickly calm down and engage socially following relational stress may allow popular girls who have a reputation for valuing popularity to use relational aggression to maintain their status in the peer group. In contrast, a failure to self-regulate following relational stress may serve as a risk factor for relational aggression among unpopular girls who visibly want to join the popular crowd. In effect, their poor emotion regulation skills may place these girls at high risk for responding to (actual or perceived) social slights with aggressive conduct. These findings highlight the provocative possibility that it is not individual differences in sympathetic stress reactions to social exclusion, but rather one’s ability to modulate these reactions, that moderate the association between having a reputation for valuing popularity and relational aggression.

Although findings from the present study suggest that having a reputation for valuing popularity may be an important factor to consider in the study of the development of relational aggression, it is important to note the distinction between having a reputation for valuing and self-reported popularity strivings. Although recent work indicates that individuals who prioritize popularity over other factors and endorse social goals related to popularity are more likely to use relational aggression (Cillessen, deBruyn, & LaFontana, 2009; Ryan & Shim, 2008), the current study extended this previous work to examine the association between reputations for valuing social status and relational aggression. As being too transparent in one’s status goals could result in ridicule and humiliation, especially for the wannabes (Adler & Adler, 1998), it is possible that unpopular individuals may be less willing to endorse popularity goals on a self-report measure. Thus, an important direction for future work is to examine the extent to which self-reports of popularity strivings are associated with peer reports of popularity strivings. In addition,
adolescents whose social strivings are obvious, overt, and transparent may be particularly likely to employ any method necessary to gain status in the peer group, including negative behaviors such as relational aggression. Given research suggesting that there are a variety of behaviors that lead to social status in the peer group (Hawley et al., 2008), an important question for future research is whether it is self-reported popularity goals, having the reputation for striving for popularity, or both, that place children and adolescents at risk for aggression.

The current study contributes to a body of work that underscores the importance of examining how social and physiological risk factors interact in the prediction of aggressive behavior. Although previous work has focused on the interaction between home stress and physiological reactivity (e.g., low SES, marital conflict; El-Sheikh et al., 2009, Katz, 2007), the current study demonstrates that peer reputations (having a reputation for valuing popularity and popularity) and physiological reactivity may be especially important factors to consider in the development of relational aggression during childhood and adolescence. These findings are particularly important when considering interventions for negative behaviors such as relational aggression. For example, interventions that promote a reduction in negative behavior through skills such as emotion regulation (e.g., Frey et al., 2009) may only be effective for a subset of individuals who exhibit exaggerated reactivity to social stress (e.g., the wannabes in the current study).

Interestingly, in the current study the bivariate association between popularity and relational aggression was not significant. Although this result was not central to the current study, this finding deviates from the positive associations that have been found previously between popularity and relational aggression (Cillessen & Rose, 2005). In fact, in regression analyses that included both a reputation for valuing popularity and popularity, there was a
significant negative relation between popularity and relational aggression. Thus, it appears that after controlling for having a reputation for valuing popularity, increases in popularity were associated with decreases in relational aggression. This finding highlights the possibility that relational aggression may result from an apparent desire to be popular rather than popularity.

Although these findings may be sample specific and a function of the moderate association between popularity and having a reputation for valuing popularity, these clear distinctions from previous work may also reflect the unique context where this study took place. It is possible that factors unique to the summer camp environment (e.g., a close-knit, closed community; a central focus on developing and maintaining healthy friendships; emphasis on addressing conflict respectfully) may inform a unique definition of popularity. As there is evidence to suggest that conceptions of popularity may vary across numerous contextual factors (e.g., LaFontana & Cillessen, 2002; Lease, Kennedy, & Axelrod, 2002; Meisinger et al., 2007), it would be interesting to see how pathways to popularity differ based on variability in definitions of popularity within the peer group. This finding highlights the necessity of examining peer relations across multiple social contexts. In addition, future research would benefit from examining whether the positive association between popularity and relational aggression typically found in school samples remains once reputations for popularity motivations are controlled.

It is also important to note that the examination of age as a moderator of the relation between popularity and relational aggression in the current study revealed that there was a positive association between popularity and relational aggression for younger girls only. This finding is a deviation from previous work indicating that the association between popularity and relational aggression becomes stronger across adolescence (Cillessen & Mayeux, 2004). These
distinct findings are important because they highlight the possibility that presumed
developmental influences on the association between popularity and relational aggression may
actually be a function of the context where these factors are examined. Specifically, previous
work has used school grade as a proxy for age. However, increases in school grade from
elementary school to middle school are also marked by changes in the school structure (e.g., less
likely to be in a self-contained classroom). These structural changes influence variability in peer
nomination procedures across grades. For example, in one study examining developmental
variability in the association between popularity and relational aggression, peer nomination
rosters in fifth grade classrooms contained less than one-hundred names whereas rosters for
students in middle school contained 300 names (Cillessen and Mayeux, 2004). It is possible that
familiarity with the peers that individuals rate may be a relevant factor to consider when using
peer nomination procedures. Thus, future work examining the association between popularity
and relational aggression across numerous contexts (e.g., different size schools, same-sex
classrooms) may provide a better understanding of developmental factors underlying the use of
relational aggression.

