

Shyness and Prosocial Tendencies During Adolescence: Prospective Influence of Two Types of Self-Regulation

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Although children's self-regulation has been widely regarded as a panacea, there may be individual differences in the adaptiveness of self-regulatory processes depending on temperamental factors. We examined whether individual differences in two conceptually distinct types of self-regulation (i.e., emotion self-regulation, nonemotion self-regulation) moderated the association between shyness measured during late childhood ($N = 1284$; 49.8% girls, 84.1% White, mean parental education fell between associate's degree/diploma and undergraduate degree) and prosocial tendencies indexed approximately two years later during early adolescence. We found that children's shyness was negatively associated with adolescents' prosocial tendencies only at high levels of emotion self-regulation, and that shyness was positively related to prosocial tendencies only at low levels of nonemotion self-regulation. In the context of relatively higher levels of shyness, being "over" emotionally regulated may interfere with positive socioemotional outcomes. These findings may provide additional insight into the heterogeneity of self-regulation, and why some shy children may be reluctant to engage in prosocial acts.

Keywords: shyness, self-regulation, prosocial, adolescence

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Shyness is a relatively stable temperamental characteristic that refers to inhibition, discomfort, and anxiousness in the face of social novelty (Jones et al., 1986). Some researchers have found positive associations between shyness and social difficulties throughout the life span. In early education settings, studies have reported a negative association between shyness and social skills, social interactions with peers, and positive associations between shyness and peer and socioemotional difficulties (Coplan et al., 2003, 2004, 2008). In adolescence, shyness is positively associated with judgements about the probability and cost of negative social interactions and also with social anxiety concurrently (Weeks et al., 2016), and childhood shyness is predictive of adolescent social anxiety (Zdebik et al., 2019). These difficulties also appear to continue into adulthood, as shyness is negatively associated with social skills (Miller, 1995), and shy adults report higher loneliness, depression and social anxiety than their nonshy counterparts (Cheek & Busch, 1981; Schmidt & Fox, 1995; Tang et al., 2017). It is,

therefore, important to explore factors associated with the social difficulties sometimes experienced by shy individuals. One factor that is correlated with, and may contribute to, shy children's socioemotional difficulties is a lack of prosocial tendencies.

Prosocial acts refer to behaviors that are voluntary and function to benefit others (Eisenberg et al., 1996). An example of a prosocial behavior is opening the door for someone or helping someone in need. A nonexhaustive list of prosocial behaviors includes helping, sharing, comforting, cooperating, and protecting, as well as emotional experiences, such as empathy and sympathy (Eisenberg et al., 2005). In addition to largely being associated with positive socioemotional outcomes, such as closeness with parents (Sturgess et al., 2001) and higher quality friendships (Berndt, 2002; Cillessen et al., 2005), a lack of prosocial tendencies has been identified as an important correlate of shyness in childhood. Shyness has been negatively associated with the quality (Eisenberg et al., 1996) and quantity (Eisenberg et al., 1996; Stanhope et al., 1987) of helping behaviors observed in the laboratory, but not within the home (Stanhope et al., 1987), although some studies have failed to find these associations altogether (Arbeau et al., 2010).

One variable that may be important to consider when examining relations between shyness and prosociality is self-regulation. Self-regulation is a multidimensional concept that encompasses the temperamental, behavioral, physiological, cognitive, or affective processes that enable individuals to regulate themselves so that they can engage in goal-directed behavior (Hofmann et al., 2006). Self-regulation is hypothesized to emerge in late infancy and continues to develop throughout life, displaying especially rapid development during the early preschool years (Geeraerts et al., 2021;

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Kopp, 1982). There are important links among self-regulation, shyness, and prosociality.

Self-regulatory processes have been implicated in the development and maintenance of shyness. For example, early in infancy, there are observable individual differences in inhibition toward novelty (Calkins et al., 1996; Kagan, 1994; Rothbart, 1988). Some investigators have suggested that the capacity to self-regulate may work to modulate these differences in reactivity to novelty, such that low levels of self-regulation may be associated with relatively higher levels of behavioral inhibition (wariness in response to novelty, a proposed antecedent of shyness) in the context of high negative reactivity (Eisenberg & Fabes, 1992; Rothbart, 1988; Rothbart & Bates, 2006). In empirical support of this theory, one study found that inhibitory control (one component of self-regulatory effortful control) at 42 months was negatively associated with longitudinal trajectories of shyness over 3.5 years (Eggum-Wilkens et al., 2016). Further empirical evidence of this notion has been reported in studies of adults in which shyness was negatively associated with self-regulation and positively associated with negative reactivity concurrently (Eisenberg et al., 1995).

