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Gratitude's role in adolescent antisocial and prosocial behavior: A 4-year longitudinal investigation

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ABSTRACT

Is gratitude developmentally related to improvements in social behavior? This study examined 566 adolescents (51.6% female, *M* age = 11.95 years at baseline, 68.0% White, 11.0% African-American, 9.9% Asian-American, 1.9% Hispanic, 8.8% 'Other') from middle school to high school for 4 years. Controlling for social desirability, age, SES, and gender, gratitude growth predicted decreases in antisocial behavior over 4 years, and life satisfaction growth marginally mediated this relation. Further, gratitude growth predicted increases in prosocial behavior over 4 years, but life satisfaction did not mediate this relation. Reverse models were also examined. Antisocial behavior growth predicted gratitude change, which was mediated by life satisfaction growth. Prosocial behavior growth predicted gratitude change, but was not mediated by life satisfaction growth. Finally, gratitude growth predicted family support, trust, and intentional self-regulation at the 4 year timepoint, and it predicted empathy with marginal significance. Implications for theory and educational applications are discussed.

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Gratitude and generosity seem to go hand in hand. When people are grateful for a benefit, it's common for them to express thanks or reciprocate kindness to the benefactor. Indeed, gratitude has long regarded been regarded as a moral emotion. For instance, Simmel considered it a 'sentiment which most immediately and directly prompts us to reward' (Smith, 1976, p. 68). Research supports this notion with adults, but not youth. Further, research has not examined the effects of gratitude and kindness over time. This study addresses both issues.

We consider social behavior in a broad, general sense rather than in a context-specific manner. Specifically, we define prosocial behavior as benefiting others and antisocial behavior causing physical or psychological harm to others (Eisenberg, 1982). Because prosocial and antisocial behaviors are conceptually distinct and not just opposite ends of a single dimension (Krueger, Hicks, & McGue, 2001), we examine each separately for unique correlates.

Empirically, McCullough, Kilpatrick, Emmons, and Larson (2001) first examined gratitude as a moral emotion with prosocial effects. Proposing that gratitude has three moral functions, their review of the literature supported a 'moral barometer' function (i.e. alerts individuals to valuable relationships) and 'moral reinforcer' function (i.e. reinforces the generosity of benefactors). Though

they did not find support for a third proposed function of gratitude – as a 'moral motive' that motivates prosocial behavior – subsequent experiments demonstrated that it motivates beneficiaries to behave kindly toward benefactors and other people too (Bartlett & DeSteno, 2006; Tsang, 2006, 2007). Thus, gratitude's effect on prosocial behavior involves more than reciprocity norms and appears to motivate a prosocial orientation (McCullough, Kimeldorf, & Cohen, 2008).

A recent meta-analysis sought to clarify how gratitude is associated with prosociality by synthesizing the results of 91 studies. The study found evidence to support a significant and reciprocal positive relation between gratitude and prosocial behavior ($r = 0.37$) (Ma, Tunney, & Ferguson, 2017). These researchers found that gratitude is associated with receiving help from another person you have helped (downstream indirect reciprocity), returning favors (direct reciprocity), and helping another because you have been helped (upstream indirect reciprocity). Thus, gratitude and prosocial behavior are positively and reciprocally related.

Gratitude and prosocial behavior among youth

Gratitude serves as a moral barometer and a moral motive for youth, too. Froh et al. (2014) found that the benefit

appraisals enabling grateful thinking (i.e. personal value of benefits, cost to benefactors, and prosocial intention of benefactors) can be supported in 8 to 11 year-olds, suggesting that sensitizing children to beneficial relationships in their lives promotes their gratitude. Specifically, compared to an attention-control condition, a grateful thinking intervention resulted in increased gratitude, positive affect, and expressing thanks (as measured by written thank you notes to the PTA) 5 months later. Thus, gratitude depends on the social perceptions of benefits and benefactors for youth too. With respect to gratitude serving a moral motive among, another study found that gratitude was associated with greater social integration (i.e. motivation to help others and contribute to society) in 10–14 year-olds 6 months later via its associations with increased life satisfaction and prosocial behavior toward peers at 3 months (Froh, Bono, & Emmons, 2010). Moreover, social integration predicted increased gratitude 6 months later via its association with greater life satisfaction at 3 months.

Thus, the above two studies suggest that gratitude helps youth feel buoyed by positive social exchanges with others (moral barometer) and broadly motivates their prosocial behavior (moral motive). Moreover, gratitude appears to mutually-reinforce prosocial behavior during early adolescence – an indication that, developmentally, gratitude may involve internalizing a broad prosocial orientation that brings life satisfaction (Froh et al., 2010). Notably, while other research has found a positive correlation between gratitude and prosocial behavior among elementary students (Tian, Du, & Huebner, 2015) in addition to high school and undergraduate students (Wangwan, 2014), research has yet to examine gratitude and prosocial behavior longitudinally within a developmental framework.

How gratitude promotes positive social behavior

Research with adults demonstrates that gratitude causes the person experiencing gratitude to behave more prosocially (Bartlett & DeSteno, 2006; Tsang, 2006). Gratitude is also good for more than just the person experiencing gratitude. The *find-remind-and-bind* theory shows that gratitude serves an evolutionary function whereby individuals strengthen relationships with responsive social partners (Algoe, Haidt, & Gable, 2008). Accordingly, gratitude signals communal relationship norms and fuels upward spirals of mutually responsive behaviors between recipients and benefactors, making gratitude important for the formation and maintenance of high quality social relationships (Algoe, 2012). This is why expressing gratitude helps recipients feel socially valued – which in turn increases compassion, empathy, and prosocial behavior (Grant & Gino, 2010) – and

why gratitude stimulates a greater sense of community for everyone involved in positive social exchanges (Algoe, Fredrickson, & Gable, 2013; Lambert & Fincham, 2011).

