Published in final edited form as:

Psychol Assess. 2014 December ; 26(4): 1259–1267. doi:10.1037/a0037132.

Examining the Factor Structure and Etiology of Prosociality

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Abstract

Prosociality is one construct included in the developmental propensity model proposed by Lahey and colleagues to explain the development of conduct problems in childhood and adolescence. Findings from previous literature on two facets of prosociality, dispositional sympathy and respect for rules, suggest that both may have genetic and nonshared environmental influences but only the latter may have shared environmental influence. The goal of the current paper was to explore the structure of the prosociality disposition from a measurement perspective as well as to examine the etiology of this construct. The sample consisted of 686 twin pairs ages 7 to 13. Parents rated their children's prosociality using the Child and Adolescent Dispositions Scale. The factor structure of the prosociality scale was examined using confirmatory factor analysis to compare a one-factor model with a two-factor model. Twin analyses were used to examine the proportion of variance associated with genetic and environmental effects on the latent factor(s) from the best-fitting model. Results of the current study suggest that prosociality is a disposition that can be conceptualized as two related factors rather than a unitary dimension. These two factors map onto the subscales of the prosociality dimension (dispositional sympathy and respect for rules). Both factors had significant genetic and nonshared environmental influences, but only respect for rules had significant shared environmental influences. Examining the dispositional sympathy and respect for rules facets of prosociality separately allowed for the discovery that shared environmental factors may have more impact on respect for rules than sympathy.

Keywords

prosociality; dispositions; genetic; environmental

Prosociality is defined as a dispositional trait related to having sympathy for others, respecting rules, and feeling guilt over misdeeds (Lahey et al., 2008; Lahey & Waldman, 2003, 2005). Prosociality (or the lack of) is often examined in the context of the development of antisocial behaviors. Research investigating prosociality and similar constructs (e.g. empathy, sociability) has consistently found negative associations with conduct problems in children and adolescents (Eisenberg et al., 1996; Frick et al., 1994; Hastings et al., 2000; Luengo, et al., 1994; Miller & Eisenberg, 1998). Prosociality is one

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construct included in the developmental propensity model, which was a model proposed by Lahey and colleagues to explain the development of conduct problems in childhood and adolescence (Lahey et al., 2008; Lahey & Waldman, 2003, 2005; Waldman et al., 2011). The aim of the current study is to examine the construct of prosociality as it is conceptualized within this model.

The developmental propensity model posits that the interaction of the environment and the emotional dispositions of *prosociality*, as well as *negative emotionality* (the propensity to experience intense negative emotions) and *daring* (willingness to take risks, being brave and adventurous), contributes to the propensity for conduct problems (Lahey & Waldman, 2003; 2005). Specifically, children and adolescents who are high in negative emotionality, high in daring, and low in prosociality are at the greatest risk for the development of conduct problems (Lahey & Waldman, 2003, 2005). Lahey and Waldman (2003, 2005) proposed that children with low prosociality are at an increased risk for conduct problems because these children are less likely to feel guilt when they commit an antisocial act. Additionally, it is believed that these children benefit less from positive social interactions and do not respond as negatively to punishment or negative social interactions. A study designed to investigate the phenotypic relations among the components of the developmental propensity model found that the three dispositions accounted for 46% of the variance in the conduct disorder dimension (Waldman et al., 2011). Of this variance, 21% was uniquely accounted for by prosociality with negative emotionality and daring each accounting for only 8% and 2%, respectively. This finding highlights the important role prosociality plays in conduct disorder and the need to more fully understand its structure and etiology.

Lahey et al. (2008) developed the Child and Adolescent Dispositions Scale (CADS) to measure prosociality, daring, and negative emotionality. The prosociality scale of the CADS was created from other similar prosociality dimensions such as Goodman's dimension of prosocial strengths (Goodman et al., 2003) and the construct of dispositional sympathy put forward by Eisenberg and colleagues (1989) which taps behaviors and attributes that are related to sympathy, sharing, kindness, helping, and consideration for others. Lahey and Waldman (2003, 2005) also included guilt and respect for rules in their prosociality factor based on an unpublished exploratory factor analysis (see Lahey & Waldman, 2003). Thus, the CADS prosociality scale consists of a "dispositional sympathy" facet comprised of eight items, as well as a "respect for rules" facet comprised of four items (Lahey et al., 2008). Although Lahey and colleagues differentiate these two facets in their scoring documentation for the CADS, the present study will be the first to examine through a confirmatory factor analysis (CFA) whether these two facets are truly measuring a single prosociality construct, or whether dispositional sympathy and respect for rules are separate but related factors. If prosociality is shown to be a multifaceted construct, then this could further research on the developmental propensity model by increasing its precision in predicting conduct problems.