Self-regulation also has been implicated in the development of prosocial tendencies. For example, some researchers have argued that self-regulation theoretically should be related positively to prosociality, because engaging in prosocial behaviors often requires one to inhibit their own needs in order to attend to the needs of another (Carlo et al., 2012). In support of this theory, self-regulation has been consistently and positively related to prosocial tendencies (Diener & Kim, 2004; Eisenberg et al., 1995, 1997, 2007; Rothbart et al., 2001).

Although self-regulation is typically positively correlated with prosocial tendencies (Diener & Kim, 2004; Eisenberg et al., 1995, 1997; Rothbart et al., 2001), some investigators have suggested that there may be individual differences in the adaptiveness of self-regulation based on temperamental factors (Henderson et al., 2015; Henderson & Wilson, 2017). Indeed, the risk potentiation model of control posits that self-regulation may heighten the risk for socioemotional and psychological problems in the context of reactive temperamental styles, such as shyness (Henderson et al., 2015; Henderson & Wilson, 2017). That is, children with higher levels of shyness may, as a result of higher levels of self-regulatory processes, spend more time monitoring their environment and perceive higher levels of social threat in benign social situations. This overmonitoring may lead to overregulated behaviors and biased cognitive perceptions, limiting children's ability to engage flexibly with their environment, including engaging in prosocial acts.

In support of the risk potentiation model of control, one study found that shyness was related to lower teacher-reported prosocial behavior when preschoolers exhibited higher levels of inhibitory control, but positively associated with regulated school behaviors when children displayed lower levels of inhibitory control (Sette et al., 2018). Another study examining the moderating role of individual differences in children's self-regulation (i.e., inhibitory control and attentional shifting) in the relation between shyness and social behavior in multiple social contexts found that, in children with relatively high attentional shifting, shyness was negatively associated with social support seeking during a frustration task and social engagement observed during a stranger approach task (Hassan et al., 2020). Other authors have shown that behavioral inhibition (a phenomenon related to shyness) was also associated

with higher levels of social anxiety and lower social initiative only in the context of high inhibitory control (Thorell et al., 2004). Still others have found that, in preschoolers with high inhibitory control, behavioral inhibition in toddlerhood was associated with greater prospective anxiety (White et al., 2011).

Neural correlates of self-regulation also have been shown to moderate the association between shyness (and behavioral inhibition) and socioemotional adjustment in the same way, such that when children displayed neural correlates (i.e., the N2 ERP component) associated with relatively strong attentional and cognitive control, shyness increased the risk for socioemotional maladjustment (Henderson, 2010; McDermott et al., 2009). Together, these studies suggest that high levels of some components of self-regulation may be less helpful for shy children compared to children with less reactive temperaments.

It is also important to point out that there are different types of self-regulation. For example, self-regulation can be delineated into emotional and nonemotional, more behavioral types (e.g., Eisenberg et al., 1997). Emotion self-regulation encompasses processes that allow for the identification and modulation of emotional experiences, particularly focused on reducing negative emotional experiences (Garner & Spears, 2000; Kopp, 1989; Shields & Cicchetti, 1998). Other conceptualizations of emotion self-regulation focus more specifically on the functionality of emotional experiences rather than on control alone, suggesting that experiencing, differentiating, and modifying (when appropriate) all emotional experiences marks effective emotional regulation (Cole et al., 1994; Garner & Spears, 2000; Thompson & Calkins, 1996). Nonemotion self-regulation, on the other hand, more broadly encompasses processes that support modulation of behavioral expressions, including controlling of impulses and more activational control-type behaviors, such as persistence (Eisenberg et al., 1997; Rothbart & Bates, 2006). Despite representing different components of self-regulation, it is important to note that these indices of self-regulation may influence each other. For example, effectively reducing strong negative emotional experiences, such as anger or sadness, may promote more effective behavioral expressions of self-regulation, such as avoiding the impulse to engage in an argument with a loved one.

To date, there has been a paucity of research examining whether differing types of self-regulation are differentially implicated in the development of prosociality and the role that individual differences in personality may play in this relation. Although there do appear to be associations among shyness, prosocial tendencies, and self-regulation, it remains unclear how different types of self-regulation (i.e., emotional and nonemotional) are differentially related to both shyness and prosocial tendencies prospectively. Furthermore, given the anxiety presumably experienced by shy individuals in social situations (Jones et al., 1986), it also remains unclear whether these different types of self-regulation would moderate the association between shyness and prosocial tendencies.