On the other hand, social life does not just involve prosocial motivation, and individuals must manage selfish or antisocial motivations in interpersonal interactions too. Research on aggression has focused more on the role of negative emotions (DeWall, Anderson, & Bushman, 2011) than of positive emotions, like empathy and generosity, which may reduce aggression. When people are grateful, they are sensitized to the thoughts, emotions, and motives driving another's positive actions and should, therefore, be focused not on self-interest or harming others but on understanding and mirroring other's kindness. So, does gratitude also decrease aggressive social behavior? DeWall, Lambert, Pond, Kashdan, and Fincham (2012) tested this. Employing various designs (i.e. cross-sectional, longitudinal, experience sampling, and experimental), these researchers found that gratitude is also linked to lower aggression among individuals who experience gratitude and that this effect is due to gratitude's promotion of empathy.

Virtually all the research linking gratitude to prosocial and antisocial behavior has used adult samples to examine immediate effects of gratitude on social behavior. Developmentally, however, such relations may involve different processes. Over time, gratitude and social behavior may involve other factors that are associated with family life and qualities of psychosocial development. The developmental picture of gratitude's links to prosocial and antisocial behavior are poorly understood.

Factors related to gratitude and prosocial behavior in adolescent development

Does gratitude lead to the development of prosocial behavior, or vice-a-versa, among youth? And does this include the reciprocal effect between gratitude and antisocial behavior found among adults (i.e. by DeWall, Lambert, et al., 2011)? Similarly, is gratitude linked with more supportive relationships among youth, as found with adults (Algoe, 2012)? And what explains these longitudinal associations? In addition to hypothesizing that gratitude development contributes to increases in prosocial behavior and decreases in antisocial behavior, this study also hypothesizes that one variable accounting for these longitudinal associations is life satisfaction.

Life satisfaction

While research indicates that gratitude and social behavior have a mutual longitudinal relation during adolescence, an important question remains. Why? Empirically, gratitude is strongly linked to life satisfaction (see Wood, Froh,

& Geraghty, 2010 for a review), and among adolescents too (Froh, Yurkewicz, & Kashdan, 2009; Sun & Kong, 2013). Because it supports so many adaptive psychological and social outcomes, life satisfaction is considered a major indicator of positive youth development (Park, 2004). For instance, it has been associated with prosocial behavior in youth (Gilman, 2001) and maladaptive relationships with others (Furr & Funder, 1998).

Attachment related factors: Parental support and trust

Though experimental manipulations of gratitude produce increased prosocial behavior (Bartlett & DeSteno, 2006; Tsang, 2006), these studies do not consider the possibility that individuals could differ in their experience of interpersonal gratitude depending on whether they tend to trust or mistrust benefactors' intentions. Mikulincer and Shaver (2010) hypothesized that securely-attached individuals would experience gratitude positively and exhibit prosocial behavior as a result, whereas insecurely-attached individuals would experience gratitude as threatening to their personal freedom and thereby be less prone to prosocial behavior. Though unpublished, this is the only study we know of examining how gratitude may influence prosocial behavior in the context of development.

Specifically, in one study Mikulincer and Shaver (2010) asked participants, whose attachment style they assessed previously, to write about sources of gratitude (treatment condition) versus a typical day (control condition). Afterwards, participants had a chance to help a researcher on an allegedly independent study by completing a cognitively-taxing survey. Time spent on the survey represented the dependent variable of prosocial behavior. Results showed that participants in the gratitude condition, compared to those in the control condition, helped more in the subsequent task; but importantly, gratitude's effect on prosocial behavior was stronger for participants lower in anxious-avoidant attachment style. Next Mikulincer and Shaver (2010) examined whether experimentally manipulating attachment security would also moderate gratitude's association with prosocial behavior. They first primed participants with different relationships (neutral vs. secure vs. avoidant vs. anxious attachment styles), then used Tsang's (2006) resource distribution task to randomly assign each priming group to receive a gratitude or chance condition – receiving a larger portion of money from a confederate intentionally or by chance after receiving a smaller portion. Mikulincer and Shaver found that participants in the gratitude, compared to the chance, condition gave the confederate more money in a subsequent round of the task; however, only for those primed with neutral or securely-attached relationships.

The above research indicates that gratitude's effect on prosocial behavior depends on attachment style and suggests that other characteristics, such as perceptions of parents' social behavior and trust, may be related to gratitude and prosocial behavior. Other research supports a longitudinal link between positive parental characteristics and prosociality in adolescents (Michalik et al., 2007). Evidence also supports a negative association between adolescents' relationships with their parents and their anti-social behavior (Deković, Wissink, & Meijer, 2004). Indeed, parental support is a robust predictor of adolescents' life satisfaction (Suldo & Huebner, 2004). Less is known about trust's relationships with gratitude and prosociality. While research finds trust linked to gratitude among adults (Dunn & Schweitzer, 2005) and prosocial behavior among children longitudinally (Malti et al., 2015), the relation between trust and gratitude among youth is less understood.

Social connection factors: Empathy and social support

Empathy, an emotion elicited by and congruent with another person's state, is a key skill related to prosocial development (Eisenberg, Miller, Shell, McNalley, & et al, 1991). Empathic adolescents are more prosocial (Eisenberg & Miller, 1987) and less aggressive (Miller & Eisenberg, 1988). Empathy has also been linked to gratitude (McCullough et al., 2001). But whether such relations hold among youth or longitudinally is unknown empirically.