Lahey and Waldman (2003) conceptualized prosociality as a dimension of temperament and predicted that, like other dimensions of temperament, it would have genetic influences. Twin studies can be used to obtain estimates of additive genetic (the sum of effects across multiple alleles inherited from one's parents), shared environmental (aspects of environmental influence that the twins share, thus making them more similar), and nonshared

environmental (aspects of environmental influence that are unique to each twin, thus resulting in differences between twins) influences. In the only published twin study of prosociality from the developmental propensity model, Waldman and colleagues found a heritability estimate of .43, a shared environmental estimate of .17, and a nonshared environmental estimate of .40 (Waldman et al., 2011). No studies have yet examined the etiology of the dispositional sympathy and respect for rules facets of prosociality separately, and it is possible that these facets may be differentially influenced by etiological factors. The developmental taxonomic theory (Moffitt, 1999) posits that subtypes of antisocial behavior have distinct etiologies. Specifically, severe aspects of antisociality that are a result of a pathological personality are thought to be stable over development and primarily influenced by genetic factors. However, less severe, transient antisociality, such as rule-breaking behavior, is thought to be a normative developmental behavior that is influenced by environmental factors. By extension, the developmental taxonomic theory would suggest that more stable dispositional aspects of prosociality may be influenced primarily by genetic factors, while respect for rules, a more transient prosociality factor, may be vulnerable to environmental influences.

Although the literature does not address the etiology of dispositional sympathy and respect for rules as conceptualized in the developmental propensity model, the literature provides some information from examinations of related constructs. For instance, studies of sympathy and callous/unemotional traits have provided heritability estimates ranging from .46 to .67, nonshared environmental influences ranging from .29 to .49, and little to no effects of shared environment (Knafo & Plomin, 2006; Saudino, Ronald, & Plomin, 2005; Scourfield et al., 2004; Viding, Frick, & Plomin, 2007). These studies suggest that the dispositional sympathy facet of prosociality may also show strong genetic influence but little shared environmental influence.

Fewer studies have specifically examined the etiology of the aspect of prosociality that Lahey and Waldman (2003, 2005) refer to as “respect for rules.” The Delinquency subscale of the Child Behavior Checklist (CBCL; Achenbach, 1991) has some similarities to respect for rules, but also includes nonaggressive delinquent behavior. Studies examining the heritability of this rule-breaking dimension in children and adolescents have shown that, similar to dispositional sympathy, it also has significant genetic and nonshared environmental influences ranging from .44 – .49 and .14 – .16, respectively (Eley, Lichtenstein, & Moffitt, 2003). However, it also has significant shared environmental influences ranging from .35 to .42 (Eley et al., 2003). A meta-analysis examining the etiology of various measures of rule-breaking behavior in children and adolescents also found significant genetic (.48), shared environmental (.18), and nonshared environmental (.34) effects (Burt, 2009). Taken together, the findings from the literature on related constructs suggest that the sympathy and respect for rules facets of the prosociality disposition may both have genetic and nonshared environmental influences but only the latter may have shared environmental influence. Thus, the examination by Waldman et al. (2011) of prosociality as one dimension may have obscured the fact that shared environment contributes to only part of it.

The developmental propensity model (Lahey & Waldman, 2003, 2005) provides an important theoretical framework for research on conduct disorder. Thus far, this model has found support from twin studies linking its dispositions to conduct disorder (Waldman et al., 2011), but it is possible that the model could be more precise in its predictions if it were characterized by prosociality broken into its two component parts. [0] Although Lahey and Waldman have allowed for the differentiation of sympathy and respect for rules, no previous work could be found which has actually examined the structure of prosociality. Also, given the theoretical and practical importance of these predictive relations, it is necessary to better understand the differential etiology of the component parts. Therefore, the goal of the current paper was to explore the structure of Lahey and Waldman's (2003, 2005) prosociality disposition from a measurement perspective as well as to examine the etiology of this construct. It was expected that the prosociality scale from the CADS would be better conceptualized as two correlated factors, Dispositional Sympathy and Respect for Rules, rather than a unitary factor. Based on previous research examining the etiology of similar constructs, it was expected that both the Dispositional Sympathy factor and Respect for Rules factor would have moderate genetic and nonshared environmental influences. However, it was expected that the Respect for Rules factor would also be influenced by the shared environment.