There are a number of strengths in the design of the current study. In particular, a multi-
method approach to measuring relational aggression was utilized, the social exclusion paradigm
was standardized across participants, and physiological reactivity to stress was examined as a
correlate of relational aggression in a female sample. Moreover, as the majority of the research
exploring children’s and adolescents’ relationships has taken place within the context of school,
it is plausible that the interaction of the social domain and the academic domain may limit the
ability to isolate uniquely social processes. In addition, the exploration of peer relationships
within the academic domain frequently assumes that all adolescents are in the same classroom or
school as individuals who they choose to interact with socially. It follows that the degree to which participants interact with individuals in classrooms or schools who participate in such studies could limit researchers’ abilities to assess social behaviors. In the summer camp context, campers engage in activities together, eat meals together, and share sleeping quarters for almost eight weeks, providing numerous opportunities for social interactions.

Although the environment where this study was conducted provides a novel background to examine social development, it is important to note the limitations of the current work. First, the generalizability of the findings may be limited because of the unique features of the camp where this study was conducted. In particular, factors such as the length of the camp season (54 days), the relatively homogenous background of the campers (primarily Caucasian; middle to upper class), the lack of exposure to electronic communication (campers are not permitted to use cell phones and computers while they are at camp), and the all-female environment undoubtedly contribute to the social adjustment of the campers. Thus, it is important that this work is replicated across diverse social contexts to determine the extent to which these findings extend to other populations and environments.

Second, although there is evidence to suggest that the bidirectional interplay between popularity and relational aggression is unique for girls, the current study was limited by the exclusion of boys. The association between status and social adjustment is relevant for both males and females (e.g., Rose & Swenson, 2009) and there is evidence to suggest that distinct patterns of reactivity to social exclusion may predict aggressive behaviors for boys and girls (Murray-Close & Crick, 2007). Moreover, as adolescent popularity has been linked with sexual behavior in mixed-sex contexts (Prinstein, Meade, & Cohen, 2003), it is possible that conceptions about what makes someone popular may differ within same-sex contexts. Thus, future work would benefit
from examining if gender differences emerge in how the interaction of social status factors and physiological reactivity to social exclusion predicts aggressive behaviors.

In addition, although two of the proposed three-way interactions accounted for a significant increase in the variability of relational aggression, the magnitude of these effects was relatively small (i.e., $\Delta R^2 = .05 - .06$). However, McClelland and Judd (1993) argue that because of the potential for low residual variance of product terms and increased measurement error in non-experimental work, the $\Delta R^2$ for the interaction terms is likely attenuated in moderation models. Thus, there is substantial support for the notion that even very small moderator effects (e.g., $\Delta R^2 = .01$) in non-experimental work are meaningful (see Evans, 1985; McClelland & Judd, 1993).

There are also potential measurement issues that could limit the generalizability of results. First, limited-choice peer nominations were utilized in the current study. Although the use of limited-choice nominations is a reliable and valid method for assessing social status and behavior, there is evidence to suggest that providing participants with the opportunity to nominate unlimited individuals may be preferable, especially for older participants (Cillessen & Marks, in press).

Moreover, although the use of a multiple informants to assess relational aggression was a strength of the current study, the measures of relational aggression did not distinguish between different functions of relational aggression (i.e., proactive and reactive relational aggression). Proactive relationally aggressive acts are strategic and planned whereas reactive relational aggression generally occurs when individuals are upset or angry (Card & Little, 2006). As hypoarousal theories of aggression suggest that blunted reactivity is associated with strategic aggression (Van Goozen, 2005) and hyperreactivity to stress may be linked with more emotional aggression (Scarpa & Raine, 1997), future work including a more nuanced measure of relational aggression
could help determine if popular individuals with high status goals and wannabes engage in different functions of relationally aggressive conduct.

In addition, although Cyberball is a well-established manipulation of social ostracism (Williams, Cheung, & Choi, 2000), there is evidence to suggest that in addition to feeling exclusion, participants also report other emotions including frustration after being excluded in a Cyberball game (Williams et al., 2000; Zadro, et al., 2004). Future work examining the association between reactivity to social exclusion and relational aggression could examine self-reports of exclusion and frustration as potential moderators to better understand the unique influence of the specific emotions associated with reactivity to exclusion.