Another factor that may be related with both gratitude and prosocial behavior is social support. After all, if gratitude is a response to the kindness of others, then feeling supported by parents or friends should provide natural sources of gratitude. While there is ample support for this relationship among adults (Wood et al., 2010), evidence with youth is correlational and scant. Gratitude is associated with supportive social relationships among adolescents (Froh, Sefick, & Emmons, 2008; Froh et al., 2009), and recent research shows that perceptions of social support from parents contribute uniquely to early adolescents' gratitude, after controlling for demographic and personality variables (Reckart, Huebner, Hills, & Valois, 2017). However, whether these relations hold longitudinally remains untested.

Life management factor: Intentional self-regulation

Does gratitude motivate self-improvement? Researchers theorize that gratitude supports coping with challenges (Nelson & Lyubomirsky, 2016), and evidence indicates that it motivates optimism about achieving positive outcomes (McCullough et al., 2001) and exercising (Emmons

& McCullough, 2003). Gratitude and social integration, a broad orientation to use one's strengths to help others and society, are mutually related (Froh et al., 2010). Intentional self-regulation is the critical life management skill that enables individuals to harmonize demands and resources in their environments with their personal goals and to function better (Gestsdottir & Lerner, 2008). A key challenge for adolescents is setting goals and strategizing to reach them. Because gratitude improves responsiveness to supportive others and supports self-improvement, over time it should help youth improve their capacity to reach important goals. Though intentional self-regulation fosters positive youth development (Lerner et al., 2005), its relation to gratitude development is unknown.

Research questions in the current study

This study examines whether gratitude and prosocial and antisocial behavior are mutually related over a critical 4 year-period when identity starts taking shape during early adolescence (ages 10–14) by analyzing the associations between changes in these behaviors longitudinally. Additionally, it tests whether changes in life satisfaction help account for any longitudinal association that emerge. Finally, to better understand the associations between gratitude and social behavior in development, this study examines whether changes in gratitude, in prosocial behavior, and in antisocial behavior are associated with perceived support from parents, general trust toward others, empathy, perceived support from friends, and intentional self-regulation.

Method

Participants

Participants at timepoint 1 were 566 adolescents (51.6% female, mean age = 11.95 years). Regarding school grade, 29.3% were in 6th grade, 33.9% in 7th, and 36.9% in 8th. Regarding ethnicity, 68.0% were White, 11.0% were African-American, 9.9% were Asian-American, 1.9% were Hispanic, and 8.8% reported 'Other'. Socioeconomic status (SES) was measured as the average of mother and father's education and occupation levels.

All adolescents were enrolled in the same middle school (grades 6–8) at timepoint 1 and then the same high school (grades 9–12) later on. The public school district was in an upper-middle class city in New York with median household income of \$115,440 for a four-person family. Sample size at timepoint 1 greatly exceeded the 250 adolescents necessary for statistical power greater than 0.80 to detect a standardized regression coefficient of ± 0.20 or larger (Schönbrodt & Perugini, 2013). Passive consent was approved by the IRB to recruit from the schools and

no parents or students refused to participate. Therefore, to our knowledge all 566 adolescents at the middle school participated.

Procedure

All adolescents were given questionnaire batteries in their classrooms during regular school hours. This occurred at 4 timepoints during a 4-year period. Questionnaire batteries included some similar questionnaires across timepoints and some unique questionnaires at specific timepoints. We measured time by months. Timepoint 1 (T1) was at 0 months (i.e. start of the study), timepoint 2 (T2) at 3 months, timepoint 3 (T3) at 6 months, and timepoint 4 (T4) at 48 months.

Measures

Shortened versions of some scales at T4 were used to reduce fatigue on participants. To increase consistency of measurement across time, scale composites comprised of only items asked at all timepoints. Coefficient alphas were calculated with listwise deletion as imputation of missing data occurred at the composite level.

Gratitude

We created gratitude composite scores by taking the mean of the *Gratitude Questionnaire-6* (GQ-6; Froh et al., 2011) and *Gratitude Adjective Checklist* (GAC; McCullough, Emmons, & Tsang, 2002). On the GQ-6, participants rated their agreement (1 = strongly disagree; 7 = strongly agree) with the 5 items recommended by Froh et al. (2011) – for example, 'I have so much to be thankful for'. On the GAC, participants rated the amount they experienced feeling 'Grateful', 'Thankful', and 'Appreciative' in general (1 = Not at all; 5 = Extremely). Participants completed these questionnaires at T1, T3, and T4, each with excellent internal consistency (all alphas ranged between 0.72 and 0.91). To account for different scaling, GQ-6 and GAC scores were standardized across time (rather than within each timepoint) before averaging them together to enable growth curve modeling of mean change over time. Composite gratitude scores had excellent internal consistency across timepoints (T1 $\alpha = 0.73$; T3 $\alpha = 0.82$; T4 $\alpha = 0.72$).

Prosocial and antisocial behaviors

We created prosocial and antisocial behavior composite scores with the Child Social Behavior Questionnaire (CSBQ; Warden, Cheyne, Christie, Fitzpatrick, & Reid, 2003). Participants rated how often (1 = never, 2 = sometimes, and 3 = often) they engaged in 5 prosocial behaviors (e.g. 'Helped another kid in your class with their work?', 'Stuck up for another kid who was in trouble?') and 6 antisocial

behaviors ('Made a kid upset because were mean to them?', 'Threatened to hurt another kid in your school to get your way?'). All composite scores were internally consistent across timepoints (Prosocial: T2 $\alpha = 0.71$; T3 $\alpha = 0.74$; T4 $\alpha = 0.73$; Antisocial: T2 $\alpha = 0.80$; T3 $\alpha = 0.79$; T4 $\alpha = 0.75$).