Method

Participants

Twins in the present study were recruited from the Florida State Twin Registry (Taylor, James, Reeves, & Bobadilla, 2006; Taylor, Hart, Mikolajewski, & Schatschneider, 2013), a database that was previously established through the Florida Twin Project on Reading (e.g., Taylor & Schatschneider, 2010). Twins were initially recruited into the registry by using a statewide database of academic records, the Progress Monitoring and Reporting Network. Through the Florida State Twin registry, 1,624 pairs of same-sex twins were invited via a mailing to participate in the study. Nearly half of the families responded to the mailing (718 families), with 693 families consenting to participate and returning completed materials and 25 declining to participate. Two families were excluded due to lack of information about twin zygosity and five families were excluded because they were missing data on all variables used in this study.

The final sample consisted of 686 twin pairs (347 monozygotic, 339 same-sex dizygotic) between 7 and 13 years of age ($M = 10.07$, $SD = 1.74$). The proportion of females was 50.7%. Parents classified the race of the twins as 70% White, 12% African American, 9% mixed race, 2% Asian, and 5% other. The ethnic composition of the sample was 24% Hispanic (5% did not report ethnicity). Household income was on average between \$50,000 and \$69,000 ($M = 3.98$, $SD = 1.67$) as indicated on a scale ranging from 1 "less than \$10,000" to 6 "\$90,000 or more." The mode of reported income was \$90,000 or more (4.5% did not report income).

Measures

Prosociality—The Child and Adolescent Dispositions Scale (CADS; Lahey et al., 2008) measures prosociality, negative emotionality, and daring as dispositional dimensions related to conduct disorder. Parents were instructed to fill out the CADS by indicating the extent to which the items describe their child's behavior in the past 12 months. The scale consists of 57 Likert-type items ranging from 1 (*not at all*) to 4 (*very much*). Previous research has demonstrated high test-retest reliability and external validity of dimension scores (Lahey et al., 2008). Only the twelve items of the prosociality dimension were used in the present study, and items of this dimension demonstrated good internal consistency ($\alpha = .82$).

Data Analysis

The factor structure of the prosociality scale was examined using CFA to compare a one-factor model with a two-factor model. In the one-factor model, all items of the prosociality scale of the CADS loaded onto a single latent factor, and in the two-factor model the items comprising the dispositional sympathy facet and the respect for rules facet of the prosociality scale loaded onto two separate but correlated latent factors.

Twin analyses were used to examine the proportion of variance associated with genetic and environmental effects on the latent factor(s) from the best-fitting CFA model. Twin analyses provide an estimate of additive genetic (A), shared environmental (C), and nonshared environmental (E) influences on traits by taking into account that monozygotic (MZ) or identical twins share 100% of their genes, and dizygotic (DZ) or fraternal twins share about 50% of their segregating alleles. As a first step, twin intraclass correlations were compared across zygosity for all items on the prosociality scale. Intraclass correlations provide support for genetic influences when MZ twins are more similar than DZ twins. They suggest nonshared environmental influences (and measurement error) when MZ correlations are less than 1.00 and shared environmental influences when MZ correlations are less than twice the magnitude of DZ correlations. Next, a common pathway model was used to examine the genetic and environmental influences underlying the factor(s) identified in the best-fitting CFA model. The first set of biometric factors (A_1 , C_1 , and E_1) estimated in a common pathway model represents the genetic and environmental influences that contribute to the variance of the latent factor. The residual variance for each indicator of the latent factor is also decomposed into genetic and environmental components.

Results

Descriptive statistics for all items on the prosociality scale are presented in Table 1. The item scores were normally distributed; all skew values were under an absolute value of 2 and kurtosis values were under an absolute value of 4. No item had missing data for more than 12 participants. Given that the sample was mixed in terms of age and gender, age, age-squared, gender, and an age-by-gender interaction were regressed onto each prosociality scale item to obtain a standardized residual for each item that was then used in the analyses to reduce bias in biometric model estimates that can arise due to age and gender effects (McGue & Bouchard, 1984). Pearson correlations among prosociality scale items are presented in Table 2. Correlations among items on the dispositional sympathy facet were all

significant and ranged from .10 to .53 and correlations among the items on the respect for rules facet were all significant and ranged from .25 to .44.