Finally, the current study was cross-sectional in nature. Consequently, we could not examine the potential bidirectional effects amongst the constructs that were measured. Moreover, we were unable to examine the viability of alternative models that could provide insight into the interplay between having a reputation for valuing popularity, popularity, reactivity to social exclusion, and relational aggression. For example, although longitudinal work suggests that popularity consistently predicts increases in relational aggression throughout adolescence, there is also some, albeit weaker, evidence that relational aggression predicts changes in popularity overtime (Cillessen & Mayeux, 2004). Thus, it is possible that relational aggression and reactivity to social exclusion potentially moderate the association between having a reputation for valuing popularity and popularity. Future longitudinal work is essential for disentangling the direction of effects proposed in the current study. It is also possible that additional contextual factors (e.g., the use of prosocial behaviors, the strategic use of relational aggression) may be important to consider when examining the association between social status motivations and relational aggression (Hawley, 2007). In particular Hawley (2007) suggests that the effective and
strategic use of prosocial behaviors in conjunction with relational aggression may promote a context in which those who strive for status may realize their goals.

Despite the limitations of the current study, this study provides a novel contribution to the growing body of work investigating the association between social status motivations and relational aggression. It is easy to envision the wannabe child or adolescent who tries too hard to be held in high esteem by her peers, yet only further isolates herself from social connections by her misguided attempts to achieve popularity. Ethnographic reports indicate that these individuals are likely both victims and perpetrators of aggressive behaviors (Adler & Adler, 1998). Our findings suggest that a visible focus on being popular may place child and adolescent girls, particularly wannabes, at risk for using relational aggression. Moreover, the interplay between the reputations for desiring popularity, reactivity to social stressors, and popularity provide unique insight into the use of relational aggression by girls during middle childhood and adolescence.
References


Footnotes

1 When peer nominations measures are used to assess assessing individual feelings about a peer (e.g., “Who do you like hanging out with the most?”), consent rates of less than 60% undermine
reliability of the measure (Cillessen & Marks, in press). However, when peer nomination items are based on reputation, as they are in the current study, lower consent rates are much less likely to be a threat to reliability (Cillessen & Marks, in press).

2 Although the four-way interactions including age were not significant, it is possible that there was not sufficient power in the current study to identify significant four-way interaction effects. As preliminary analyses revealed that interactions including age predicted variability in relational aggression, all three-way interactions that tested study hypotheses were analyzed with the significant effects that included age (i.e., the interaction between popularity and age, the interaction between having a reputation for valuing popularity and age, and the interaction between having a reputation for valuing popularity, popularity, and age) to partition out any variance due to these significant effects. The pattern of findings for the three-way interactions including these additional terms was identical to those reported when age was in the model as a control variable.

3 Additional hierarchical regression models were used to test the hypothesized three-way interactions when the relational aggression outcome was based on either peer nomination items or counselor reports. The pattern of effects with both peer nominations and counselor reports as outcomes was identical to the pattern revealed when the composite measure was the outcome.
### Means, Standard Deviations, and Intercorrelations Among Study Variables

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*p < .10, *p < .05, **p < .01, ***p < .001
Table 2

**Preliminary hierarchical regression analyses predicting relational aggression**

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Note: β's are standardized coefficients at the predictor's entry into the equation.
* p ≤ .10, * p ≤ .05, ** p ≤ .01, *** p ≤ .001
### Table 3

*Regression Models for Having a Reputation for Valuing Popularity, Popularity, and Physiological Reactivity to Social Exclusion Predicting Relational Aggression*

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<td>Reputation for valuing popularity (RVP)</td>
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<td>-1.75</td>
<td>.00</td>
</tr>
</tbody>
</table>

Note: β's are standardized coefficients at the predictor’s entry into the equation.  
*p ≤ .10, †p ≤ .05, ‡p ≤ .01, §p ≤ .001
Figure Captions

Figure 1.
Three-way interaction of having a reputation for valuing popularity, popularity, and age predicting relational aggression.

Figure 2.
Three-way interaction of having a reputation for valuing popularity, popularity, and heart rate reactivity predicting relational aggression.

Figure 3. Three-way interaction of having a reputation for valuing popularity, popularity, and RSA withdrawal predicting relational aggression.
Valuing Popularity and Relational Aggression

- High Popularity, Older
- (1) High Popularity, Younger
- (2) Low Popularity, Older
- (3) Low Popularity, Younger

Relation Aggression

Low Reputation for Valuing Popularity

High Reputation for Valuing Popularity
Valuing Popularity and Relational Aggression

- (1) High Popularity, High HR Reactivity
- (2) High Popularity, Low HR Reactivity
- (3) Low Popularity, High HR Reactivity
- (4) Low Popularity, Low HR Reactivity
Valuing Popularity and Relational Aggression

- ▲ - (1) High Popularity, High RSA Withdrawal
- ■ - (2) High Popularity, Low RSA Withdrawal
- □ - (3) Low Popularity, High RSA Withdrawal
- ▼ - (4) Low Popularity, Low RSA Withdrawal

Low Reputation for Valuing Popularity
High Reputation for Valuing Popularity

Relational Aggression

-8 -6 -4 -2 0 2 4 6 8 10 12

Low Reputation for Valuing Popularity
High Reputation for Valuing Popularity