Life satisfaction

Life Satisfaction composite scores were created with the Brief Multidimensional Students' Satisfaction with Life Scale (BMSLSS; Seligson, Huebner, & Valois, 2003). Participants rated their satisfaction with 5 different aspects of their life (i.e. family, friends, school, self, and community) on a 7-point scale (1 = terrible; 7 = delighted). Composite scores were internally consistent across timepoints (T1 $\alpha = 0.80$; T3 $\alpha = 0.72$; T4 $\alpha = 0.77$).

Family and friend support

Family and friend support composite scores were created from the Multidimensional Scale of Perceived Social Support (Zimet, Dahlem, Zimet, & Farley, 1988) measured only at T4. Participants rated how they 'feel about such experiences in the last month?' on a 6-point scale (1 = none of the time; 6 = all of the time). We used 2 *Family* subscale items ('I get the emotional help and support I need from my family'; 'My family is willing to help me make decisions') and 5 *Friend* subscale items (e.g. 'I can count on friends when things go wrong'). Both composites were internally consistent (Family: T4 $\alpha = 0.70$; Friend: T4 $\alpha = 0.84$).

Trust, empathy, and intentional self-regulation

These 3 constructs were also only measured at T4. Participants rated 'how much statements describe [them] personally' on 5-point scales (1 = strongly disagree; 5 = strongly agree). *Trust* was measured using 2 items from Eisenberger, Lynch, Aselage, and Rohdieck's (2004) Expectational Benevolence subscale ('If you act in good faith with people, almost all of them will reciprocate with fairness towards you'; 'Most people are basically good and kind'). *Empathy* was measured using three items from the California Healthy Kids Survey (Constantine & Benard, 2001) ('I feel bad when someone gets their feelings hurt'; 'I try to understand what people go through';

'I try to understand what other people feel and think'). *Intentional self-regulation* was measured using items from the Selection, Optimization, Compensation model as a single factor (SOC; Geldhof et al., 2015). Compensation items were excluded due to inter-item correlations with the selection and optimization items close to zero. Three goal selection items (e.g. 'When I decide on a plan, I stick to it') and three goal optimization items (e.g. 'I keep trying to find the best possible way to succeed at a goal') were averaged together. All three composite scores were internally consistent (Trust: T4 $\alpha = 0.77$; Empathy: T4 $\alpha = 0.86$; Self-regulation: T4 $\alpha = 0.81$).

Social desirability

Social desirability composite scores were created from the Marlowe-Crowne Social Desirability Scale X2 short form (Fischer & Fick, 1993). T1 composite scores showed adequate internal consistency for dichotomous items ($\alpha = 0.51$).

Results

Missing Data

Of the 566 participants at T1, complete cases were available for 89% at T2 ($n = 501$), 62% at T3 ($n = 349$), and 48% at T4 ($n = 269$). A small number of participants dropped out of the study ($n = 10$), but most participants only missed one timepoint. Table 1 presents the absolute and relative frequency of participants with observed data across timepoints. The columns of the table are the different composite scores used in the analyses. The additional outcomes only measured at T4 had absolute frequencies ranging from 276 (48.8%) to 288 (50.1%).

Missing data were handled with multiple imputation using predictive mean-matching (PMM) in the R statistical package 'mice' (van Buuren & Groothuis-Oudshoorn, 2011). In contrast to listwise deletion, multiple imputation minimized parameter estimate bias and maximizes statistical power (McKnight, McKnight, Sidani, & Figueredo, 2007). We included 29 auxiliary variables and created 30 imputed datasets, which is sufficient given the fraction of missing data (Graham, Olchowski, & Gilreath, 2007). Diagnostics

Table 1. Observed data by timepoint and total score.

Timepoint	Gratitude		Prosocial		Antisocial		Life Satisfaction	
	Abs Freq	Rel Freq, %	Abs Freq	Rel Freq, %	Abs Freq	Rel Freq, %	Abs Freq	Rel Freq, %
T1 – 0 months	566	100.0	NA	NA	NA	NA	562	99.3
T2 – 3 months	NA	NA	502	88.7	502	88.7	410	72.4
T3 – 6 months	391	69.1	410	72.4	411	72.6	434	76.7
T4 – 4 years	437	77.2	430	76.0	430	76.0	NA	NA
All Timepoints	306	54.1	287	50.7	288	50.9	315	55.7

Notes: Abs = Absolute; Rel = Relative; NA = not measured at that timepoint; 'All timepoints' frequencies were the observed data for the growth curves.

for all imputed variables were assessed to ensure convergence of the Markov Chain Monte Carlo algorithm. We used Rubin's (1987) formulas to calculate standard errors with the R statistical package 'mitools' which incorporates both traditional sampling error and between-data-set variability in parameter estimates (Lumley, 2014).

Growth curve creation

Individual growth curves for gratitude, life satisfaction, prosocial behavior, and antisocial behavior were created from each variable's total scores at three timepoints. Time in months was entered as a predictor of gratitude and life satisfaction at T1, T3, and T4 (i.e. 0, 6, and 48 months) and prosocial and antisocial behavior at T2, T3, and T4 (i.e. 3, 6, and 48 months). Importantly, growth curves were estimated *prior to* multiple imputation to allow for the 29 auxiliary variables to more accurately impute growth curves for participants without observed data at all three timepoints. All growth curves were estimated with individual ordinary least squares (OLS) regressions, due to its flexibility in modeling the large positive skew in antisocial behaviors, as multi-level modeling individual bayes estimates assume normal distributions.

In addition to growth curves, we created two raw difference scores. They were change in gratitude and life satisfaction from T3 to T4 which allowed for temporal precedence when testing reciprocal effects between gratitude, life satisfaction, and social behavior. To prevent confusion, the gratitude growth curves across T1, T3, and T4 are labeled 'gratitude growth' and the gratitude difference scores from T3 and T4 are labeled 'gratitude change'. The same was done for life satisfaction.