Confirmatory factor analysis was used to examine the structure of the prosociality scale by comparing a one-factor model with a two-factor model. The one-factor model consisted of all 12 items from the prosociality scale loading onto one latent factor. The two-factor model consisted of two correlated latent factors, with the eight items from the dispositional sympathy facet of the prosociality scale loading onto one factor, and the four items from the respect for rules facet loading onto a second factor (see Figure 1). Analyses were performed using MPlus 7.0 (Muthen & Muthen, 1998–2012). To correct for the non-independence of observations (i.e., twins nested in pairs), the TYPE=COMPLEX option of the analysis command and the CLUSTER option of the variable command were used. The estimator used was maximum likelihood with robust standard errors (MLR). For both models, all factor loadings were estimated and all factor variances were fixed at 1. As there is no absolute consensus on which goodness-of-fit index to use, the recommendation of assessing several indices was followed (Kline, 2011; Hu & Bentler, 1998). The chi-square test statistic (χ^2), Root Mean Square Error of Approximation (RMSEA; Steiger, 1990), Bentler Comparative Fit Index (CFI; Bentler, 1990), Tucker-Lewis Fit Index (TLI; Tucker & Lewis, 1973), and Standard Root Mean Square Residual (SRMR) were used to assess model fit. A non-significant finding for the χ^2 test indicates a perfect fitting model (Kline, 2011), though the χ^2 statistic is sensitive to large samples, and additional fit indices should be evaluated. For the RMSEA, values less than .05 indicate a good fitting model and values of .06 to .08 indicate a moderate fit (Steiger, 1990). Values equal or greater to .95 for the CFI (Bentler, 1990) and greater than .90 for the TLI (Tucker & Lewis, 1973) indicate good fit. For the SRMR, values less than .08 indicate a model of good fit (Hu & Bentler, 1998). The two models were compared using the Satorra-Bentler Scaled (S-B) Chi-Square difference test (Satorra, 2000), which is recommended when using the MLR estimator (Satorra & Bentler, 2001).

The one-factor model provided a moderate to good fit to the data ($\chi^2(54) = 387.79, p < 0.001$; RMSEA = .07; CFI = .85; TLI = .82; SRMR = .06). The two-factor model also provided a moderate to good fit to the data ($\chi^2(53) = 271.10, p < 0.001$; RMSEA = .06; CFI = .90; TLI = .88; SRMR = .05). However, an examination of the model results suggested a better fit in all indices for the two-factor model. Furthermore, the S-B chi-square difference test was significant ($\chi^2_d(1) = 95.92, p < .001$), indicating the two-factor model provided a better fit to the data as expected. Given this, the two-factor model was chosen as the best representation of these data. Path loadings and residuals for the two-factor model are presented in Figure 1. Items loadings for the Dispositional Sympathy factor and Respect for Rules factor were all significant as was the correlation between the factors ($p < .001$).

As a first step in examining the etiology of prosociality, twin intraclass correlations were examined. Intraclass correlations for prosociality items (Table 2) were consistently higher among MZ twins than DZ twins, which is indicative of genetic influences. However, MZ correlations were less than twice the magnitude of DZ correlations, suggesting shared environmental influences as well. Further, the MZ correlations were less than 1.00, indicating nonshared environmental influences (and measurement error). Next, two common

pathway models were fit to examine the etiology of the Dispositional Sympathy factor and the Respect for Rules factor separately. The models were fit using Mx and 95% confidence intervals were used to test for significance (Neale et al., 2003). Missing data were handled by using the Full Information Maximum Likelihood (FIML) approach. The common pathway model for the Dispositional Sympathy factor is presented in Figure 2. Item loadings were all significant and ranged from .35 to .77, similar to results from the previous CFA. The first set of biometric factors estimated (A_1 , C_1 , and E_1) in this common pathway model represents the general genetic and environmental influences that contribute to the variance of the Dispositional Sympathy factor. The general genetic biometric factor (A_1) suggested significant (i.e., confidence interval did not include zero) genetic effects (pathway .81). The general shared environmental biometric factor (C_1) suggested non-significant shared environmental effects. Finally, the general nonshared environmental biometric factor (E_1) suggested small but significant nonshared environmental effects (pathway .09) contributing to the Dispositional Sympathy factor. Results support the hypothesis that the Dispositional Sympathy factor would have significant genetic and nonshared environmental effects, but no shared environmental effects. However, the results suggest higher than expected genetic effects and lower than expected nonshared environmental effects. The common pathway model also allows for parsing the residual variance of each indicator into genetic, shared environmental, and nonshared environmental components. As can be seen in Figure 2, most items had significant unique genetic, shared environmental, and nonshared environmental influences. However, two items (4 and 43) on the dispositional sympathy scale did not have significant unique shared environmental influences.