The Present Study

Using a short-term, prospective longitudinal design, we examined the relations among shyness, self-regulation, and prosocial behaviors in a large sample of typically developing youth over approximately a two-year period. We elected to focus on late

childhood and early adolescence because this is an important transition time in development. This time period is marked by the transition to high school and developmental changes across many domains, including physical changes coinciding with the onset of puberty, social relationship changes where peers become particularly salient, and cognitive changes where the child is moving from concrete to formal operations (Cheek et al., 1986) and maturation of brain areas involved in self-regulatory processes (Sowell et al., 1999). Because peer relationships become increasingly important during this period (Tang et al., 2017), prosocial tendencies may contribute to the quality of these relationships.

There were two goals of the present study. The first goal was to determine whether different types of self-regulation (i.e., emotion and nonemotion) were related differentially to the development of prosocial tendencies prospectively from middle childhood to early adolescence. The second goal was to explore whether each type of self-regulation differentially moderated the association between shyness and prosocial tendencies prospectively during this same time period. We controlled for sex and age in all analyses because girls have been found to be more prosocial than boys, and there are developmental differences in prosociality (Bryant, 1982; Carlo et al., 2003; Menesini, 1997; Sebanc, 2003; Sette et al., 2018).

Because of the positive associations broadly between self-regulation and prosocial tendencies, we predicted that each type of self-regulation would be positively associated with prospective prosocial tendencies (Diener & Kim, 2004; Eisenberg et al., 1995, 1997, 2007). We also predicted that each type of self-regulation would emerge as a significant moderator in the relation between shyness and prosocial tendencies. Although self-regulation generally has been positively associated with prosociality (Diener & Kim, 2004; Eisenberg et al., 1995, 1997, 2007), we predicted that shyness would only be negatively associated with prosocial tendencies in the context of relatively higher levels of emotion and nonemotion self-regulation, because of the emerging literature suggesting that shyness is positively associated with overcontrol and negative socioemotional outcomes in the context of relatively higher levels of self-regulation (Hassan et al., 2020; Henderson, 2010; McDermott et al., 2009; Sette et al., 2018; Thorell et al., 2004; White et al., 2011).

Method

Participants

The participants were 1,284 students (49.8% female) from several elementary and high schools in Southern Ontario, Canada, who were surveyed across three waves annually beginning in 2017 for a larger study examining psychological and physical health outcomes in adolescence. The focus of the present study was on psychological measures collected at Wave 1 ($n = 1284$; $M_{age} = 10.72$ years, $SD_{age} = 1.73$ years, $Minimum_{age} = 7$ years, $Maximum_{age} = 14$ years) and Wave 3 ($n = 801$; $M_{age} = 12.42$ years, $SD_{age} = 1.70$ years, $Minimum_{age} = 9$ years, $Maximum_{age} = 16$ years) of data collection.

The sample comprised primarily Canadian-born students (96.3%). Parent-reported race and ethnicity indicated that 84.1% of the children and adolescents were White, 2.8% were Hispanic, 2.1% were Asian, 1.7% were Black, .9% were Indigenous, 7.6%

were Mixed Race, and .9% preferred not to answer. M levels of parental education fell between associate's degree/diploma and undergraduate degree.

Sample size was determined by conducting a power analysis in G*Power for linear regression (Faul et al., 2007). We used the average effect size ($f^2 = .28$) from two previous studies that examined the moderating role of self-regulation in the relation between shyness and socioemotional outcomes (i.e., Henderson, 2010; Sette et al., 2018). This power analysis revealed that for our objective of examining the interaction of shyness and self-regulation in predicting social behavior, we would require a minimum sample size of 38 participants to detect a large effect size (Power = .80, $\alpha = .05$). Importantly, the power analyses were performed on previously collected data, and so our analyses reflect observed power rather than a priori power analyses to determine sample size.

Procedure

Students were invited to participate in the study during visits to their schools. Each year, the survey was completed in two separate parts, both occurring within a four-month period (January–April). Trained researchers and volunteers administered the surveys to participate in their classrooms during regular school hours. Participants received gifts (e.g., backpacks, pencils) as compensation. All students who participated in their first year were invited to participate again in subsequent years. Participants provided informed assent while their parents provided informed consent. The study was approved by the Brock University ethics board before survey administration at both assessments (Project Title: Healthy Youth Project; Approval Number: 16–080).