Average growth across time

Only life satisfaction showed significant change across three time points. The average life satisfaction growth was a 0.546 *decrease* in standard deviations of life satisfaction per year ($p < 0.001$; $SD = 0.081$). Average gratitude growth (slope) was a 0.004 *increase* in standard deviations of gratitude per year ($p = 0.804$; $SD = 0.253$). Average prosocial behavior growth was a 0.021 *decrease* in standard deviations of prosocial behaviors over time ($p = 0.446$; $SD = 0.303$). Average antisocial behavior growth was a 0.005 *increase* in standard deviations of antisocial behaviors over time ($p = 0.820$; $SD = 0.287$).

Gratitude growth predicting social behavior growth

We conducted a series of multiple regressions to test whether gratitude growth predicted prosocial and antisocial behavior growth. Importantly, gratitude was measured

at T1, T3, and T4, while prosocial and antisocial behavior was measured at T2, T3, T4, to give temporal precedence between gratitude and social behavior. We also tested whether life satisfaction growth mediated these longitudinal effects. In each model, we controlled for social desirability, age, SES, and gender to ensure effects were not simply due to survey response tendencies or demographic differences (Heintzelman, Trent, & King, 2015). Table 2 presents the results for both prosocial and antisocial behavior. In Table 2, the first two sections are the total effects of gratitude growth on social behavior growth (c paths), the next section is the effect of gratitude growth on life satisfaction growth (a path), and the last two sections are the effect of life satisfaction growth on social behavior growth (b paths).

The two total effects were significant and depicted in Figure 1 with their associated bivariate scatter plots. No evidence for mediation was found as the Sobel test¹ showed no significant mediation through life satisfaction growth (standardized indirect effect = 0.009; $z = 0.18$; $p = 0.861$; mediation = 7.50%). Similarly, the total effect of gratitude growth on antisocial behavior growth was significant, but the Sobel test showed that life satisfaction growth mediated this relation with marginal significance (standardized indirect effect = -0.106; $z = -1.76$; $p = 0.079$; mediation = 79.1%). Gratitude and life satisfaction growth are clearly linked, but life satisfaction growth does not predict prosocial behavior growth and only marginally predicts antisocial growth.

Social behavior growth predicting gratitude change

We then tested the reverse direction of the previous effects, whether prosocial and antisocial behavior growth predicted changes in gratitude. Again, life satisfaction was tested as a mediator. Importantly, these analyses use gratitude change and life satisfaction change from T3 to T4 to maintain temporal precedence from prosocial and antisocial behavior. Table 3 presents the results for both prosocial and antisocial behavior. In Table 3, the first two sections are the total effects of social behavior growth on gratitude change (c paths), the next two sections are the effect of social behavior growth on life satisfaction change (a paths), and the last two sections are the effect of life satisfaction change on gratitude change (b paths).

We found reciprocal effects of social behavior growth on gratitude change and one significant mediation effect. The total effect of prosocial behavior growth on gratitude change was significant; however, the Sobel test showed no significant mediation through life satisfaction growth (standardized product = 0.046; $z = 1.60$; $p = 0.109$; mediation = 33.1%). The total effect of antisocial behavior growth on gratitude change was significant, and the Sobel

Table 2. Prosocial and antisocial behavior growth multiple regression results.

	Std. β	95% CI lower	95% CI upper	FMI
Prosocial growth: 'c path'				
$R^2 = 0.037$				
Gratitude growth	0.125*	0.018	0.232	0.407
Social desirability	-0.007	-0.113	0.099	0.403
Age	0.097	-0.029	0.223	0.586
SES	-0.007	-0.149	0.135	0.667
Gender (girl = 1)	-0.048	-0.168	0.073	0.54
Antisocial growth: 'c path'				
$R^2 = 0.046$				
Gratitude growth	-0.136**	-0.24	-0.032	0.369
Social desirability	-0.054	-0.16	0.051	0.418
Age	-0.097	-0.205	0.012	0.443
SES	0.03	-0.11	0.169	0.652
Gender (girl = 1)	-0.075	-0.176	0.026	0.327
Life satisfaction growth: 'a path'				
$R^2 = 0.526$				
Gratitude growth	0.709***	0.644	0.774	0.291
Social desirability	-0.082*	-0.152	-0.012	0.327
Age	-0.002	-0.068	0.065	0.247
SES	-0.065	-0.14	0.009	0.402
Gender (girl = 1)	0.091*	0.027	0.154	0.189
Prosocial growth: 'b path'				
$R^2 = 0.038$				
Life satisfaction growth	0.013	-0.135	0.161	0.361
Gratitude growth	0.116	-0.034	0.265	0.383
Social desirability	-0.005	-0.112	0.101	0.402
Age	0.097	-0.029	0.223	0.586
SES	-0.006	-0.149	0.137	0.667
Gender (girl = 1)	-0.049	-0.169	0.072	0.532
Antisocial growth: 'b path'				
$R^2 = 0.058$				
Life satisfaction growth	-0.15	-0.317	0.016	0.522
Gratitude growth	-0.029	-0.184	0.126	0.431
Social desirability	-0.067	-0.174	0.04	0.433
Age	-0.097	-0.204	0.011	0.439
SES	0.019	-0.122	0.161	0.669

Note: Std. β = standardized β weight; CI = confidence interval; FMI = fraction of missing information. The first two regressions represent the total effects of gratitude growth predicting social behavior growth and are modeled in Figure 1.