The common pathway model for the Respect for Rules factor is presented in Figure 3. Item loadings were comparable to those obtained from the previous CFA; all loadings were significant and ranged from .45 to .66. The general biometric factors suggested significant genetic ($A_1 = .63$), shared environmental ($C_1 = .26$), and nonshared environmental ($E_1 = .11$) effects contributing to the Respect for Rules factor. Results support the hypothesis that the Respect for Rules factor would have significant genetic, shared environmental, and nonshared environmental effects. In terms of the unique etiological effects for each indicator, most items had significant unique genetic, shared environmental, and nonshared environmental influences. However, item 5 on the respect for rules scale did not have significant unique shared environmental influences.

Discussion

Previous research examining the developmental propensity model suggests that there are three socioemotional dispositions that contribute to conduct problems in childhood and adolescence: low prosociality, high negative emotionality, and high daring. The current study aimed to examine the structure of the prosociality dimension from the developmental propensity model as it was designed to include measurement of two dispositional characteristics (sympathy and respect for rules). Results of the current study suggest that prosociality is a disposition that can be conceptualized as two related factors rather than a unitary dimension. These two factors map onto the subscales of the prosociality dimension, namely dispositional sympathy and respect for rules, and seem to tap into different (though moderately to highly correlated) aspects of prosociality. Given the magnitude of the

correlation between the facets, it is likely that dispositional sympathy and respect for rules are sub-factors of a broad, higher-order prosociality dimension. However, it may prove useful to distinguish these facets in some contexts. The Dispositional Sympathy factor is comprised of items that mostly reflect emotionality, including the child's own emotional reaction to others' feelings, and is related to other conceptualizations of sympathy in the literature (Eisenberg et al., 1989; Goodman et al., 2003). The Respect for Rules factor is made up of items tapping into fairness and guilt over transgressions, which has similarities to concepts like callous/unemotional traits (Frick et al., 2000), delinquency (Achenbach, 1991), and rule-breaking behavior (Burt, 2009). The finding of prosociality being multifactorial is in line with literature suggesting that the related construct of social skills is also multi-faceted (Clark, Gresham & Elliott, 1985; Gresham & Elliott, 2008).

In addition to examining the structure of the prosociality dimension, the current study also explored the etiological influences contributing to the Dispositional Sympathy factor and the Respect for Rules factor by using twin analyses. The results of these analyses suggest that both the Dispositional Sympathy factor and the Respect for Rules factor were significantly influenced by genetic factors, as hypothesized. These results are consistent with the assertion of Waldman et al. (2011) that the developmental propensity model suggests genetic influences on each of the socioemotional dispositions.

The Dispositional Sympathy factor showed a small (and nonsignificant) shared environmental influence, though most items had unique significant shared environmental influences. These results suggest that the construct of Dispositional Sympathy is influenced by genes, but not by shared environmental influences. Rather, shared environmental factors influence the residual variance of the individual components of dispositional sympathy. Results from the current analyses cannot answer the question of whether distinct shared environmental influences are acting on each item, but they do suggest that shared environmental influences are not contributing to the covariation among the items on the Dispositional Sympathy factor. That is, shared environmental influences may act on distinct aspects of dispositional sympathy (i.e., individual items on the dispositional sympathy facet), but there does not appear to be common shared environmental influences across all items. On the other hand, the Respect for Rules factor had significant shared environmental factors both at the factor level and the item level for most items. Overall this suggests that shared environmental factors (which could include things like parenting, the home environment, or the neighborhood environment) may have more impact on a child's overall respect for rules than their level of sympathy. Importantly, examining the Dispositional Sympathy and Respect for Rules factors separately allowed the opportunity to discover this difference in shared environmental influence, which would have been masked if a unidimensional prosociality factor was examined. Although actual developmental processes could not be measured, these results suggest that there are different etiological influences which underlie the development of the components of prosociality, further indicating that these components are unique. Therefore, it may be useful to examine the dispositional sympathy and respect for rules facets separately, rather than examining the prosociality factor as a whole, especially when studying etiological relationships in the context of the developmental propensity model.