Self-Report Measures

The constructs examined in the present study were determined a priori and were derived from individual items using the scales described below. Given that the testing occurred in the schools during class regular time, we administered a limited number of items selected from a range of personality scales in order to reduce participant burden and to capture a broad range of domains. Our underlying constructs were then conceptually and empirically derived, and factor structure and psychometric soundness were ensured.

Shyness

Shyness was self-reported by children at Wave 1 and was measured using 6 items. The 6 individual items were drawn from the following scales: the Shyness Scale (Cheek & Buss, 1981); the Preference for Solitude Scale (Burger, 1995); the Early Adolescent Temperament Questionnaire, Revised Shyness subscale (Ellis & Rothbart, 1999); and the Social Anxiety Scale (Ginsburg et al., 1998). Sample items included “I feel shy about meeting new people” and “I am quiet when I am with a group of other students my age.” Children were asked to indicate how much they agreed with each statement on a scale from 1 (*strongly disagree*) to 4 (*strongly agree*), such that higher values were indicative of more shyness.

A principal components analysis revealed that a two-factor solution explained 56.14% of the variance, where Factor 1 included all the nonreverse worded items, and Factor 2 included all the reverse

worded items. Factor 1 explained 37.09% of the variance, and factor loadings ranged from .56 to .76. Factor 2 explained 19.05% of the variance, and factor loadings ranged from .85 to .86. We elected to include both factors in the final shyness scale, because we believed each item theoretically captured components of shyness, and because only reverse-worded items loaded onto the second factor. It is not uncommon for reverse worded items to comprise a separate factor and does not necessarily suggest a theoretically distinct factor (see Brown, 2003; Heffer et al., 2021; Woods, 2006, for reviews of this issue). The composite measure of shyness demonstrated acceptable internal consistency ($\alpha = .66$). A complete list of the shyness items and the intercorrelations among items are presented in Supplemental Table 1.

Emotion Self-Regulation

Emotion self-regulation was self-reported by children at Wave 1 and measured using 3 items from the Difficulties with Emotion Self-Regulation Scale (Gratz & Roemer, 2004). Items from this scale included “When I am upset or stressed, I have difficulty thinking about anything else,” “When I am upset or stressed, I start to feel bad about myself,” and “When I am upset or stressed, I have difficulty concentrating.” Children were asked to indicate how much they agreed with each statement on a scale from 1 (*strongly disagree*) to 4 (*strongly agree*).

A principal components analysis revealed that a one-factor solution explained 69.67% of the variance, with factor loadings ranging from .59 to .83. For presentation purposes, the scale was reversed, such that higher values were indicative of more emotion self-regulation. This scale demonstrated good internal consistency ($\alpha = .78$). A list of the emotion self-regulation items and the intercorrelations among items are presented in Supplemental Table 2.

Nonemotion Self-Regulation

Nonemotional self-regulation was self-reported by children at Wave 1 and measured using 8 items. The 8 individual items were drawn from the following scales: the Early Adolescent Temperament Questionnaire—Revised, the Activational Control and Attention subscales (Ellis & Rothbart, 1999), and the Revised Dimensions of Temperament Survey from the Distractibility subscale (Windle & Lerner, 1986). Sample items include “If I have something hard to do, I get started right away” and “It is easy for me to really concentrate on homework problems.” Children were asked to indicate how much they agreed with each statement on a scale from 1 (*strongly disagree*) to 4 (*strongly agree*), such that higher values were indicative of more self-regulation.

A principal components analysis revealed that a two-factor solution explained 50.21% of the variance, where Factor 1 included all the nonreverse worded items, and Factor 2 included all the reverse worded items. Factor 1 explained 35.70% of the variance, and factor loadings ranged from .60 to .69. Factor 2 explained 14.52% of the variance, and factor loadings ranged from .61 to .78. Using the same rationale as with the shyness scale, we elected to include both factors in the final nonemotion self-regulation scale because we believed each item theoretically captured components of non-emotion self-regulation, and because only reverse-worded items loaded onto the second factor (Brown, 2003; Heffer et al., 2021; Woods, 2006). This scale demonstrated good internal consistency ($\alpha = .71$). A complete list of the nonemotion self-regulation items

and the intercorrelations among items are presented in Supplemental Table 3.