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

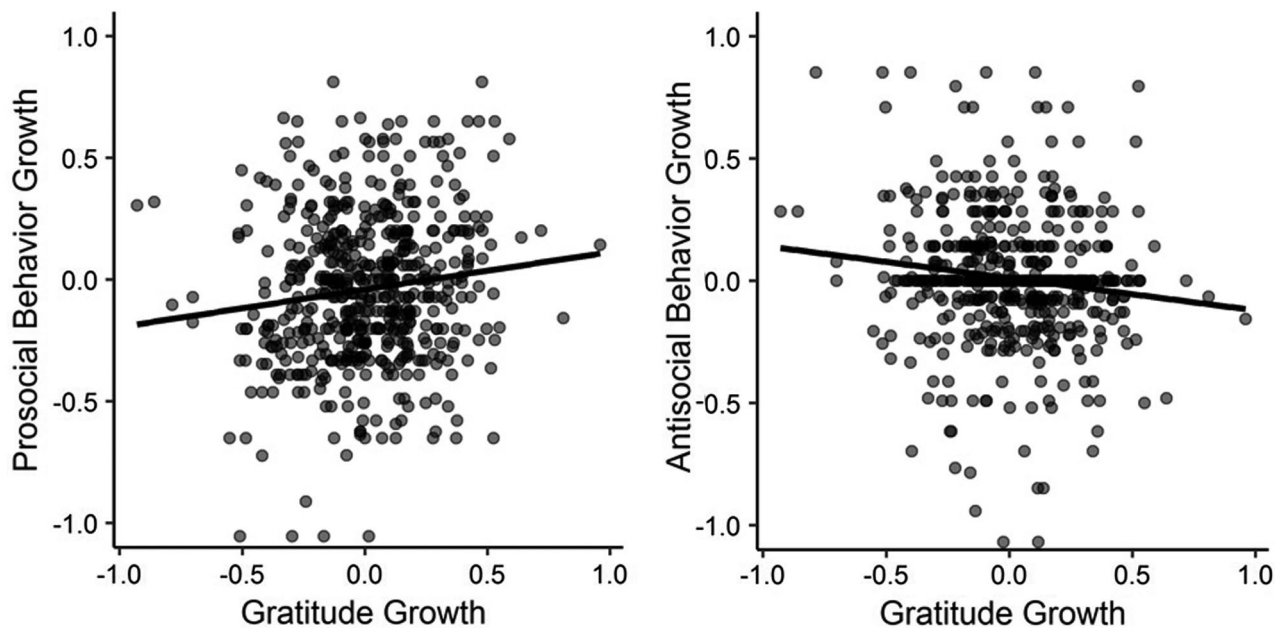


Figure 1. Scatter plot of gratitude growth curves predicting prosocial and antisocial behavior growth curves. One imputed dataset – out of the 30 used – is graphed, which had bivariate coefficients similar to the aggregated results.

Table 3. Gratitude change multiple regression results.

	Std. β	95% CI lower	95% CI upper	FMI
Gratitude change: 'c path'				
$R^2 = 0.033$				
Prosocial growth	0.139*	0.025	0.253	0.497
Social desirability	-0.032	-0.145	0.081	0.464
Age	0.018	-0.09	0.126	0.416
SES	-0.055	-0.172	0.061	0.508
Gender (girl = 1)	-0.038	-0.15	0.074	0.464
Gratitude change: 'c path'				
$R^2 = 0.032$				
Antisocial growth	-0.135*	-0.24	-0.031	0.405
Social desirability	-0.04	-0.154	0.073	0.467
Age	0.018	-0.093	0.128	0.449
SES	-0.053	-0.171	0.066	0.522
Gender (girl = 1)	-0.055	-0.169	0.059	0.481
Life satisfaction change: 'a path'				
$R^2 = 0.083$				
Prosocial growth	0.101	-0.02	0.223	0.575
Social desirability	0	-0.111	0.111	0.483
Age	0.002	-0.108	0.113	0.469
SES	-0.196**	-0.32	-0.072	0.587
Gender (girl = 1)	-0.153**	-0.27	-0.036	0.522
Life satisfaction change: 'a path'				
$R^2 = 0.104$				
Antisocial growth	-0.176*	-0.312	-0.041	0.653
Social desirability	-0.009	-0.119	0.101	0.484
Age	-0.005	-0.118	0.109	0.509
SES	-0.192**	-0.32	-0.064	0.624
Gender (girl = 1)	-0.171**	-0.292	-0.051	0.555
Gratitude change: 'b path'				
$R^2 = 0.222$				
Life satisfaction change	0.453***	0.352	0.554	0.524
Prosocial growth	0.093	-0.014	0.2	0.522
Social desirability	-0.032	-0.133	0.068	0.452
Age	0.017	-0.076	0.109	0.357
SES	0.033	-0.084	0.151	0.588
Gender (girl = 1)	0.032	-0.071	0.136	0.478
Gratitude change: 'b path'				
$R^2 = 0.058$				
Life satisfaction change	0.453***	0.347	0.56	0.558
Antisocial growth	-0.055	-0.168	0.057	0.556
Social desirability	-0.036	-0.138	0.066	0.466
Age	0.019	-0.073	0.112	0.358
SES	0.034	-0.085	0.153	0.594
Gender (girl = 1)	0.024	-0.085	0.132	0.514

Note: Std. β = standardized β weight; CI = confidence interval; FMI = fraction of missing information.

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

test showed significant mediation through life satisfaction growth (standardized product = -0.080 ; $z = -2.47$; $p = 0.014$; mediation = 58.9%). Again, gratitude and life satisfaction growth are clearly linked, but life satisfaction growth only mediates antisocial behavior's effect, and not prosocial behavior's effect, on gratitude change.