Both the Dispositional Sympathy factor and the Respect for Rules factor had small but significant nonshared environmental effects at the factor level. Previous research examining the etiology of prosociality and similar constructs has found higher estimates of nonshared environmental effects (Eley et al., 2003; Knafo & Plomin, 2006; Saudino et al., 2005; Scourfield et al., 2004; Viding et al., 2007; Waldman et al., 2011). This difference from prior research is perhaps not surprising given that a latent factor approach was taken in the current analyses. That is, by using a latent factor approach, it is likely that measurement error (which is included in estimates of nonshared environment) was estimated at the residual level, and not included in the latent variable. Using a latent variable approach helps to reduce the impact of error on the estimates of decomposed variance at the factor level, and reduces estimates of nonshared environmental influence. Further, this reduction in error allows for a greater amount of variance to be accounted for by either genetic or shared environmental influences. It may be for this reason that estimates of genetic influence for the Dispositional Sympathy factor are slightly higher than previously reported estimates (Eley et al., 2003; Knafo & Plomin, 2006; Saudino et al., 2005; Scourfield et al., 2004; Viding et al., 2007; Waldman et al., 2011).

Lahey and Waldman's (2003) developmental propensity model suggests that individuals with *high* levels of prosociality and *low* levels of negative emotionality and daring are *unlikely* to develop conduct problems. Further understanding of the etiology of these dispositions may lead to better understanding of protective factors, and may have implications for intervention. Based on the current results, shared environmental factors may be more important for the Respect for Rules factor than the Dispositional Sympathy factor of prosociality, suggesting that parenting, discipline, or rules in the home may be able to influence a child's respect for rules. However, future research is needed to determine which shared environmental effects influence the Respect for Rules factor.

The results of the current study should be interpreted in the context of some important limitations. First, the parent-report version of the CADS was used given that the youngest twins in the sample may not have been able to provide an accurate report of their own prosocial behavior. However, it may be the case that parents are not aware of their twins' true levels of prosociality, and may not know how their children would behave in situations outside the home. Using the child-report version of the CADS may result in different estimates of genetic, shared environmental, and nonshared environmental influences and should be examined in future research, though previous research supports using parent-report of the CADS dispositions (Lahey et al., 2008). Also, the present study included a somewhat wide age range, and it is possible that there may be different developmental periods of prosociality, during which genetic and environmental influences are more or less important. To adequately examine the effects of age, a larger sample or longitudinal testing would be necessary. Finally, this paper is unable to speak to the possibility of more dynamic processes underlying prosociality, including gene-environment interactions and gene-environment correlations (Johnson, 2007). For example, previous research provides support for gene-environment interactions such that the shared environment may be more influential in disadvantaged environments (Cleveland, 2003; Tuvblad, Grann, & Lichtenstein, 2006). Although the sample in the present study reported a wide-range of income levels, examining

prosociality in a sample with lower socioeconomic status may result in higher levels of shared environmental influence for respect for rules and possibly the detection of shared environmental influences on sympathy.

Conclusions

Thus far, the construct of prosociality as measured by the CADS has primarily been examined as a unified construct, but the current study suggests that prosociality may be better defined as two correlated, but separate dimensions. It may be the case that these two dimensions, dispositional sympathy and respect for rules, have different correlates and differential relationships with conduct disorder, as well as other related childhood disruptive behavior disorders. Future examinations and extensions of the developmental propensity model may benefit from distinguishing between these two facets of prosociality. Further, Lahey and Waldman's original conceptualization of the developmental propensity model of conduct disorder included mention of cognitive deficits, or problems with academic achievement (Lahey & Waldman, 2003). It is possible that the respect for rules dimension relates to a child's school performance, thus partially explaining how academic achievement is related to disruptive behavior disorders. Examining the Respect for Rules and Dispositional Sympathy factors of prosociality separately may help to better conceptualize the development of conduct disorder and other related problems.

Acknowledgments

This research was supported, in part, by grants from the National Institute of Child Health and Human Development (P50 HD052120) and the Institute of Education Sciences, U.S. Department of Education (R305B04074). Views expressed herein are those of the authors and have neither been reviewed nor approved by the granting agencies.

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Figure 1.

Confirmatory Factor Analysis with Dispositional Sympathy and Respect for Rules as

separate but correlated factors. CADS = Child and adolescent dispositions scale.