Prosocial Tendencies

Prosocial tendencies were self-reported by children at Wave 3 and measured using 6 items from the Prosocial Tendencies Measure (Carlo & Randall, 2001) and the Prosocial Behavior Questionnaire (Weir & Duveen, 1981) and several items that were created to capture internal and external motivations for engaging in prosocial behaviors (Wentzel et al., 2007). Sample items from this scale include “I never hesitate to help others when they ask for it” and “I try to be fair in games.” Children were asked to indicate how much they agreed with each statement on a scale from 1 (*strongly disagree*) to 4 (*strongly agree*), such that higher values were indicative of greater prosocial tendencies. Of note, prosocial tendencies were not assessed at Wave 1.

A principal components analysis revealed that a one-factor solution explained 49.64% of the variance, and factor loadings ranged from .62 to .82. This scale demonstrated acceptable internal consistency ($\alpha = .79$). A complete list of the prosocial items and the intercorrelations among items are presented in Supplementary Table 4.

Parental Demographics

A demographics questionnaire was also completed by the primary caregiver at Wave 1 that included questions about place of birth, race, and parental education.

Missing Data Analysis

Missing data occurred because some students did not complete all the questions in the survey (average missing data were 1.74% across visits), and because some students did not complete each part of the survey across visits. As mentioned in the procedure section above, each year the survey was split into two parts, and missing data were primarily due to absenteeism, but also occasionally due to time conflicts, students declining to participate in one part of the survey, and students moving from the school district. Age, sex, race, parental education, and shyness at Wave 1 did not predict missingness at Wave 3 (all $ps > .10$). However, binary logistic regressions revealed that age ($\chi^2 = 54.33$, $df = 1$, $p < .001$), emotion self-regulation ($\chi^2 = 7.08$, $df = 1$, $p = .008$), and nonemotion self-regulation ($\chi^2 = 24.89$, $df = 1$, $p < .001$) at Wave 1 predicted missingness at Wave 3. Increases in age ($OR = 1.30$, 95% CI [1.21, 1.39]) at Wave 1 significantly increased the odds of having missing data at Wave 3, whereas increases in emotion self-regulation ($OR = .94$, 95% CI [.89, .98]) and nonemotion self-regulation ($OR = .93$, 95% CI [.90, .94]) at Wave 1 significantly decreased the odds of having missing data at Wave 3. Missing data were estimated for all variables using multiple imputation (12 iterations), thus avoiding the biased parameter estimates that can occur with pairwise or listwise deletion (Schafer & Graham, 2002).

Statistical Analyses

We examined relations among shyness, emotion self-regulation, nonemotion self-regulation, and prosocial tendencies using a series

Table 1*Pearson's Correlations, Means, Standard Deviations (SD), and Ranges for Study Measures*

Variable	1	2	3	4	<i>M (SD)</i>	Range
1. Shyness	—	-.42***	-.32***	-.04	13.25 (3.69)	6–24
2. Emotion self-regulation	—	—	.25***	.04	6.32 (2.58)	1–10
3. Nonemotion self-regulation	—	—	—	.16***	22.36 (4.37)	9–32
4. Prosocial tendencies	—	—	—	—	17.52 (3.84)	6–24

*** $p < .001$.

of Pearson correlations, and the relation between sex and prosocial tendencies using a t test.

To explore whether children's emotion and nonemotional regulation moderated the association between shyness and prospective prosocial tendencies, we used separate linear regressions with all predictors centered at their means (Aiken & West, 1991). The predictors were continuous scores of shyness, emotion self-regulation, and nonemotion self-regulation during late childhood (i.e., Wave 1). The dependent measure was prosocial tendencies during early adolescence (i.e., Wave 3). In the first step, age and sex were entered as covariates. In the second step, children's shyness was entered. In the third step, emotion self-regulation or nonemotion self-regulation was entered. In the final step, a term capturing the interaction between shyness and emotion self-regulation or nonemotion self-regulation was entered.

Results

Descriptive Statistics

Consistent with previous studies, we found that sex had a significant impact of prosocial tendencies, $t(1281) = -3.31$, $p = .001$, such that girls ($M = 17.79$, $SE = .19$) reported significantly higher prosocial tendencies compared to boys ($M = 17.27$, $SE = .19$), and that age was positively associated with prosocial tendencies, $r = .05$, $p < .001$.

Table 1 presents the descriptive statistics for the study measures. Of note, shyness was significantly and negatively associated with emotion ($r = -.42$, $p < .001$) and nonemotion self-regulation ($r = -.32$, $p < .001$). Nonemotion self-regulation and emotion self-regulation were also positively related ($r = .25$, $p < .001$). Nonemotion self-regulation was also significantly and positively associated with prosocial tendencies ($r = .16$, $p < .001$).