Gratitude and social behavior growth predicting social outcomes

To obtain a fuller picture of how gratitude growth, prosocial behavior growth, and antisocial behavior growth facilitate social growth in the lives of adolescents we examined correlations between growth over the 4-year period and various social outcomes (see Table 4). Only gratitude growth predicted any indicators of social growth at T4 – specifically, family support, trust, and intentional

self-regulation. Empathy was also marginally related with gratitude growth.

Discussion

The purpose of this longitudinal study was to examine whether gratitude, prosocial behavior, and antisocial behavior are mutually related during adolescence (i.e. from ages 10–14 to ages 14–18). Previous research has identified gratitude's positive and reinforcing relation with prosocial behavior without evaluating this relation longitudinally (Tian et al., 2015; Wangwan, 2014) beyond 6-months (Froh et al., 2010). This study goes beyond previous work by extending the timeframe to 4 years and including antisocial behavior within a developmental framework. This was done by analyzing the associations between changes in prosocial and antisocial behaviors

Table 4. Time 4 correlation results.

Time 4 outcome	Gratitude growth	95% CI	FMI	Prosocial growth	95% CI	FMI	Antisocial growth	95% CI	FMI
Family social support	0.161**	(-0.043, 0.279)	0.525	-0.001	(-0.131, 0.130)	0.589	-0.026	(-0.156, 0.104)	0.619
Friend social support	0.079	(-0.041, 0.198)	0.527	0.1	(-0.017, 0.217)	0.505	0.074	(-0.035, 0.184)	0.436
Trust	0.134*	(0.000, 0.269)	0.628	0.011	(-0.129, 0.150)	0.648	0.012	(-0.139, 0.162)	0.704
Empathy	0.035	(-0.099, 0.169)	0.617	0.139 [†]	(-0.007, 0.285)	0.68	0.013	(-0.123, 0.150)	0.632
Intentional self-regulation	0.136*	(0.019, 0.253)	0.515	0.112	(-0.024, 0.249)	0.646	-0.064	(-0.194, 0.066)	0.618

Note: CI = confidence interval; FMI = fraction of missing information.

[†] $p < 0.10$.

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

throughout the course of a critical 4 year-period in development when social identity takes root. Furthermore, we tested whether changes in life satisfaction help account for any longitudinal links that emerge between gratitude, prosocial behavior, and antisocial behavior. Aiming to better understand the links between gratitude and social behavior development, we also examined whether changes in gratitude, prosocial behavior, and antisocial behavior are associated with perceived support from parents and friends, general trust toward others, empathy, and intentional self-regulation.

The results of this study demonstrate that change in gratitude predicted change in prosocial behavior over time. This is consistent with past research showing that adults induced to feel grateful are more likely to behave prosocially (Bartlett & DeSteno, 2006; Tsang, 2006, 2007) while showing that the prosocial behavior of youth is not just an immediate effect motivated by gratitude, but an effect with longer term consequences for social life. This study extends research indicating that grateful youth are more prosocial, as found using cross-sectional (Froh et al., 2009) and shorter-term longitudinal designs (Froh et al., 2010), by showing that the longitudinal effects of gratitude and prosociality are reciprocal. It also corroborates the notion that gratitude development involves self-improvement (Nelson & Lyubomirsky, 2016) during adolescence via association with an orientation for trusting others and approaching future goals.

Furthermore, the results of this study also demonstrate that gratitude development predicted reduced antisocial behavior change over time, supporting the findings by DeWall, Lambert, et al. (2011) that grateful people are less aggressive and that states of gratitude are incompatible with aggression. This finding, we believe, is significant. Antisocial behaviors are disruptive acts of covert or overt hostility and intentional aggression toward others – including violations of social rules, defiance of authority, deceitfulness, theft, and a reckless disregard for self and others. Left unchecked, these coercive behavior patterns can persist and worsen over time, becoming a chronic behavioral disorder in youth (Hair, Park, Ling, & Moore, 2009). Therefore, given our study's findings, fostering gratitude

should be considered a viable option for addressing antisocial behavior in adolescents.

The current study also found that gratitude development predicted increases in life satisfaction over time, which is consistent with previous research (Froh et al., 2008; Sun & Kong, 2013). However, life satisfaction was not longitudinally associated with increases in prosocial behavior, which counters evidence that life satisfaction is linked to constructive social behavior (Furr & Funder, 1998; Gilman, 2001) and provides no support for our mediation hypothesis. Thus, other mechanisms account for the longitudinal relation between gratitude and prosocial behavior.

Instead, we found evidence to support the notion that change in life satisfaction accounts for the negative mutual associations of gratitude and antisocial behavior over time. This suggests that the fulfillment from being grateful may help undercut motives for acting antisocially (i.e. garnering attention or validation) among adolescents. Researchers, however, should test this notion.

To gain a better understanding of other constructs related to longitudinal changes in gratitude, prosocial behavior, and antisocial behavior in adolescents, we found that gratitude development was positively related with family social support, general trust, intentional self-regulation, and possibly empathy 4 years later. Perceived social support from parents was the most strongly correlated with gratitude development among these constructs, which corroborates recent evidence that perceived support from parents contributes uniquely to differences in gratitude among early adolescents (Reckart et al., 2017). Further, these findings support our hypotheses that gratitude development would be related with supportive and secure relationships (Mikulincer & Shaver, 2010; Wood et al., 2010) and executive strategies for adapting to environmental challenges and pursuing goals (Lerner et al., 2005). This latter finding provides the best evidence to date that gratitude development is associated with a central driver of positive youth development.