Standardized path coefficients and residual variances are presented. All path coefficients,

residual variances, and the correlation between factors are significant at $p < .001$. Cads42 =

cares about other's feelings; cads19 = concerned about others who are hurt; cads4 =

spontaneously helps others; cads34 = cheers up others when sad; cads37 = feels sorry for

kids who get picked on; cads21 = would be upset if saw animal get hurt; cads17 =

spontaneously shares; cads43 = enjoys learning interesting things; cads48 = concerned about

right and wrong; cads41 = wants everyone to follow rules; cads7 = would feel guilty if broke

a law; cads5 = tries to do excellent work.

Figure 2.

Common pathway model for the Dispositional Sympathy factor. Standardized path coefficients are presented; significant paths are presented in bold (with 95% confidence intervals). A = additive genetic influence; C = shared environmental influences; E = nonshared environmental influences; CADS = Child and adolescent dispositions scale. Cads42 = cares about other's feelings; cads19 = concerned about others who are hurt; cads4 = spontaneously helps others; cads34 = cheers up others when sad; cads37 = feels sorry for kids who get picked on; cads21 = would be upset if saw animal get hurt; cads17 = spontaneously shares; cads43 = enjoys learning interesting things.

Figure 3.

Common pathway model for the Respect for Rules factor. Standardized path coefficients are presented; significant paths are bolded (with 95% confidence intervals). A = additive genetic influence; C = shared environmental influences; E = nonshared environmental influences; CADS = Child and adolescent dispositions scale. Cads48 = concerned about right and wrong; cads41 = wants everyone to follow rules; cads7 = would feel guilty if broke a law; cads5 = tries to do excellent work.

Table 1

Descriptive Statistics for Prosociality Scale Items

Item	Mean	SD	Skew	Kurtosis
Dispositional Sympathy Facet				
42. Cares about other's feelings	3.33	.69	−0.64	−0.32
19. Concerned about others who are hurt	3.39	.68	−0.86	0.28
4. Spontaneously helps others	3.21	.76	−0.53	−0.58
34. Cheers up others when sad	3.18	.80	−0.67	−0.25
37. Feels sorry for kids who get picked on	3.16	.81	−0.60	−0.40
21. Would be upset if saw animal get hurt	3.66	.63	−1.89	3.19
17. Spontaneously shares	2.95	.87	−0.48	−0.50
43. Enjoys learning interesting things	3.56	.60	−1.03	0.14
Respect for Rules Facet				
48. Concerned about right and wrong	3.10	.77	−0.48	−0.34
41. Wants everyone to follow rules	2.87	.86	−0.37	−0.52
7. Would feel guilty if broke a law	3.62	.67	−1.82	2.95
5. Tries to do excellent work	3.37	.73	−0.84	−0.15

Table 2

Prosociality Scale Item Correlations and Intraclass Correlations by Zygosity.

Item	42.	19.	4.	34.	37.	21.	17.	43.	48.	41.	7.	5.
42.	--											
19.	.53	--										
4.	.44	.34	--									
34.	.46	.43	.42	--								
37.	.49	.47	.34	.40	--							
21.	.30	.42	.13	.20	.33	--						
17.	.35	.30	.41	.27	.24	.10	--					
43.	.36	.25	.29	.24	.27	.22	.19	--				
48.	.38	.33	.20	.25	.35	.17	.17	.26	--			
41.	.36	.24	.14	.15	.26	.15	.11	.24	.44	--		
7.	.29	.29	.20	.21	.27	.22	.14	.17	.32	.26	--	
5.	.27	.21	.31	.19	.23	.11	.19	.33	.28	.29	.25	--
r _{MZ}	.80	.85	.75	.75	.89	.87	.86	.84	.93	.82	.88	.60
r _{DZ}	.52	.56	.39	.57	.67	.73	.56	.56	.70	.60	.56	.35

Note. Intraclass correlations are presented in the bottom two rows. All correlations are significant at $p < 0.01$. Item 42 = cares about other's feelings; 19 = concerned about others who are hurt; 4 = spontaneously helps others; 34 = cheers up others when sad; 37 = feels sorry for kids who get picked on; 21 = would be upset if saw animal get hurt; 17 = spontaneously shares; 43 = enjoys learning interesting things; 48 = concerned about right and wrong; 41 = wants everyone to follow rules; 7 = would feel guilty if broke a law; 5 = tries to do excellent work.