Relation Between Shyness and Prosocial Tendencies: Moderating Influences of Two Types of Self-Regulation

Emotion Self-Regulation

The model, $F(5, 1273) = 3.89$; $p = .002$, $R^2 = .03$, revealed a significant interaction between shyness and emotion self-regulation in late childhood in predicting children's prospective prosocial tendencies in early adolescence (unstandardized $B = -.03$, $t = -2.02$; $p = .047$, see Figure 1).¹ In order to probe this interaction, we calculated the simple slope of shyness at high (one standard deviation above the mean) and low (one standard deviation below the mean) values of emotion self-regulation. As predicted, in children with high emotion self-regulation, shyness was significantly negatively associated with prospective prosocial tendencies (unstandardized $B = -.14$, $t = -2.00$; $p = .045$). In

children with low emotion self-regulation, shyness was not statistically significantly associated with prospective prosocial tendencies (unstandardized $B = .05$, $t = .77$; $p = .443$).

Nonemotion Self-Regulation

The model, $F(5, 1273) = 8.30$; $p < .001$, $R^2 = .07$, revealed a significant interaction between shyness and nonemotion self-regulation in late childhood in predicting prospective prosocial tendencies in early adolescence (unstandardized $B = -.02$; $p = .04$, see Figure 2). In order to probe this interaction, we calculated the simple slope of shyness at high (one standard deviation above the mean) and low (one standard deviation below the mean) values of nonemotion self-regulation. In children with high nonemotion self-regulation, shyness was not statistically significantly associated with prospective prosocial tendencies (unstandardized $B = -.02$, $t = -.391$; $p = .691$). In children with low emotion self-regulation, shyness was positively associated with prospective prosocial tendencies (unstandardized $B = .14$, $t = 2.28$, $p = .023$).

Discussion

Using a short-term, prospective longitudinal design, the purpose of the present study was to better understand the role of emotion and nonemotion self-regulation in the development of prospective prosocial tendencies independently, as well as within the context of individual differences in shyness from late childhood to early adolescence. To this end, we had two specific goals. Our first goal was to determine whether varying types of self-regulation (i.e., emotion and nonemotion) were differentially related to the development of prosocial tendencies prospectively. We found that only nonemotion self-regulation was positively associated with prospective prosocial tendencies.

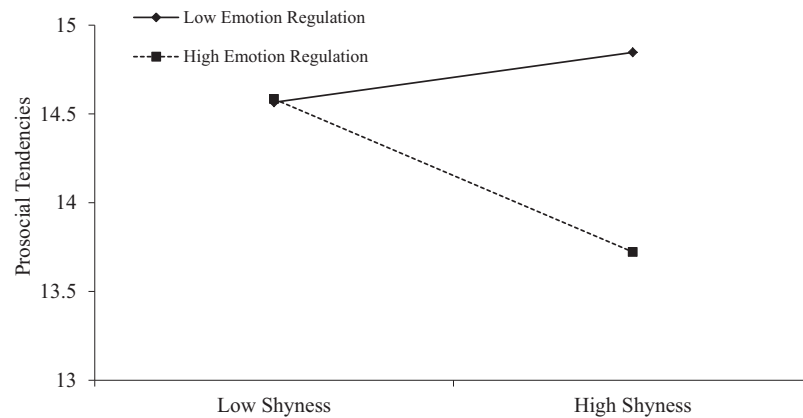
Our second goal was to explore whether different types of self-regulation differentially moderated the association between shyness and prosocial tendencies prospectively. We found that shyness was 1) negatively associated with prospective prosocial tendencies when individuals displayed relatively high levels of emotion self-regulation, and 2) positively associated with prosocial tendencies at low levels of nonemotion self-regulation.

Nonemotion Self-Regulation and Prosocial Tendencies

The finding that nonemotion self-regulation was associated with prospective prosocial tendencies is largely in line with the extant literature. Numerous studies have examined the relation between self-regulation and prosociality and found positive associations

¹ Results remained unchanged when using the shyness measure recently reported in Hassan et al. (2021).