Consistent with Reckart et al.'s (2017) results, we found that gratitude development was not linked to greater perceived social support from friends in our sample, which counters previous correlational findings (Froh et al., 2008,

2009). Therefore, the overall picture our study paints is that the more grateful children become during early adolescence, the more likely they are to have internalized habits of self-discipline and be ready to expand their social identity. From a psychosocial perspective, it is plausible that early adolescents, compared to later adolescents, have not yet established the level of autonomy from their parents needed to base their identity on the new social relationships emerging at this time and that connection to family support is paramount (Levitt, Weber, & Guacci, 1993).

Strengths, limitations, and future directions

The current study is unique in providing a longitudinal picture of gratitude and prosociality spanning 4 years during adolescence. Despite these contributions, the current study has some limitations. First, our sample was not representative of the US in terms of ethnicity, SES, or geographic location. Longitudinal research would benefit from more nationally representative samples that allow for analyses by subgroup to determine if effects generalize across demographics. Second, we did not include repeated measurements for some variables (family support, friend support, trust, empathy, and intentional self-regulation), and this limited our ability to detect longitudinal effects and identify social developmental processes linking gratitude, life satisfaction, and social behavior. Third, there were overlapping timepoints between our predictor, mediator, and outcome growth curves. Therefore, some of the change between these constructs may have been simultaneous rather than one after the other across different time intervals. While we established temporal precedence when possible, this cannot be guaranteed for the mediation models. It is worth noting that this study became possible because of the second author's relationship with a school district that permitted continuation of a previous study conducted at one of its middle schools; when the opportunity arose to include a 4-year follow-up survey, we included potential explanatory measures at the last timepoint. Consequently, we modeled longitudinal effects as best as possible and explored characteristics that helped explain these effects to fill a critical gap in the research.

A fourth limitation was our exclusive use of self-report data from youth. Future research should collect data from other informants (e.g. teachers, parents) or use behavioral data to identify constructs through multiple methods. This would provide a more accurate representation of the measured variables and potential determinants – especially for social behavior, which may be prone to method bias.

Future longitudinal research should explore more comprehensive models incorporating other variables central

to gratitude during adolescent development. Research on antecedents of gratitude is sparse, and empirically, a developmental theory of gratitude is lacking (Bono, Froh, & Forrett, 2014). It is, however, emerging. For instance, Reckart et al. (2017) found that extraversion and neuroticism are personality antecedents of gratitude in early adolescence and that parent and teacher support are robust environmental antecedents. They also found that stressful life events have a negative, albeit small, direct effect on gratitude and that gratitude did not buffer adolescents from stressors, which counters other research (Zheng, Fan, & Lou, 2011; Zhou & Wu, 2015). Reckart et al. suggested that youth may report lower gratitude and life satisfaction in reactions to the threats stressors pose on their valued resources. We echo their call for research to explore such comprehensive models of gratitude longitudinally. Specifically, future research should examine other psychosocial factors pertinent to adolescent functioning that may support gratitude (e.g. cognitive and emotional processes, group identity, autonomy support), consequences of gratitude (e.g. coping, resilience, bullying), and other potential moderators beyond stress. Nonetheless, our study inches toward articulating a developmental theory of gratitude.

Conclusion

Gratitude is a moral emotion with many advantages. One construct gratitude has been related to is prosocial behavior (Bartlett & DeSteno, 2006; McCullough et al., 2001; Tsang, 2006, 2007). Because gratitude promotes prosocial behavior in adults (Bartlett & DeSteno, 2006; DeSteno et al., 2010; Tsang, 2006), examining the nature of gratitude's relationship with prosocial and antisocial behavior longitudinally helped advance developmental knowledge about gratitude. By examining the mutual relations of gratitude with prosocial and antisocial behavior over time, the present study is unique in providing a developmental perspective.

This study has implications for basic research on gratitude among youth. Early adolescence (ages 12–18) is a critical period for identity development because many cognitive and emotional developments occur. With formal operational thinking emerging, early adolescents can think in relativistic ways about themselves, others, and the world (Lee, Anzures, & Freire, 2011). This is also a period of emotional complexity, when they can identify, comprehend, and express a wider range of emotions (Kang & Shaver, 2004). Major developmental tasks are to gain mastery of this more complex emotional and social life by making choices and learning strategies for achieving personal goals, fostering supportive social relationships for succeeding in these efforts, and solidifying a group

identity (Newman & Newman, 2001). The current study provides evidence that gratitude development supports early adolescents on such tasks.

Our study has implications for applied work and interventions. We examined gratitude and social behavior naturally among adolescents. But youth spend significant portions of their life becoming socialized at school. Gratitude practices applied in school settings may not only curb negative social behavior, but improve positive social behavior. With regards to the negative, antisocial behavior patterns emerge during adolescence, and such behavior can contribute to adjustment problems (e.g. decreased academic achievement and increased mental health problems) that persist into adulthood (French & Conrad, 2001). Thus, gratitude practices may help schools tackle students' conduct issues. With regards to the positive, students often learn in collaboration with teachers, peers, and with encouragement from the school community (Zins, Bloodworth, Weissberg, & Walberg, 2007); and schools that support students' socioemotional learning not only improve their social and emotional skills, but their attitudes, behavior, and academic performance too (Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011). While interventions hold promise (Froh et al., 2014), much work is needed to improve such efforts (Renshaw & Olinger Steeves, 2016). Results from our study suggest that it is worth pursuing. Youth deserve chances to become the best versions of themselves, and those versions include positively benefiting others around them, building the life management skills and motivation to achieve, and maturing into adults who contribute positively to society at large. The practice of gratitude may help youth meet key developmental challenges and establish a foundation for thriving.

Note

1. Although non-symmetrical bootstrapped confidence intervals are best practice for testing the significance of indirect effects, there is no clear way to obtain them for multiply-imputed data.

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