Figure 1
Interaction of Shyness and Emotion Self-Regulation During Late Childhood in Predicting Prosocial Tendencies During Early Adolescence Plotted at One Standard Deviation Above and Below the Mean



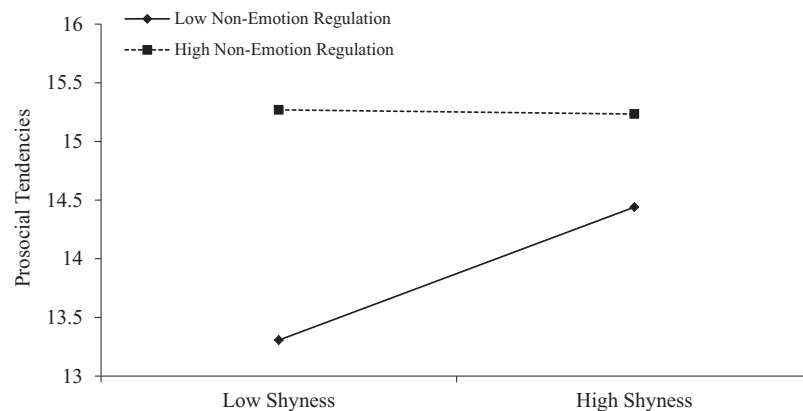
(e.g., Diener & Kim, 2004; Eisenberg et al., 1995, 1997, 2007). Convergenly, our results support the notion that the ability to modulate one's own behavioral impulses and desires may allow individuals to engage in more prosocial behaviors. It is possible that high levels of behavioral regulation may allow individuals to divert attention outward in order to support the needs of others. Our results extend on previous work by using a longitudinal design during a developmental period (i.e., adolescence) where relationships with peers are becoming increasingly important (Tang et al., 2017), and add specificity to the levels of self-regulation that are implicated in prosociality.

Why was only nonemotion self-regulation, but not emotion self-regulation, associated with prospective prosocial tendencies? If we take a closer look at previous studies that have examined relations between self-regulation and prosociality, we can see that these

indices either focused on measures of inhibitory control and impulsivity that are more behavioral in nature (Diener & Kim, 2004; Eisenberg et al., 1995, 2007), or combined items indexing both general behavioral and emotion self-regulation (Carlo et al., 2012). These behavioral conceptualizations are more in line with our measure of nonemotion self-regulation. This suggests that the bulk of the extant literature that we have reviewed in the present study has focused on behavioral conceptualizations of self-regulation, rather than emotional self-regulation per se.

It is also important to discuss the possible reasons why one measure of self-regulation was predictive of prosocial tendencies while the other was not. There are at least two reasons for why general, nonemotion self-regulation may be more important than emotion self-regulation in the development of prosocial tendencies. First, the act of inhibiting one's own needs in order to address the needs

Figure 2
Interaction of Shyness and Nonemotion Self-Regulation During Late Childhood in Predicting Prosocial Tendencies During Early Adolescence Plotted at One Standard Deviation Above and Below the Mean



of others may involve processes related to the modulation of impulsivity, such as inhibitory control. This may allow individuals to inhibit dominant responses in favor of activating more subordinate ones, rather than processes involved with emotion self-regulation (Kochanska et al., 1996). Second, emotion self-regulation may not be equally important for all individuals, and its importance may depend on an individual's level of negative emotion reactivity. Negative reactivity refers to the speed and intensity with which negative emotions are felt and displayed (Rothbart & Bates, 2006). For individuals who have high levels of negative emotional reactivity, high levels of emotion self-regulation may be more important in the development of prosocial behaviors. Indeed, Eisenberg and colleagues have suggested that the effects of emotion reactivity and emotion self-regulation may be additive (Eisenberg et al., 1994; Eisenberg & Okun, 1996).

Shyness, Emotion Self-Regulation, and Prosocial Behaviors

Beyond simple correlations, we also found that shyness was only negatively associated with prospective prosocial tendencies in the context of relatively high levels of emotion self-regulation. Our results converge with several other studies reporting that a combination of relatively high levels of self-regulation and shyness may be problematic. For example, only in preschoolers with relatively higher levels of self-regulation, shyness and related constructs have been negatively associated with prosocial behaviors, popularity, social initiative, and positively associated with social anxiety concurrently (Sette et al., 2018; Thorell et al., 2004) as well as longitudinally with respect to anxiety (White et al., 2011). These results have been replicated and extended when examining neural correlates of self-regulation (Henderson, 2010; McDermott et al., 2009), as well as behavioral indices of social engagement (Hassan et al., 2020).

The present results contribute to the emerging literature suggesting that, in the context of relatively higher levels of shyness, some components of self-regulation may interfere with positive socioemotional outcomes. High levels of regulation in reactivity-based temperaments such as shyness may lead to an overcontrolled presentation where children have difficulty engaging in prosocial behaviors toward others since shyness is defined and maintained by the social context. It is possible that children with relatively higher levels of shyness and regulation are more likely to perceive prosocial acts as intrusive or distressing, deterring them from engaging in these behaviors. Importantly, our results extend on this previous work by using a longitudinal design and adding specificity in identifying which levels of regulation are related to which outcomes.

We also found that nonemotion self-regulation was a significant moderator in the relation between shyness and prosocial tendencies, but not in the same way as emotion self-regulation. We found that at high levels of nonemotion self-regulation, shyness was not statistically significantly associated with prosocial tendencies. Individuals with high levels of self-regulation displayed high levels of prosociality, regardless of shyness. However, at low levels of nonemotion self-regulation, shyness was positively associated with prosocial tendencies. These results are somewhat in line with previous studies examining the role of self-regulation in the context of shyness and prosocial behaviors in preschoolers (Sette et al., 2018).

As we have already argued, nonemotion self-regulation may be associated with high levels of prosociality regardless of shyness, because nonemotion self-regulation may support processes related to inhibiting one's own needs in order to address the needs of others (Kochanska et al., 1996). At low levels of nonemotion self-regulation, shyness may be positively associated with prosocial acts, because children are able to act more impulsively (i.e., engage in prosocial acts quickly) without evoking top-down processes. Failure to evoke top-down processes in this context may reduce feelings of self-consciousness that would likely inhibit one's ability to engage in prosocial acts. We speculate that although shy children may have an initial impulse to act prosocially, top-down processes that function to inhibit prosocial acts may be invoked due to negative cognitions about the social situation and over concerns about the self in these situations. In support of this speculation, shyness has been positively associated with negative cognitive distortions in the social realm (Koydemir & Demir, 2008) and anxious self-consciousness in social contexts (Melchior & Cheek, 1990).

Strengths, Limitations, and Future Directions

The present study had several strengths. These include the use of a large sample, a prospective longitudinal design, a consideration of different types of self-regulation, and the examination of an understudied and important developmental timepoint (i.e., adolescence).

The study also had several limitations that warrant discussion. First, we used self-report measures rather than potentially more objective measures of behavior, such as direct observation. However, it is important to note that the measures we used were based on existing conceptualizations of shyness, self-regulation, and prosocial tendencies, were internally consistent, and exhibited the expected factor structures. Furthermore, focusing on children's self-report rather than maternal or paternal reports of children and adolescent's personality and behavior may reduce some of the limitations associated with questionnaire-based assessments, particularly in school settings. Second, related to the use of self-report measures, we were unable to independently validate our composite measures of shyness, two kinds of self-regulation, and prosocial behaviors. Of note, the emotion self-regulation scale only had 3 items. Including items from different scales rather than the complete scales was due to the natural trade-off between gathering a large sample of youth in school during class time in order to have the power to test our hypotheses, and reducing time constraints and participant burden. While we acknowledge this as a limitation, it is important to note that the derived scales used in the present study were internally consistent, and factor analyses were conducted to ensure appropriate factor structure for each scale. A third limitation was that our sample was typically developing and primarily White and middle-class. Accordingly, it is possible that our results may not be generalizable to children from more ethnically, and economically diverse backgrounds. Lastly, because our sample was not selected for shyness or self-regulation, we may have lacked individuals who had extreme scores on each of these measures. This may reduce the generalizability of our findings to extremely shy or dysregulated children. Future studies should use behavioral indices of shyness and self-regulation from direct observations to replicate and extend the results from the present study in a more ethnically and economically diverse sample of adolescents who are selected for shyness and self-regulation.

Conclusions

Using a short-term prospective, longitudinal design, we found that nonemotion self-regulation was positively associated with prospective prosocial tendencies in early adolescence. We also found that both emotion and nonemotion self-regulation moderated the association between shyness and prospective prosocial tendencies but in different ways. Specifically, as predicted, there was a negative association between shyness and prosociality in the context of relatively high levels of emotion self-regulation, and a positive association between shyness and prosociality in the context of relatively low levels of nonemotion self-regulation. In the case of the former relation, these results add to the growing body of evidence suggesting that relatively high levels of self-regulation might reflect overcontrolled processes that impede positive socioemotional outcomes for shy children (Hassan et al., 2020; Henderson, 2010; McDermott et al., 2009; Sette et al., 2018; Thorell et al., 2004; White et al., 2011). In the case of the latter relation, these results also highlight the importance in studying heterogeneity in both shyness and the adaptiveness of different types of self-regulation (i.e., emotional and nonemotional) during key developmental periods. As well, this study is an important first step in increasing specificity in order to better understand the heterogeneity in self-regulatory processes and establishing which types of self-regulation are implicated in the development of prosocial tendencies.

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